2024th ESPRM

European Society of Physical and Rehabilitation Medicine

ESPRM
European Society of
Physical & Rehabilitation Medicine

Slovensko zdravniško društvo
Združenje za fizikalno in rehabilitacijsko medicino
Slovenian Society for Physical and Rehabilitation Medicine

24th European Congress of Physical and Rehabilitation Medicine ESPRM

and

9th Congress of Slovenian Society for Physical and Rehabilitation Medicine

Ljubljana, Slovenia, April 23 - 27, 2024

PROCEEDINGS

24th European Congress
of Physical and Rehabilitation Medicine - ESPRM
and 9th Congress of Slovenian Society for Physical and Rehabilitation Medicine -

Proceedings

Organised by: European Society of Physical & Rehabilitation Medicine – ESPRM and Slovenian Society for Physical and Rehabilitation Medicine

Editor: Professor Helena Burger, MD, PhD

Review: Publication was reviewed by a board of Reviewers

Documentation processing: Cankarjev dom, Prešernova cesta 10, 1000 Ljubljana

Publication price: not for sale

File: PDF https://esprm2024.com/

Published by: European Society of Physical & Rehabilitation Medicine – ESPRM

Published: 23 April 2024, Ljubljana, Slovenia

The content of abstracts is the responsibility of authors.

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The editing of the Proceedings was closed on 15 April 2024.

Kataložni zapis o publikaciji (CIP) pripravili v Narodni in univerzitetni knjižnici v Ljubljani

COBISS.SI-ID 193234179

ISBN 978-961-95837-4-6 (Slovensko zdravniško društvo, PDF)

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PREFACE

Dear Colleagues, Ladies and Gentlemen

Welcome to the 24th Congress of the European Society of Physical and Rehabilitation Medicine (PRM). Our Scientific Committee has prepared an excellent programme that covers all aspects of our specialty - all the different health conditions that our patients may have and all the different rehabilitation interventions that we can use to improve their functioning and quality of life, from newborns to the elderly, from pre-rehabilitation to reintegration into society, return to work and quality of life. We have added some important topics such as rehabilitation in emergencies, rehabilitation in palliative care, use of modern technologies such as telerehabilitation and artificial intelligence, and some others.

We have eight excellent distinguished invited plenary speakers and twelve special sessions organised by all European PRM bodies (PRM Board, Professional Practice Committee, Clinical Affairs Committee, European Academy of Rehabilitation Medicine) and organisations that have signed the Memorandum of Understanding with ESPRM. There will be several oral sessions, most of which will begin with a keynote presentation by an expert in the field, who will present the latest evidence or the latest important research in the field. There will also be short poster presentations and poster displays. You have submitted several case presentations and we have selected the most interesting ones for oral presentation in the three sessions, one per day. The congress will begin with fourteen workshops, several of which will involve hands-on participation. We are confident that each of you will return home with at least one new idea to change in your daily clinical practice.

We received 747 abstracts, each of which was reviewed by at least two different reviewers from two different countries, and all of which were accepted for oral presentation by three reviewers. In total, we have carried out almost 2000 reviews.

Enjoy the prepared scientific and social programme as well as our beautiful country.

Many thanks to all the members of the Scientific Committee and to all the reviewers for their support and work.

Professor **Helena Burger**, MD, PhD

President of the ESPRM2024, President of Scientific Committee

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Plenary Lectures

State of Rehabilitation in the WHO European Region

Justine Gosling[1]
[1]*WHO Europe,London, United Kingdom*

Globally, 1 in 3 people today are estimated to be living with a health condition that would benefit from rehabilitation. In the WHO European Region in 2019, 394 million people had a health condition amenable to rehabilitation during its course, representing two in five people. Rehabilitation addresses the impact of a health condition on a person's everyday life by optimizing their functioning and reducing their experience of disability.

Rehabilitation expands the focus of health beyond preventative and curative care to ensure people with a health condition can remain as independent as possible and participate in education, work and meaningful life roles. Anyone may need rehabilitation at some point in their lives, whether they have experienced an injury, disease, illness, or because their functioning has declined with age.
Universal health coverage and the attainment of the Sustainable Development Goals cannot be achieved without access to quality rehabilitation without financial hardship.

In this context, today's presentation will provide an overview of the need for rehabilitation in the EUROPE/ Central Asia region, how wider stakeholders can support a concerted and coordinated global action to scale up rehabilitation in line with Rehabilitation 2030: a call to action, and activities being implemented by the WHO Regional Office for Europe to support our 53 member states in realizing this ambitious target.

Pathophysiology of Low Back Pain: A New Compressive/Venous/Inflammatory (COVIN) Integrated Model

Luigi Tesio[1]
[1]*Istituto Auxologico Italiano, IRCCS, Milan, Italy*

Chronic benign low back pain with or without sciatica is the most common condition requiring rehabilitation worldwide. This notwithstanding, it is still labelled descriptively. In 1934, Mixter and Barr recognised disc herniation as a nosology entity and associated it with spinal cord lesions and sciatica. After that, the dominant pathogenetic model became compressive: disc prolapses and arthritic degenerations of the inter-apophyseal (facet) joints lead to compression of nociceptive nerve endings within the spinal canal. This model still inspires the most common conservative and surgical approaches.

Many contradictory observations, however, still need to be explained. These are, for instance:

- Pain aggravated by rest/night pain vs. pain during spinal loading
- Pain aggravated by lumbar extension vs. flexion
- Pain in pregnancy
- Pain in diseases of internal organs: e.g., heart insufficiency, liver cirrhosis, caval vein thrombosis, left renal vein compression (nutcracker syndrome).
- Inconsistencies between imaging and symptoms
- Inconsistencies between imaging and time course of the syndrome
- Behavioural differences between acute and chronic pain and the corresponding response to different drugs.
- The variable association of pain with spinal stenosis and the restless legs syndrome.

A pathophysiologic model is proposed here, highlighting the role of the epidural venous plexus identified by Breschet (1836) and Batson(1940). This is the 4th venous system after the portal, the caval and the pulmonary system. This system consists of a dense network of veins running in the epidural space from the sacral segments to the cranial venous system. It is highly interconnected with vertebral veins, the caval and the Azygos veins. In case of direct compression in the narrow vertebral canal (disc herniation, arthritic stenosis), obstacles to the caval flow, heart insufficiency, increased pulmonary arteries' resistance or excess abdominal venous drainage (e.g., in advanced pregnancy), the Breschet-Batson plexus acts as an escape route and, being valveless, can quickly become engorged. The cost, however, is compression and ischemia of nerve endings and the dural sac (in this case, leading to meningeal symptoms). Phlebitis may follow and make the condition chronic, particularly in the case of a pre-existing fibrinolytic defect.

Venous and osseous-discal compression may thus make a vicious circle and concur to back pain and sciatica. Phlebitis may join the causal chain.
Mechanical treatments should aim to widen the vertebral canal and deflate the Breschet-Batson plexus. The treatments most consistent with the CoVIn model are the Lind-Natchev-Tesio auto-traction, Williams flexor exercises, and water exercises, all acting on both arms of the model simultaneously.

Tesio L. Low back pain: a new comprehensive pathogenetic model supporting methods of Medical Rehabilitation. Bull Rehabil Med 2023;22,5:83-92
Tesio L. Lumbar-sciatic pain. A new pathogenetic model and treatment principles (in Italian). Il Pensiero Scientifico Editore. Roma, March 2024; pp.1-170

Advancing Stroke Rehabilitation: Unveiling Opportunities and Innovations in Europe

Xiaolei Hu
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Stroke, a leading cause of adult disability globally, places a profound burden on patients, families, and society. In this plenary lecture, Associate Professor Xiaolei Hu, MD, PhD, addresses the intricate landscape of stroke rehabilitation services across Europe. Focusing on the effectiveness of rehabilitation interventions and their impact on recovery and disability reduction, Prof. Hu conducts a comprehensive review of current practices. The lecture highlights key elements of rehabilitation interventions that play pivotal roles in enhancing stroke recovery.

Prof. Hu goes beyond the present landscape, delving into the potential of emerging rehabilitation technologies. By exploring innovative approaches, she aims to unlock opportunities for cost-effective interventions and service deliveries that align with patient-centered rehabilitation after stroke. Join us in this insightful session, where Prof. Hu navigates the evolving field of stroke rehabilitation, offering a glimpse into the future of enhanced recovery and improved quality of life for stroke survivors.

Helping persons with paraplegia walking again – the promises from the brain-spine interface research

Stefano Carda[1]
[1]*University of Lausanne, Switzerland*

One of the most disrupting and debilitating features of spinal cord injuries is the loss of walking ability. Even if a spinal cord lesion carries many other problems to the autonomic function, the loss of mobility is the most visible problem that characterizes these lesions among patients and the general public.
The idea of developing a "digital bridge" between the brain and the spine has led to the development, in primates and then in humans, of a sophisticate brain-spine interface that allow a patient to walk naturally after a spinal lesion.
In this presentation we will discuss the complex journey from an ambitious idea to a possible treatment, from the point of view of a PM&R specialist, the possible future implementations and the current challenges.

Building academic capacity in Europe

Gerold Stucki

The need for rehabilitation has grown significantly in the 21st century. WHO's Rehabilitation 2030 Initiative and the 2023-endorsed WHO Resolution on rehabilitation has propelled rehabilitation as a major health strategy, helping to shape health systems all over the world. To adequately meet this growing need for rehabilitation, academic capacity building is fundamental, as stated in the WHO Resolution, to ensure integrated and coordinated provision of…evidence-based interventions, to develop strong multidisciplinary rehabilitation skills and to promote high-quality rehabilitation research. was launched. This talk will present the joint effort by ESPRM, the Association of Academic Physiatrists and the International Society of Physical and Rehabilitation Medicine to advance academic capacity in in Europe.

Neural Plasticity at the Junction Between Pain and Rehabilitation Medicine

Roberto Casale

The term plasticity appeared in scientific literature more than a century ago by William James He adopted the term to denote changes in nervous paths associated with established behaviour (i.e adult learning). However, there were two Italian scientists Eugenio Tanzi and Ernesto Lugaro that identified the articulations between neurons -not yet called synapses- as the key structure of neural plasticity and to link neural changes with these interneural contacts. Resistance against this revolutionary principle of a modifiable brain, as now we know it, was probably due to the influence of the great Spanish neuroanatomist, Santiago Ramon y Cajal. Although he himself had studied and demonstrated that mental exercise, such as learning a musical instrument, might be associated with an increase in the growth of new axon collaterals and new terminal dendrites he firmly postulated that neural connections in the adult brain are fixed and immutable. It was only in the middle of the last century that Hebb resurrected the concept arguing successfully that there was no better alternative way to think about the modifiability of the brain by experience, practice, and let me say rehabilitation, than the neural plasticity.
This apparently simple and appealing concept is instead extraordinarily complex and an elusive issue. Indeed, the concept of a neuronal plasticity is used in such a broad spectrum of different subdisciplines and often at multiple levels of analysis (from genetic to behavioural), to generate misunderstanding and wrong attribution. Plasticity seems to become a sort of daily bread of anyone who talks about modifications induced by physiological (i.e. learning) or pathological (injuries or diseases) events without any specification at which level, from genetic to behavioural level, we are referring to. In 2000 Clifford Wolff coined the term “maladaptive plasticity” to define chronic pain just as in rehabilitation we may apply it at the pathological modification, for example spasticity, induced by a central nervous lesion. However, although neuronal plasticity is placed at the crossroads between pain and its control and nervous injury and its rehabilitation, the indiscriminate and unsubstantiated use of the paradigm has led to a trivialization of the term and to a misuse in both fields. Many of the inherent problems related to what “brain plasticity” means remain unanswered today.

As an example: if we consider the pioneering definition of plasticity offered by the French scientist J. Paillard ,“the term plasticity is only appropriate in terms of the ability of a system to achieve novel functions, either by transforming its internal connectivity or by changing the elements of which it is made”. Thus, in pain control as well as in a rehabilitation context if there is no function recovery or no structural change underlying this recovery, then plasticity is not the appropriate term. A current definition of neural plasticity is “a key component of neural development and normal functioning of the nervous system, as well as a response to the changing environment, aging, or pathological insult”. Plasticity is necessary not only for neural networks to acquire new functional properties, but also for them to remain robust and stable.

The aim of this lecture is to disentangle some misinterpretation of the term for a better understanding on how to use the ability of the nervous system to learn and to re-adapt.

Return to work of persons with chronic diseases. Evidence based rehabilitation interventions in Germany

Susanne Weinbrenner

Rehabilitation services on behalf of the German Pension Insurance (GPI) are offered to maintain or restore the insuree's earning capacity in the long term. The most frequently practiced model is medical rehabilitation. Medical rehabilitation in Germany can be defined as a full-day service programme lasting on average 3 to 4 weeks for somatic illnesses or 5 to 6 weeks in case of mental diseases respectively. Services are provided in specially qualified rehabilitation facilities including e.g. exercise training, physiotherapy, education, counselling etcetera being organized by a multi-professional team. After rehab services, there is the option of job-related services and vocational rehabilitation if required.

Based on current findings from reviews and meta-analyses the model practiced in Germany is effective in terms of the occupational participation of insured persons. In view of the many social and political challenges as well as new scientific findings, rehabilitation in Germany is constantly evolving. The presentation will depict and discuss new evidence-based developments. It will be shown that services which are focused on the specific requirements of the individual workplace can be more effective. In future, rehabilitation services aiming at people with complex health issues will become increasingly important. Rehabilitation must therefore be recognized both in practice and in research as a "comprehensive strategy" as well as an "individual service".

Keynote Lectures

Translating Research Evidence Into Clinical Practice for Stroke Survivors

Katharina Stibrant Sunnerhagen[1]
[1]*University Of Gothenburg/Rehabilitation medicine, Gothenburg, Sweden*

There are certain organizational concepts that has very high evidence- such as comprehensive stroke unit care and also early supported discharge. So why is this not implemented everywhere? Maybe, organizational aspects are less visible and perhaps thereby less interesting for physicians? Many physicians seem to be more engaged in active measures such as drug treatment (BTX) or technical devices that are visible and less evidence based. The active measures are valuable for the person with the problem and the organizational concepts of value for all (stroke unit care) or many (early supported discharge). As rehab physicians, we need to implement research evidence and take a lead for stroke rehab care. This means both the challenge of getting involved in the organizational aspects as well as treating single patients.

Adult spinal deformities: a clinical prospect

Camille Daste[1]

[1]*Cochin university hospital, AP-HP.Centre-Université Paris Cité, Paris, France*

Adult spinal deformities (ASD) encompass a heterogeneous spectrum of spine abnormalities occurring in adult patients. Due to the global aging, the prevalence of ASD is increasing and leading to significant impairment in health-related quality of life in aging populations worldwide. Physical examination and radiological assessment are the cornerstones of patients' evaluation and the first steps to establish treatment strategies. Although non-surgical treatment is regarded as the first-line treatment, consensual assessments and therapeutic strategies are lacking. Therefore further investigations and collaborative work in this field are required.

Computer Gait Analysis in Clinical Settings With Markers or Artificial Intelligence

Imre Cikajlo[1]
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Application of human activity assessment systems in institutional hallways, such as hospitals, has increased in recent years. Understanding how people move in these settings can provide valuable insights into mechanisms of pathological gait. So far accurate marker based optical gait analysis systems have been used within the specialized gait labs.
A video-based deep learning approach has emerged as a promising technique for analysing 3D human movement in institutional hallways, leading to the development of a smart hallway. Fast recording intelligent cameras could be mounted on the ceiling and calibrated to provide fast and accurate transformation of video into kinematics coordinate system. Open-pose (open source libraries) are available to calculate body-segment lengths, step length, step time, cadence after foot-event detection.
Such smart-hallways may provide information on limb joint angles, spatio-temporal parameters to support clinical decision making. The marker-less system delivers data without the need for additional data extraction or analysis thus increasing the use of gait analysis in clinical settings.

Robotics in Physical Rehabilitation Medicine

Marko Munih[1]
[1]*University of Ljubljana, Faculty of electrical engineering, Ljubljana, Slovenia*

Introduction: A rehabilitation robot (RehabRobot) is defined as a service robot for professional use that provides physical and information technology support during therapy sessions for the rehabilitation of sensorimotor deficits. The therapy is carried out by stimulating the physiological limb muscles and peripheral receptors through functional arm/hand and leg movement exercises based on the principle of neuroplasticity.

Advances in robotic technology, developed on the basis of neurophysiological and clinical findings, have led to encouraging results in the healthcare sector. RehabRobot devices can assist in the activation of upper or lower limb movements and motor relearning and develop proprioception, cognitive functions and attention. The focus is on achieving high repetition rates in interactive and self-initiated therapy to achieve greater functional recovery in a shorter time frame. The philosophy of using robots in rehabilitation is not to replace the therapist, but to expand the treatment options.The robot also assists rehabilitation physicians in delivering more accessible, efficient and consistent training while collecting valuable data to assess patients' recovery progress.

Systems: The RehabRobot consists of various rehabilitation devices designed for training the hands, upper and lower limbs and for movement and balance training. Commercial rehabilitation robots only came onto the market in 1989 with the development of the MIT-MANUS, which was clinically tested for the first time in 1994. Other examples of rehabilitation robots for the lower limbs based on end effectors are GaitTrainer, G-EO, Lokohelp, THERA-Trainer, the Lopes I and II exoskeletons, Autoambulator, Alex, Hocoma Lokomat, AxoAtlet, MyoSuit, Exo Motus, Ankle Motus. Examples of upper limb devices are MIT-MANUS, MIME, ARM Guide, Bi-Manu-Track, T_WREX, NeReBot, ARMin, Armeo, Amadeo, Arm Motus, Wrist Motus. There are a number of hand rehabilitation devices, mainly for research, as well as various gloves, such as HandyRehab, Bimeo, Deigo. Various aspects of balance are covered by specialised systems such as Pablo, Balo and Coro (Thera Trainer), C-mill (Hocoma), Balancecoach IQ (Zebris). The www.medicalexpo.com currently lists 65 products from 30 companies in the robotic rehabilitation systems category alone. Most of the rehabilitation robots currently on the expanding market are therefore intended for specific segments of the limbs and not for the whole body; they have limited sensory capabilities and decision-making options.

In early mobilisation and treadmill training, gait RehabRobots help to mobilise the patient into a vertical position, support the physiological gait formation process and reduce secondary complications. It also provides physical support for caregivers and therapists. Patients can use wearable exoskeletons to perform overground gait training as they improve. These robots can serve not only as therapeutic but also as supportive aids.

Effectiveness: Many clinical studies and meta-analyzes gather clinical evidence and evaluate the effectiveness of rehabilitation robots, with mixed results. For upper extremity (UE) training, studies indicate improvement in activities of daily living (ADL), arm and hand function, and arm and hand muscle strength. For the lower extremities (LE), studies suggest that post-stroke patients who received such training in combination with conventional physiotherapy were more likely to achieve independent walking than those who received conventional therapy alone. In particular, people in the first three months after the stroke and those who could not yet walk benefited most from this type of intervention.

These results suggest that robot-assisted therapy offers certain benefits for patients, at least in the motor area.

Doctrine and advances: The principle is that RehabRobot treatments allow more manual and repetitive therapy components to be delegated to robotic devices, allowing a clinician to care for more patients in a given time, and improving the accessibility of therapy to patients remotely from the comfort of their own home through telerehabilitation. The data collected can objectively assess performance and document compliance and progress using artificial intelligence (AI), promoting data-driven therapy. Virtual reality (VR) combined with haptics results in a multimodal movement rehabilitation environment that provides therapists with more customizable treatment options in a safe environment.

Force feedback is one of the core technologies implemented in RehabRobots. The force feedback algorithms and motors are able to mimic the therapist's hand during manual therapy. If a user is too weak to perform the movement in the initial phase, the device provides "assist-as-needed", guiding the user to perform the correct movement while ensuring their participation. As the user gradually regains strength, the device reduces its assistance or provides resistance instead. The force feedback technology allows the device to diversify the training modalities: passive mode (to improve range of motion), assistive mode (to encourage active participation), active mode (to optimise motor control) and resistive mode (to improve muscle strength), allowing the system to analyse each movement in detail to meet the needs of the mid and late rehabilitation phase.

The advanced force feedback also enables an immersive interactive experience that mimics different resistances, inertia, elasticity and obstacles, allowing the creation and perception of a digital model of the physical training environment. The realistic training scenario, which combines visual, acoustic and kinaesthetic inputs, takes the user experience to the next multimodal level. The training modes are equipped with various game scenarios that motivate the user to actively participate. The stereotype that rehabilitation procedures are boring can now be overcome when the user can complete professional rehabilitation through gaming. Skills in this area include object recognition, quick reaction, hand-eye coordination, accuracy and precision of movements, improving range of motion and strength, and improving ADL in general. The devices that work towards these goals can provide simple gravity balancing only, as well as large controllable forces or combinations with actual objects, bimanual training is also possible.

Future: There are still many problems to be solved and many questions to be answered when it comes to RehaRobot, e.g. effectiveness, costs, reimbursement and regulatory challenges. The McKinsey Global Institute mentioned that new technologies such as robotics and exoskeletons could reduce the overall burden of disease by 6 to 10 percent by 2040. Manufacturers such as Hocoma, Fourier Intelligence, TyroMotion and others are increasingly investing in research activities by collaborating with established rehabilitation research institutes to develop innovations and new ideas.

Balance Disorders Related to Spatial Misperception After Stroke

Isabelle Bonan[1]
[1]*PRM department, universitary hospital of Rennes, RENNES , France*

There are numerous arguments in the literature suggesting that a part of balance disorders observed after a stroke, especially after a right stroke, are related to disturbances in the body's representation in space. However, there is not much quantification of the relative importance of these spatial disorders, likely due to the difficulty in identifying them specifically.
After a right hemisphere stroke, disturbances in the representation of the body in space, such as visual-spatial neglect, alteration of the sense of verticality, and longitudinal body axis deviation, are quite common. Patients recovering from a right hemisphere stroke typically regain balance and walking abilities later. Additionally, there is a connection between verticality and lateropulsion, as well as a link between deviation of the longitudinal body axis (LBA) and body weight asymmetry.
To identify these balance disorders related to spatial cognition, one can rely on the presence of lateropulsion and pusher syndrome, which are linked to the representation of verticality, and on body weight asymmetry, which is connected to LBA but lacks specificity.
Lateropulsion can be assessed using various scales, including SCP and Scala, and more recently, some more quantitative measures have been proposed. Asymmetry of support can be quantified on a force platform but can only be measured once the standing position is achieved and is not specific. Indirect assessments of spatial body representation-related balance disorders, such as verticality and LBA, have been suggested, while this connection is not found for subjective straight ahead (SSA) and neglect.
There are very few specific rehabilitation program proposals despite their impact on the patients' autonomy. Traditionally, patients are trained to maintain a seated and standing position using top-down techniques. Therapeutic approaches of a bottom-up nature have been proposed, including sensory stimulations, which has shown some encouraging results, as well as suspension methods.

Musculoskeletal Ultrasound: Dusting off Physical and Rehabilitation Medicine

Levent Özçakar[1]
[1]*Hacettepe University Medical School, Ankara, Türkiye*

In this lecture, the entrance of ultrasound and its noteworthy contribution (thereafter) in our specialty will be exemplified. Several indications for its daily clinical use in diagnostic and interventional physiatry alike will be discussed.

Management of Upper Limb Amputees

Carolina Schiappacasse[1]
[1]*British Hospital, La Lucila, Argentina*

The idea is to talk on prescription of prosthesis from body powered ones to sate of the art devices.
Fitting and training by PT and OT will also be addressed.
Vocational rehabilitation for these patients as done in Argentina will be shown and discussed also.
I firmly believe PMR doctors must be more active in prescription and management of amputee patients.
They need to be more acquainted with prosthetic components and their correct indication and training

Upper Limb Prosthetics: Considerations About the State of the Art

Corry K. Van Der Sluis[1]
[1]*University Medical Center Groningen, Groningen, Netherlands*

Innovative technologies such as multigrip prosthesis hands, sensory feedback integrated in prostheses or machine learning algorithms to improve prosthetic control offer great promise to improve the lives of people with upper limb loss. However, many of the scientific advances have not yet reached clinical practice and even fewer are used at home. Why is the translation of research results into clinical practice or the users' homes so difficult? Which factors fill the gap between research and practice and what can we learn from implementation science? In this presentation I will briefly consider the state of the art of the field of upper limb prosthetics and focus on the factors that contribute to the translation and integration of science into practice.

Recent Advancements in PRM Management of People With Idiopathic Scoliosis

Stefano Negrini[1,2,3]

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Idiopathic scoliosis (IS) rehabilitation treatment is a field of growing interest within physical and rehabilitation medicine (PRM). Population aging led to the discovery of the growing and important impact of spinal deformities on quality of life, with an increased IS prevalence from 2-3% in children to above 60% in the elderly. In children, IS has always been a very specialized area of work. Orthopedic surgeons, who used to lead what they called the conservative field, are gradually leaving space mostly to PRM. Generally speaking, PRM global approach to IS as a chronic health condition leading to disability, provides better treatment tools. Nevertheless, it is crucial to gain an adequate, highly specific knowledge - e.g. in adult IS, it is not possible to limit our approach to pain ignoring the progressive deformity and disability.

Research in this field is globally exploding. New developments include, but are not limited to, better understanding of IS progression and related factors in all ages, new rehabilitation tools particularly for adults, increasing efficacy results from RCTs on therapeutic exercises and new understanding of the determinants of bracing success in children. Moreover, the new understanding coming from the new rehabilitation definition developed by Cochrane Rehabilitation with 80 global stakeholders is giving us a different understanding in IS field too, showing how much research should consider treatments as complex interventions with a totally different approach to evidence gathering.

The lecture will pinpoint some of these results and provide participants with an overview of the relevant literature to participants with a wide rehabilitation and evidence-based approach.

Why collect data in PRM? It's a win-win-win!

Ruud Selles[1]
[1]*Erasmus MC, Berkel en Rodenrijs, Netherlands*

Routine measurement of clinical care outcomes is increasingly important, although implementation in practice remains challenging. One of the problems in clinical implementation is that the goals of collecting data are often poorly described, mentioning rather vague goals such as 'providing information about the patient' or 'gaining insight in outcomes'. Since costs are involved in collecting data and may take time away from other clinical activities, the goals must be more clearly defined so that the proven benefits outweigh the costs (time and money).
In this presentation, I will provide several examples of long-term successful data collection implementations in PRM. I will describe how routine data collection can be organised to reduce the burden for the individual clinician, patient, and organisation, thereby minimizing the 'costs' of collecting data. In addition, I will provide a framework for describing the benefits of routine measurement of patient data for improving care in rehabilitation medicine. This framework describes these benefits at three levels: 1) improving individual-patient decision-making, 2) improving quality control and benchmarking, and 3) providing unique data for scientific research, including new artificial intelligence applications. I will link these three levels to PRM concepts: value-based health care, patient-centered care, data-driven care, shared decision-making, and the science of real-world evidence. Since smart data collection in daily care will benefit all three levels, it can create a win-win-win situation.

How effective are rehabilitation interventions in improving functioning based on the ICF in individuals with breast cancer related lymphedema?

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Lymphedema is one of the frequent consequences of breast cancer surgery with axillary dissection. It is associated with psychological and physical problems resulting in impaired functioning and poor health related quality of life (HRQoL). The International Classification of Functioning, Disability and Health (ICF) Core Sets for lymphedema can give a thorough picture of functioning problems that range from impairment in mental functions to activity limitations and participation restrictions including carrying out daily routine, walking, driving and many others (1). There are many physical and rehabilitation medicine (PRM) interventions to address problems in functioning of breast cancer survivors with BCRL. These include patient education regarding skin care, avoidance of infections, weight reduction and exercise as well as complex decongestive therapy (CDT) with components of compression garments, compression bandaging, and manual lymph drainage. Intermittent pneumatic compression and low level laser therapy (LLLT) (known as (photobiomodulation) may also be considered (2). Regarding evidence of the effectiveness of PRM interventions in the management of BCRL, complex decongestive therapy steps forward as the most recommended treatment for improving HRQoL (3, 4); with findings that manual lymphatic drainage may not have an additional effect and compression bandaging component (5) might be sufficient for reducing limb volume and circumference. Beneficial effects of LLLT on limb volume and circumference reduction were also demonstrated; however, not on shoulder mobility or pain (6). Additionally, extracorporeal shock wave therapy combined with CDT was shown to have potential beneficial effects on arm volume, skin thickness, and shoulder mobility based on very low certainty evidence (7). Dance/movement therapy was suggested to have favourable effects on HRQoL, although not on body image, fatigue, anxiety, stress, shoulder range of motion, or arm circumference in patients with BCRL (8). In conclusion, although there are a number of evidence-based PRM interventions to target treatment for impaired functioning in individuals with BCRL, it seems that there is a need for more rigorous trials to show benefits particularly in activities and participation components of the ICF.

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Side-Effects Management, Supportive Care and Cancer (P)Rehabilitation in Austria

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Background: Cancer and its necessary treatment can lead to different and severe consequences such as to pain, fatigue, nutritional deficits, and reduced performance status, polyneuropathy, hand–foot syndrome, mucositis, lymphedema, incontinence, sexual dysfunction, cognitive deficits, dysthymia, and depression. As survival rates and survival time of are increasing, cancer rehabilitation is an important part in the treatment and care of cancer survivors. The goal is to improve functional status (physical, mental, and psychosocial functions), quality of life, and participation. Rehabilitation centers offer multidisciplinary and multi-professional programs, which are adjusted to the patient's needs including physical modalities and exercise, psycho-oncology, nutrition, and education. Early integration of cancer rehabilitation into the cancer care continuum is important. Cancer prehabilitation uses the pretreatment time period to prevent a treatment-related functional decline and its subsequent consequences, and therefore occurs between the time of cancer diagnosis and the beginning of acute cancer treatment. It aims to improve functional status, physical and psychological health outcomes and to decrease overall health care costs. Furthermore, it can support cancer patients to better participate in cancer rehabilitation after cancer treatment.

Aim: This Keynote Lecture aims to present the practical and scientific development of Side-Effects Management, Supportive Care and Cancer (P)Rehabilitation in Austria – a work of the last quarter century

Results: In Austria, there are 640 beds for inpatient cancer rehabilitation, and there are also several outpatient facilities. The field of Physical Medicine and Rehabilitation with competencies in diagnostic and therapy as well as of coordination of the multi-professional and interdisciplinary rehabilitation teams is an important part of cancer rehabilitation, and had a pioneer role during the implementation of cancer rehabilitation. 25 years ago, the first steps were done at the Department of Physical Medicine, Rehabilitation and Occupational Medicine of the Medical University of Vienna, Austria (PMR-OM) with first "pioneer" exercise programs – at a time when exercise had been a contraindication for this patient group. At the PMR-OM, cancer Rehabilitation is now well developed and also part of the Comprehensive Cancer Centre (CCC) Vienna. There is a spezialized outpatient clinic for cancer rehabilitation (since 2000), the at this time worldwide unique CCC-tumour board for cancer rehabilitation (since 2010), and a CCC-platform for side-effects management, supportive care and cancer rehabilitation (since 2015) – all with a physiatrist in the leading position. At the PMR-OM, science focuses especially on exercise, but also on extracorporeal shockwave therapy, pulsed electromagnetic field therapy, biofeedback and vagal nerve stimulation as well as on the application of different physical modalities in cancer survivors, with the typical indications immobility and reduced performance status, pain, polyneuropathy, lymphedema, incontinence, and sexual dysfunction.
Discussion and Conclusions: Most cancer survivors are able to benefit (also during pandemia) from cancer rehabilitation, especially from improvement of physical performance, nutrition, mental stabilization and sufficient pain medicine as well as from long-term prevention and reintegration effects. The PMR-OM as a part of the CCC Vienna with his "Pioneer-Status" and the described milestones is well established the national cancer rehabilitation concept of our country.

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Disease Modifying Effect of Exercise in Patients With Inflammatory Rheumatic Diseases

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Nonpharmocological treatment of the most common inflammatory rheumatic disease (e.g. rheumatoid arthritis, psoriatic arthritis or axial spondyloarthritis) represents equally important, but also complementary approach to pharmacotherapy. Sinergy of these approaches enable us to achieve main rehabilitation outcomes: improving function and independence and decreasing disability and impairment. EULAR (European alliance againts rheumatism) has previously published several recommendations highlighting the importance of medical exercise in RA, PsA and/or axial SpA. Systematic review and meta-analysis informing the 2021 EULAR recommendations for lifestyle improvements also highlights the benefit of exercise on various disease domaines (eg. pain, fatigue, disease activity, function…) leading to better life style as well. Although there are no specific laboratory findings which could reflect the benefits of exercise, there are generic and disease specific questionnaires useful for the assessment of exercise effect on function.

On the other hand, we need to focus on one specific organ - fundamental to exercise – skeletal muscle. During past decade, there has been a growing of evidence showing that skeletal muscle is very active and versatile organ able to communicate with other systems in our body by secreting myokines. Numerous cytokines and growth factors are produced by the muscle itself or by infiltrating inflammatory cells during regeneration: hepatocyte growth factor, insulin-like growth factor (IGF1), fibroblast growth factor, transforming growth factor, interleukin-4 (IL-4), interleukin-6 (IL-6) and leukemia inhibitory factor (LIF). The letter two (IL-6 and LIF) were recognized as myokines - cytokines produced by the working skeletal muscle during exercise. An interesting approach focused on myokine has been presented not so long ago highlighting the fact that the increase of IL-6 in the circulation occurs during dynamic exercise without any sign of muscle damage. The finding that IL-6 is released into the blood stream during exercise and that this release is dependent on substrate availability during exercise, suggested that IL-6 plays a role in maintaining energy status during exercise. Release of muscle derived IL-6 inhibits the production of the TNF-alpha, stimulates and induces the production of anti-inflammatory cytokines IL-1Ra (receptor antagonist) and IL-10. Increase in circulating levels of IL-1Ra and IL-10 in the post-workout period and their release is probably enhanced by the IL-6. Both of these cytokines, IL-1Ra and IL-10, may inhibit the action of pro-inflammatory cytokines as well as preventing cytokine synthesis. This muscle derived IL-6 is significantly different to the pro-inflammatory IL-6 with its known local and systemic effects in patients with RA. Muscle derived IL-6 blocks upstream and downstream signalling pathways of NF-kappa beta through the cross-reaction of the activated signalling pathways of the nuclear factor of actrivated T-cells (NFAT) and mytogen activated protein kinase (MAPK) with subsequent antinflammatory effect. These findings lead to the paradigm shift into better understanding of the benefits of exercise in patients with arthritis: disruption of cycle of chronic inflammation and improving CV comorbidities and CV risk. On the other hand, less data is available on the long-term effects of regular exercise on the cytokine profle in humans. Existing studies indicate that the cytokine profile of an individual changes with chronic exercise, although the degree to which they change remains widely debated. With regards to changes in pro-infammatory cytokines, the ATTICA study found that regular physical activity reduces basal plasma IL-6 and TNF-α in an urban population with proposed mechanism that regular exercise leads to a reduction in body fat.

The relationship between regular exercise, cytokine profles and infammation is one which, with further research, may provide further insight into the long-term benefts of exercise, particularly in regards to infammatory, cardiovascular and other chronic diseases.

Key words: exercise, arthritis, spondylitis, effect, disese-modifying

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Prehabilitation: rehabilitation as a preventive strategy for the loss of functioning after surgery or cancer treatments.

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Prehabilitation represents a proactive approach to patient care, focusing on improving individuals' overall health and functional capacity prior to surgery, particularly in oncological contexts. It aims to optimize patient outcomes from a biopsicosocial approach.

Prehabilitation is a multidisciplinary, proactive intervention strategy designed to enhance a patient's health status before undergoing a surgical procedure. This concept is particularly relevant in oncological surgery, where preoperative optimization can significantly impact postoperative outcomes.

The interventions in prehabilitation are multifaceted, encompassing physical exercise, nutritional optimization, and psychological support. These interventions are tailored to individual patient needs, based on comprehensive preoperative assessments.

In the rehabilitation services, physiatrist evaluate candidates Looking for frailty. Frailty is a cumulative decline in various physiologica systems leading to an increased vulnerability to stressors like surgery. This condition characterized by disminishe physiological reserve, can significantly impact postoperative outcomes, potentially resulting in disability or loss of independence. Screening for frailty is crucial, with tools like the Fried Frailty Phenotype, Clinical Frailty Scale, and Edmonton Frail Scale being commonly used. A comprehensive geriatric assessment, including medication review and mobility, cognitive, and social environment evaluations, is recommended once frailty is identified. Functional capacity is assessed using tools like the Duke Activity Status Index , the 6-Minute Walk Test (6MWT) or the Timed-Up-and-Go test. These assessments help predict postoperative morbidity and are crucial in tailoring prehabilitation exercise components. The cardiopulmonary exercise test (CPET) is the gold standard for functional capacity assessment, aiding in risk stratification and monitoring prehabilitation progress.

Another area in prehabilitation standards is the nutritional optimization focused on correcting nutritional deficiencies and improving overall dietary status to support recovery and immune function.

Malnutrition is another key concern in surgical patients, with a high prevalence in oncological cases due to various factors like the disease itself and treatment side effects. Screening tools like MUST, CNST, or NRS-2002 help identify patients at risk. If risk is detected, a detailed assessment by a registered dietician, including food intake evaluation and the Patient-Generated Subjective Global Assessment, is necessary.

The last part of the trimodal prehabilitation is the psychological support which involves counseling and stress management techniques to prepare patients mentally and emotionally for surgery and recovery.

This trimodal approach has shown benefitis for patients that go to surgeries and suffer from cancer related fatigue, malnutrition and psychological stress that are responsable for a lack of funtioning and deterioriation post op.

Prehabilitation has shown promising results in improving postoperative outcomes, such as reduced complication rates, shorter hospital stays, and improved quality of life. For instance, in colorectal cancer surgery, prehabilitation has been linked to enhanced physical function and reduced postoperative complications.

Despite its benefits, implementing prehabilitation faces challenges including resource allocation, patient adherence, and the need for personalized intervention plans. Future research should focus on refining intervention strategies, exploring cost-effectiveness, and establishing standardized protocols.

The Significance of Clinical Assessment of the Autonomic Nervous System Dysfunction Following Spinal Cord Injury

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The consequences of spinal cord injury (SCI) may influence all systems of the body whose function is affected to varying degrees. The severity of the lesion and the functional status after SCI were determined for a number of years with the Frankel scale (1969)1. Comparison between different approaches of management, final outcome and therapeutic efficacy requires common language and terminology. Knowing the great importance of the severity of lesion concerning the planning of the rehabilitation program and the possible future candidacy of individuals with SCI to new therapeutic techniques, the severity of autonomic nervous system (ANS) dysfunction should be a significant part of SCI evaluation.
The International Standards for Neurological Classification of Spinal Cord Injury (ISNCSCI) as a result of the collaboration of two large scientific organizations (ASIA & ISCoS)2 is being revised and updated (8th edition, 2019) in an attempt to reduce ambiguity in the method of clinical evaluation and reporting of this evaluation. The ISNCSCI refer to residual somatic nervous system function and cannot be used to document the degree of ANS function after SCI. In May 2004, ASIA appointed a working group with international participants to develop standards for ANS function after SCI. A steering committee, and subgroups to discuss bladder, bowel, sexual and general autonomic functions were appointed. The International Standards for Autonomic Function after Spinal Cord Injury (ISAFSCI), by ASIA and ISCoS were presented. Internationally accepted definitions of ANS dysfunction in accordance with the level and severity of the SCI are lacking. Bedside examination is not always enough to document cardiovascular, bladder, bowel and sexual function after SCI; for example, special clinical tests are needed to study cardiovascular function of individuals with SCI, urodynamics to evaluate voiding, etc. The ISNCSCI is based on physical evaluation, the ISAFSCI takes into account also self-reported history as well and both can be performed at acute phase and during follow-up.
The ISAFSCI is under revisions targeting the clarification of history report, clinical assessment with standardized tests and finally the establishment of a validated autonomic classification tool for individuals with SCI 3, 4. The initially included Urodynamics evaluation is no more a component of the form. However, the Autonomic Standards Committee encourages clinicians to consult the International Urodynamics SCI Data Set 5, 6.

The ISAFSCI is still a relatively novel tool and only a limited number of clinicians use it on a regular basis7. Somato-somatic and visceral-somatic conus medullaris reflexes involving neurotomes T12 to S5: anal, vesico-anal, vesico-urethral, and anal-cough reflexes11, bulbocavernosus, and dardos reflexes8,9,10, may contribute to clarify the severity and prognosis of SCI despite the opposing views in the literature11,12. The revised (2021)13 version of the ISAFSCI provides a format for documenting the impact of SCI on ANS neural control of cardiovascular, thermal and sudomotor, bronchopulmonary, and sacral organ system function, which includes lower urinary tract, gastrointestinal tract, and genitalia and reproductive organs, introducing for the first time a scoring system.

In conclusion, the assessment of autonomic nervous system dysfunction following SCI is critical, having impact on health related quality of life of persons with SCI.

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Respiratory Muscle Dysfunction in Chronic Disease States: Clinical Significance and Implications in Cardiac Rehabilitation

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Exercise limitation is a cardinal manifestation of many cardiovascular diseases (CVD) and is associated with poor prognosis. It is increasingly well understood that exercise-based cardiac rehabilitation (CR) is an intervention that portends favorable clinical outcomes, including improvements in exercise capacity. The etiology of exercise limitation in CVD is multifactorial but is typically governed by terminal sensations of pain, fatigue, and/or breathlessness. A known but perhaps underestimated complication of CVD that contributes to breathlessness and exercise intolerance in such patients is inspiratory muscle dysfunction. Evidence supports the clinical benefits of inspiratory muscle training in patients with cardiac diseases; however, there is a lack of knowledge and use of this treatment among CR physicians.
The aim of this session is to make rehabilitation physician to consider assessment of global respiratory muscle function as a standard as part of the patient intake assessment for phase II CR programs, giving practical guidance on the implementation of such measures as well as inspiratory muscle training as part of phase II CR.
Method: I will present the last evidence about the inspiratory muscle training in CR patients through an oral with audiovisual support .

In this session I will compare the different techniques used to assess respiratory function and understand the parameters used to define function and understand the parameters used to define respiratory muscle dysfunction. We will identify the prevalence and clinical significance of respiratory muscle dysfunction in different states of cardiopulmonary respiratory muscle dysfunction in different cardiac disease states. We will evaluate the potential role of specific respiratory muscle training as a rehabilitation strategy in as a rehabilitation strategy in patients undergoing phase II cardiac rehabilitation (CR) Finally, we will recognize the practical considerations for including respiratory muscle function assessment and training in respiratory muscle function and specific inspiratory muscle training in the context of stage II CR

For people with cardiac diseases, inspiratory muscle training by itself can improve ease of breathing, increase the amount of distance that they can walk, and improve quality of life.

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Safety of exercise-based cardiac rehabilitation patients with frailty and heart failure

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Progressive aging is associated with the overall number of patients with heart failure (HF) and geriatric syndromes (especially Frailty), which represent a serious burden on healthcare systems. Frailty is a geriatric syndrome characterized by a state of vulnerability associated with the decline in function of multiple physiological systems and the loss of physiological reserves. Frailty and HF share common pathological mechanisms and are associated with poor clinical outcomes1.

The aim of this paper is to emphasize that a more comprehensive assessment of Frailty is important for determining risk in patients with HF. There is a need to better understand these syndromes, with particular attention to the importance of Frailty in the context of cardiac care, including cardiac rehabilitation (CR), where we need to better understand whether exercise-based CR can alter the course and prognosis of Frailty in CVD.

The prevalence, clinical and prognostic importance of Frailty in the CR setting is still not well characterized, despite the increasing frequency of elderly patients in CR, where Frailty likely affects the initiation, type and intensity of exercise programs and the design of tailored rehabilitation interventions for these patients. We need to start looking for Frailty in older patients entering CR programs and become more familiar with some of the tools to recognize and assess the severity of this condition. Members of the multidisciplinary team, especially PRM specialists, should play an important role in Frailty assessment in intensive care units and specialized CR institutions. The Edmonton Frail Scale can be used as a proxy for users, it contains 10 domains that assess cognitive function, balance, mobility, mood, independent daily functioning, medication administration, nutrition, health attitudes, social support and quality of life1,2.

Several meta-analyses published in the last decade have reported the benefits of CR for several cardiac indications, including HF and Frailty. A better understanding of the mechanistic basis for HF-induced muscle dysfunction can be used to design more effective and sustainable therapeutic strategies. Global health systems need to ensure consistency of access to exercise-based rehabilitation for patients with HF as part of their routine care. The basic evaluation of physical function should be adapted to their physical conditions, and the CR program should be individualized based on their functional compromise and disability. Especially in patients with CHF, structured exercise training improves neurohormonal, inflammatory, and metabolic parameters and has beneficial effects on physical function, functional capacity, and quality of life1,2.

Conclusion: In patients with Frailty and HF on CR, clinical intervention must be focused on physical efficiency assessed by aerobic capacity (cardiopulmonary assessment test), on functional assessment of activities of daily living and on improving muscle strength, balance and flexibility (for which a battery of short physical performances showed a great sense).

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Unlocking Intimacy: State of the Art of Sexual Rehabilitation in 2024

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Sexual health is a state of physical, emotional, mental and social well-being in relation to sexuality. For sexual health to be attained and maintained, the sexual rights of all persons must be respected, protected and fulfilled. This includes the right to have access to sexual and reproductive health care information, education, and services and to be protected from discrimination based on the exercise of their sexuality. The human being is a sexual being with a sexual identity, and any disabling health condition can impact sexual function, sexual identity, self-esteem, and self-image. Moreover, some conditions, such as spinal cord injury, can affect fertility and pregnancy. People can experience direct consequences of a disabling or chronic condition at the level of sexual function, for example, loss of sensibility or erectile dysfunction, but also indirect consequences from other secondary impairments such as incontinence, pain, fatigue, or spasticity. But also, limitations of activities and participation restrictions can impact intimacy and sexuality. Therefore, sexual issues should be an integral part of quality rehabilitation care.

A sexual rehabilitation programme starts with a precise clinical examination and diagnosis of sexual function impairments. The next step is informing the patient (and partner) on the consequences of their condition for sexuality and fertility and, more importantly, remaining or alternative possibilities. People should be encouraged to explore their changed bodies and experiment, alone or with their partners. Possible components of rehabilitation intervention are education, practical advice, finding new positions, using assistive devices and aids (like vibrators, sex toys, lubricating gel, massage oil), pelvic floor training, assertiveness training and psychotherapy addressing anxiety and depression if relevant, but also self-image and self-esteem. Sexual assistance can be proposed if needed and available.

Sexual rehabilitation requires a personalized biopsychosocial approach by the entire multiprofessional team, including peer counsellors. The almost 50-year-old 4-level “PLISSIT model” for addressing sexual functioning remains valid: from Permission giving, over Limited Information and Specific Suggestions, to Intensive Therapy. The timing for sexual counselling can vary according to the type and phase of the health condition, but it is always relevant for the patient.

Rehabilitation and Women: The Time To Focus on Gender Equality

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Rehabilitation is a vital component of healthcare, particularly for women who encounter unique challenges owing to their distinct biological, social, and psychological traits. Recognizing the importance of gender-specific rehabilitation strategies is crucial, considering women's diverse needs and experiences in recovery processes.

Women's bodies react differently to injury and illness compared to men, largely due to hormonal fluctuations and distinct body composition. This difference is particularly evident in conditions like osteoporosis, more prevalent in women, necessitating a customized approach in rehabilitation. Hormonal changes during critical life phases such as pregnancy and menopause significantly influence the rehabilitation process. A deep understanding of these unique biological aspects is essential for effective treatment and recovery.

Most pharmaceutical research historically has centered around male animal models, thereby avoiding the variable effects of hormonal changes typical in females. This male-centric approach in drug development has profound implications for women as patients. Medications developed based on male biology often fail to consider women's specific physiological characteristics, including hormonal variances, unique pain receptor profiles, and different metabolic processes. Consequently, this gender bias in drug development can result in less effective, sometimes harmful, medical treatments for women.

The majority of medical research has traditionally overlooked the gender variable. Rather than merely quantifying women's participation in studies, it's critical to examine how women specifically respond to different medical interventions. This lack of gender-specific analysis leaves a substantial gap in our understanding of the full impact of medical treatments on female patients, thus emphasizing the need for more inclusive and gender-sensitive research.

Social and cultural contexts significantly influence women's access to and engagement with rehabilitation services. The traditional roles and expectations placed upon women can create additional challenges, particularly in balancing rehabilitation with family and caregiving responsibilities. Cultural norms and beliefs can also shape women's access to and participation in rehabilitation programs. Therefore, addressing these social and cultural factors is crucial for the success of rehabilitation outcomes for women.

Women also face several obstacles in accessing and benefiting from rehabilitation services. These challenges include limited healthcare access and utilization, especially in low-income and marginalized communities. Recent studies also highlight a gender bias in healthcare, leading to the underestimation of women’s symptoms and pain. This bias can impact the quality of life and influence the type of treatments and rehabilitation received by women. Economic barriers are another significant issue, as they often prevent women from affording rehabilitation services or accessing them due to caregiving responsibilities at home.

Acknowledging these facts is a vital step in enabling rehabilitation doctors to tailor programs that cater to the unique physiological and psychosocial needs of women. By incorporating gender-specific strategies and addressing the comprehensive biological, psychological, and social factors, healthcare providers can significantly enhance the quality and effectiveness of rehabilitation for women.

In conclusión rehabilitation for women must be approached with an understanding of the unique challenges and needs they face. Incorporating gender-specific strategies into rehabilitation programs is not just a matter of fairness but also of medical efficacy. By tailoring rehabilitation to meet women's specific needs, healthcare providers can improve outcomes and ensure more equitable and effective healthcare for all.

‘AT Changed My Life’ – Unlocking a Lifetime of Human Potential Through Rehabilitation and Assistive Technology

David Constantine[1]
[1]*ISPO, Bristol, UK*

Following a life changing accident, David Constantine received excellent rehabilitation and access to society through assistive technology.
As a result of this he was able to study, work and start an international non-government organisation set up to design and provide appropriate wheelchairs in low income countries.

He will explain his journey and how he became involved in the sector to the point where he is now the ISPO president.

Involvement of PRM physicians in end-of-life decisions in Europe; an overview

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At first glance, end-of-life-decisions (ELDs) might appear to be contradictory to rehabilitation and its goals. However, Physical and Rehabilitation Medicine (PRM) physicians can play an essential role in well-informed decisions on life and death of persons with disabling health conditions.
In general, there is a variation in practices concerning ELDs between European countries and even within countries based on, for example, legal frameworks, culture and religion. Several developments in the last decades, such as changing demographics and changing attitudes towards ELDs, stress the importance of well-developed policies on this subject.
In this presentation, different ELDs and potential roles of PRM physicians and their team will be discussed, as well as an overview on recent developments, (examples of) legal frameworks and involvement of PRM physicians in ELDs in European countries.

Disorders of Consciousness: An Evidence-Based Update

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Disorders of consciousness: An evidence-based update

This lecture will review issues pertinent to neurorehabilitation clinicians working with patients with disorders of consciousness (DOC). Current classification schema will be discussed as well as controversies and caveats regarding same. Behavioral assessment and diagnosis of disorders of consciousness will be addressed including the utility of neurodiagnostics such as neuroimaging and EEG in this context. The topic of covert consciousness will receive particular attention given its myriad neuromedical, ethical and legal implications. The neuromedical literature on morbidity including life expectancy/ median survival time in persons with DOC will be assessed. Current treatment strategies including sensory stimulation programs, pharmacotherapy and neuromodulation will reviewed. The lecture will conclude with a discussion of caregiver burden and quality of life in the context of long-term management of persons with DOC.

Rehabilitation and Parkinson's disease: time for advancing technology-based interventions

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Parkinson's disease (PD) is the second most frequent neurodegenerative disorder after Alzheimer's disease, affecting more frequently men than women, with a prevalence of roughly 3/1000 in the whole population, increasing with age up to 1/100 in the over-80s58. More than 6 million people worldwide suffer from PD, and its incidence and prevalence are increasing faster than in other neurological disorders. PD is a heterogeneous and complex pathology, with the concomitant presence of both motor and non-motor disorders and different kinds of disability progression.

As such, PD represents the archetype of complexity. It affects multiple (if not all) body functions, producing different functioning profiles, that vary in severity and course across patients and are strongly influenced by several other individual variables (like the response to drugs, the personality traits, the socioeconomic and cultural background, comorbidity levels, family environment and even climate changes) (1,2)

A multimodal and intensive rehabilitation treatment has the potential for helping people with PD to achieve long lasting benefits in any disease phase and subtype. There is laboratory evidence that goal-based and aerobic exercise strengthens and improves motor circuitry, leading to increased expression of neurotrophic factors, increased blood flow, altered immune response, increased neurogenesis and mitochondrial health (3). There is sparse evidence that such changes might also lead to enhanced neuronal circuitry between the basal ganglia and its cortical and thalamic connections, and result in improved motor, non-motor, and cognitive behaviour in patients with PD.

Variable combinations of robot-assisted motor training, action observation techniques, virtual reality-enhanced sensory feedback, and non-invasive brain stimulation have been proposed to support motor relearning (4).

However, the outcome after any rehabilitation approach largely varies across patients exhibiting different demographic, motor, and non-motor features. Currently, there is no agreement about the recommended levels of physical activity/motor/cognitive training that may benefit people in different disease phases, with different clinical features and disability levels. In a multifaceted scenario of several factors affecting disability progression, clinicians are frequently challenged by the need to recognize, and correctly discriminate which patients will benefit from highly expensive (namely robotic rehabilitation) and demanding (namely multimodal intensive training) rehabilitation interventions, also combined with the best available drug treatment or with functional neurosurgery.

A refined predictive ability will avoid delaying proper treatment in people with less aggressive disease, while also excluding from invasive approaches those who exhibit multiple factors of poor responsiveness to any intervention and would deserve palliative care.

To develop prediction models for people with Parkinson's disease, clinicians still rely on clinical rating scales and patient-reported outcomes. Although relevant and validated measures are available, like the Unified Parkinson's Disease Rating Scale (UPDRS), the Non-Motor Symptom Scale score, the PD Sleepiness Scale, the King Pain questionnaire, and the PDQ-39, all present the disadvantage of being modulated by individual expectations, beliefs, prejudices and fears. Researchers advocate using objective quantitative measures of motor behavior and non-motor functions to describe the health status of people with PD . A multimodal monitoring approach, based on wearable sensors, would allow the collection of continuous data about the several domains of PD-related disability in a real-life environment.

I will present data collected with a multicenter trial in the framework of the RAPIDO (teleRehabilitation for pAtient with ParkInson's Disease at any mOment) study and discuss the acceptability and usefulness of technology-based interventions in specific disease stages.

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Health benefits and availabilities of parasports

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Evidence displaying the beneficial effects of physical activity on both physical and mental health is unequivocal. In consequence, the World Health Organization recommends all adults engage in 150-300 minutes of moderate physical activity, or 75-150 minutes of vigorous physical activity, on a weekly basis. Moreover, strengthening exercises focusing the main muscle groups should be performed twice weekly.

These recommendations also extend to adult populations presenting with chronic diseases or disabilities. Among the latter, research also demonstrates that physical activity enables to improve motor deficits, enhance autonomy and improve quality of life. Physical activity is therefore regarded as an important tool in rehabilitation. However, adherence to physical activity is low as some authors suggest up to 80% of this population do not reach the recommended levels for physical activity.

One way to increase adherence to physical activity is by making the activity more enjoyable. In that sense, parasports, which are typically performed in a social setting, could be an interesting avenue. However, research on the parasports in rehabilitation is in its infancy.

Regarding benefits, a systematic review was conducted in order to gather and analyse data on the effects of integrating parasports to the neurorehabilitation of stroke, spinal cord injury and multiple sclerosis. A total of 30 articles were included, and results demonstrated parasports to be a feasible and safe complement to conventional rehabilitation. Moreover, benefits of the intervention were observed on all the different domains of the International Classification of Functioning, Disability and Health (ICF) model.

In terms of availability of parasports, hospitals and rehabilitation centers in Belgium were contacted in order to evaluate the availability of this offer. Only a minority (25%) propose parasports to their patients during rehabilitation. The remaining hospitals and rehabilitation centers mostly propose physical activity sessions (aside of physical therapy). Some of them also redirect their patients to external institutions such as sports clubs, to practice an adaptive sport.

Despite these results showing mediocre to poor availability of parasports in Belgium, comparisons to 30 other European countries shows that, on a European level, Belgium is among the leading countries proposing parasports as a rehabilitative tool. Other leading countries such as France and the Netherlands, could be used a good example to continue to develop parasports in Belgium.

Woundcare and Rehabilitation, Basics, Bridges, and Synergies

Hubert Vuagnat

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Although wounds are incredibly numerous in the medical field, they have only been recently recognised as a crosscutting problem.
Ubiquitous, they range from traumatic to medical origins and many medical specialities will encounter them.
Unlike other disciplines, wounds evade basic medical training leaving most MD helpless to some extend in facing chronic wounds.
The field of rehabilitation medicine does not really escape this.
On one hand, as the field or rehabilitation is very wide, facing wounds is very common, post traumatic, post-surgical, pressure ulcers but also wounds linked to aging such as venous leg ulcers, arterial insufficiency, skin tears and others as geriatric rehabilitation is more and more frequent in our industrialised settings.
On the other hand, many rehabilitation specialists have positive assets to bring to the woundcare field.
As most wounds require a holistic and interprofessional approach, our discipline is one that has developed these qualities far before others.
Many wounds lead to physical disability and rehabilitation medicine is already well involved in prevention and/or treatments. In that field, burn or spinal cord injured patients' rehabilitation are prototypes that could well be extended to other types of wounds. Patients with arterial insufficiency can benefit from rehabilitation.
Of course, highly qualified specialists will always be necessary but basic training can make a big difference.
Different concepts and methods have been and are developed to help us to be more efficient on a daily basis.
One of them relies on the 6 basic principles of woundcare developed by the World Alliance for Wound and Lymphedema Care.

1) Diagnose and treat both:

a. The cause of the wound. For example, in a pressure ulcer the causative events are pressure and shear, and the treatment is alleviating them. Dressings have a side role.

b. All other factors and states that can have a role in limiting woundhealing. This is vast and encompasses issues such as other diagnosis, malnutrition, pain, tobacco, or substance abuse but also limited access to care.

2) Maintaining wound bed in a controlled moist environment. Basically, woundhealing is a biological process needing both moisture and body temperature.

3) Prevent further damage to the wound bed and wound edges. Woundbed is fragile and must be protected from further direct physical lesions but also from chemical induced ones such as lengthy disinfection. Wound edges and at distance periwound skin must also be considered and protected, mostly by hydration with a lipidic ointment.

4) Keep the woundbed clean and non-infected. This is achieved by the correct evaluation of the wound during dressing. Necrosis must be debrided, wound must be washed, shower with large quantities of plain water is currently a standard. Antimicrobial will be used only if there is local infection. Topical antibiotics are not recommended anymore. Systemic antibiotic will be given only if a spreading or generalised infection is diagnosed.

5) Wound and periwound oedema must be reduced. Through the inflammatory reaction the wound and surroundings are oedematous and retain inflammatory components and proteolytic enzymes.

Furthermore, many elderly patients often already have a cardiac oedema. Alleviating it by limb compression of will favour the woundhealing process. Of course, contraindications such as major arterial insufficiency, untreated cardiac failure must be first assessed.

6) Disability must be prevented. Patients with major wounds, especially near a joint or prone to important retraction must benefit from early rehabilitation to avoid this disability.

As attention over wound care is growing, we can now benefit from many guidelines, position documents to help us in caring for these patients. One example could be the European Wound Management Association “education portal” https://ewma.org/what-we-do/education .

All these guidelines are based on the best level of evidence and expert’s opinions. Their clinical implementation will allow woundcare to be more standardized and efficient.

Among the rehabilitation specialist assets in woundcare, one is his longtime ability for interprofessional care which will often allow the patient to benefit from highly specialised care in a much more orderly manner.

In conclusion, as wounds are often seen in rehabilitation patients and that most physicians lack basic training in the field, it seems important, for our patients, to develop basic training and simple tools and pathways.

The Rehabilitation in Intensive Medicine – The role of Physical and Rehabilitation Medicine

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In structural, functional, multifactorial clinical contexts and disabling health conditions, Rehabilitation and Physical and Rehabilitation Medicine (PRM) play a fundamental role in a holistic activity for diagnosis, therapy, prevention and functional clinical prognosis, in critical / acute medical and surgical pathologies in Intensive Care Medicine-ICM (Intensive Care– IUC and Intermediate Care-IntUC Units), with a multiprofessional and inter-multidisciplinary approach.

The scientific literature shows clinical - health management (cost-effective) evidence of multiprofessional and inter-multidisciplinary teams, based on studies of multiprofessional/disciplinary intervention models advantages versus non-integrated mono-professional/disciplinary intervention models. It includes interdisciplinarity between medical specialties and multidisciplinary among health professionals (in rehabilitation: PRM physicians, rehabilitation nurses, physiotherapists, speech therapists, occupational therapists,..). Rehabilitation Team Work is the best clinical and management model for WHO.

Rehabilitation team organization in ICU/IntUC, under the coordination of a PRM Physician, is a clinical and management impact team model, based on the organizational, clinical activities and financing levels for rehabilitation and PRM; in the biopsychosocial model, centered in the patient; in interdisciplinary with other medical and surgical specialties, in various areas and phases of intervention.

The approach to Critically Ill's Rehabilitation is multiprofessional, inter-multidisciplinary, multimodal, individualized (even with flowcharts and protocols -"adapted standardization"), depending on patient's level of awareness and degree of collaboration, on pathology(ies) and it (their) severity, on clinical and functional complexity, on previous and current functional degree.

It includes a range of heterogeneous interventions, from 48 hours until the 5th day in IUC (accomplished the exclusion criteria), due to (medical and surgical) population heterogeneity and clinical-functional situation.
The role of the PRM Physician includes: Patient's holistic clinical- functional assessment, metric instruments and functional tests application, (additional) subsidiary diagnostic exams (SDE) performance, correlation of previous SDE and the PRM requested or applied exams, the performance of clinical and functional diagnoses, clinical meetings with other medical colleagues, PRM clinical and functional prognosis, rehabilitation team coordination (clinical discussion, prescription, supervision of multiprofessional interventions), critically ill's alignment decision at IUC discharge to other levels of health (rehabilitation) care.

In the various rehabilitation interventions for critically ills are: promotion of early removal of sedation, improvement of delirium, promotion of ventilatory weaning and tracheostomy decannulation, functional respiratory reeducation, neuromuscular electrical stimulation, early mobilization, transfers and gait training, orthopedic, neurological and effort reconditioning functional training. Metric assessment instruments are need as: Chelsea Critical Care Physical Assessment tool or Physical Function ICU test, Perme Intensive Care Unit Mobility Score, Morton Mobility Index. Also, different PRM/ multiprofessional functional texts, ICF, others SDE should be carried out.

The PRM role and Rehabilitation Team Work enables high level and earliest respiratory functional reeducation, neuromuscular electrical stimulation and mobilization in critically ills.

In health management, we allocate limited economic/financial resources to virtually unlimited needs of Health, namely in critical, acute, subacute and chronic patient's rehabilitation, through the continuum of different levels of care. Health management "opportunity cost" of developing Rehabilitation and the activity of the PRM Physician in ICM is measurable in "Monetary units", "Functionality", Activity", "Participation", "Quality of Life", "Years of life saved" versus "Mortality" and "Co-morbidities".

Rehabilitation of Patients With Traumatic Brain Injury in Hungary

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Background: Rehabilitation services are typically hospital-based in Hungary. Rehabilitation of patients with neuro-musculo-skeletal disabilities can take place on 6 914 inpatient rehabilitation beds all over the country. Number of treated cases in rehabilitation units was 95 693 in 2019 before the covid-19 pandemic (47% degenerative joints problems, arthritis, after operative treatment of osteoarthritis). The ratio of postacut rehabilitation programs was 40%. Neurological disabilities were about 20% of all rehabilitation cases. In details: 13 769 post-stroke, 909 severe brain injury, 753 spinal cord injury cases, and 3 795 others (MS, GB SY, brain tumors, craniotomy etc).

In Hungary rehabilitation of severely brain-injured patients is carried out by centers, similar to acute care (the 4 centers are: National Institute for Medical Rehabilitation (NIMR) in Budapest, and at the university clinics in Debrecen, Pécs, and Szeged). After acute care (neurointensive unit), the rehabilitation of patients with severe brain injury usually continues in the rehabilitation ward after consultation, but it can also take place in the form of outpatient, day hospital care or in the patient's home. The average time of patient admission to the rehabilitation unit after the accident is 3-4 weeks. The time of acute care can be increased by the severity of the brain injury, various interventions (measurement of brain pressure, treatment of intracranial bleeding, decompressive craniectomy, implantation of a ventriculo-peritoneal shunt), or treatment of other injuries: thoracic, abdominal, limb. Any complication of the intervention listed above, various bacterial infections (urinary, respiratory) or septic conditions will also delay admission to the rehabilitation unit.

Aim: Presentation of the rehabilitation practice of patients suffered severe brain injury in Hungary and description of the results achieved in the department of the National Institute for Medical Rehabilitation specializing in the rehabilitation of patients with traumatic brain injury.

Methods: Retrospective evaluation of the rehabilitation process and prospective follow-up five years after discharge of patients with severe traumatic brain injury from rehabilitation unit.

Results: The Brain Injury Rehabilitation Unit of NIMR has multi-disciplinary rehabilitation team, headed by UEMS PRM (Union of European Medical Specialists) Board-certified physician. They have a postacute rehabilitation program with accreditation by UEMS PRM Board. The number of beds is 40, and 8 for the early cases, the staff is also about forty. During 2017 year 256 patients were treated in the unit, in details: 88 patients with severe traumatic brain injury, 104 stroke patients, and other 64 patients having disability with other neurological origin (MS, GB SY, brain tumors, craniotomy etc). The average length of stay was 54 days, mortality rate 0,4%. Bed occupancy rate in the unit was 95%. Most of the patients were discharged to their own home after rehabilitation program (198 of 256). The Unit is specialized for rehabilitation of patients with traumatic brain injury. Of 66 patients with severe traumatic brain injury, treated during 2013 year fifty patients (13 women and 37 men) were successfully contacted for follow-up (51%), and three patients deceased. The mean age of the patients was 42 years (range: 22-72). The majority of them (36/50) were injured in traffic accidents. The mean duration of coma and length of post-traumatic amnesia were 19 (1-90) and 45 days (5-150), respectively. Patients were admitted for rehabilitation on the 44th (11-111) day after the injury and were treated for 95 days (10-335). Thirty-eight patients became independent at daily living activity during the rehabilitation period, two patients needed moderate and one a little help for the activities of daily living. After successful rehabilitation 4 patients continued their higher education, 24 patients return back to work (six in sheltered, six in the original, 12 in other workplaces). Twenty-two patients did not have permanent jobs, two of whom were retired.

Conclusions: After the acute care, rehabilitation of patients with severe brain injury should be carried out in center where multidisciplinary team has experience in treating such patients. Based on our research after completing specialised rehabilitation program the majority of the patients with severe traumatic brain injury were successfully reintegrated into society. More than half of the patients returned to work or continued their studies. These successes were greatly facilitated by the multidisciplinary team working and the 40 years of experience in rehabilitation of patients with severe brain injury.

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Are amputee prostheses really intelligent ? and still artificial? overview on innovations in the age of artificial intelligence

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In the past and until the 1980s, performance and efficiency depended on mechanics and materials. The first technological leap in the 1980s led to the development of prostheses adaptive to activity and activity in the environment, through the integration of electronic sensors and data processing. The second scientific and technological jump was, in the 2000s, the regulation between joints, between components, to simulate human neurophysiology and biomechanics.

But are these prothesis-called “bionic and intelligent” really intelligent?
What is the most important form of intelligency ? probably “relational intelligency”, which allows the intuitive adaptation of behavior in situations, both in action and in reaction.

In order to better understand the progress and limits of current lower limb and upper limb prostheses, top-down approaches and bottom-up approaches will be presented and even “opposed”, based on examples of commonly used devices for clinical routine and research/development. A prosthesis is totally integrated when it interacts naturally with the remaining physiology. We can say that the prothesis is not artifical (!!) because the fusion is being total between individual and technology.

Application of New Technology in Rehabilitation: Difficulties in the Daily Clinical Practice

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Objective: Medical care underwent significant development during the past decades by applying advanced technology. Innovations also appeared in several fields of rehabilitation: assistive technology, supporting functional improvement in neurological conditions, prosthetics and orthotics, etc. The expectations are high, but several times, they do not meet the real results. This work aims to provide expert's opinions and experiences regarding the application of computerized therapeutic devices in neurological rehabilitation, focusing on daily clinical practice.

Method: Overview of robotic and non-robotic computerized interactive devices and what problems should be overcome during their application.

Results: These devices are usually applied in the scope of a rehabilitation programme, sometimes as a single intervention. Several rehabilitation providers have only one or two machines and cannot apply the appropriate device according to the actual functional status of the patient. In certain cases, the same therapist gives traditional and robotic therapy; in others, a specialized therapist provides robotic-mediated therapy. The intensity of this kind of therapy is also very different. The main limitations are as follows: lack of high-level scientific evidence for the appropriate clinical application; the devices usually can support the functional development only of a part of the body (e.g. shoulder-elbow, but not the whole upper limb) opposite to a physiotherapist; most of the devices make possible practising on a screen and not with real objects, in real life situations; the cost-benefit ratio is still rather low, sometimes the device does not fit correctly to the patient's body.

Conclusions: The new technologies provide promising opportunities to reach better functional outcomes in rehabilitation. To meet these expectations, we should have more scientific evidence regarding the way of use, more complex devices, and possibilities for practising activities of daily living.

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Keywords: advanced technology, robotics, clinical methodology, limitations

Rehabilitation in Patients With Metabolic Conditions

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Given the rates of persons with disabilities or post acute conditions who are also obese, it appears of importance for PRM specialists to familiarize with the principles in Rehabilitation of Metabolic conditions. Obesity is a chronic condition often associated with multiple comorbidities which can have disabling consequences. Most research on obesity treatment has focused on life-style modification, pharmacological treatment and on bariatric surgery. Unfortunately, being severe obesity chronic and disabling, such “weight centered” approach has excluded those patients with advanced disease stage (with established/end stage organ damage, significant/severe psychopathology and functional limitations), who are either poor candidates for surgery or in whom weight loss alone (especially in sarcopenic obesity) is unlikely to significantly reverse quality of life reduction and disability. If advanced-stage obesity represents a disabling disease in a multidimensional perspective, therefore a multidisciplinary and integrated rehabilitative approach is required. According to current guidelines, the management of severe obesity in a rehabilitative setting should be multidisciplinary and characterized by the integration of nutritional, physical/functional rehabilitation, psycho-educational, and rehabilitative nursing interventions in relation to the clinical complexity of obesity. The intensity of the rehabilitative interventions should depend on the level of severity and comorbidities, frailty of the psychic status, degree of disability and quality of life of the patient. The rehabilitative setting must be structurally adequate to the needs of patients with excess of body mass with availability of bariatric lifting and transferring aids. The lecture will revise the existing recommendations, the current guidelines and the range of multidisciplinary rehabilitative interventions, including novel adjuvant treatments supported by initial experimental evidence, for patients with comorbid obesity.

Implementation of evidence based research into practice in the field of rehabilitation

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Although a considerable amount of knowledge is being generated through evidence-based research, the implementation of this knowledge into practice is slow, taking 17 years or more. This is referred to as the "know-do-gap" whereby research evidence is known but not used in practice. "Knowledge translation" has emerged as a paradigm to learn and act towards closing this gap. Knowledge translation (KT) is defined as a dynamic and iterative process that includes the synthesis, dissemination, exchange and ethically sound application of knowledge to improve health, provide more effective health services and products, and strengthen the health care system. This process takes place within a complex system of interactions between researchers and knowledge users which may vary in intensity, complexity and level of engagement depending on the nature of the research and the findings as well as the needs of the particular knowledge user. KT research (implementation science) addresses to study the methods to promote the uptake of research findings into practice. Various models/frameworks that can be used to support KT practice and research have been developed. One of the most commonly used framework is the Knowledge-to-Action-Cycle (KTA), which composes knowledge creation funnel and the action cycle. Knowledge creation includes knowledge inquiry, knowledge synthesis, and knowledge tools/products. The action cycle includes the following phases: 1) Identify a problem that needs addressing; identify, review, and select the knowledge or research relevant to the problem, 2) Adapt the identified knowledge or research to the local context, 3) Assess barriers and facilitators to using the knowledge, 4) Select, tailor, and implement interventions to promote the use of knowledge, 5) Monitor knowledge use, 6) Evaluate the outcomes of using the knowledge, 7) Sustain ongoing knowledge use.

It has been reported that research evidence is not adequately integrated into clinical practice in the field of rehabilitation throughout the life span and across various conditions such as stroke, musculoskeletal disorders, and paediatric conditions. KT research in rehabilitation aims to identify individual and organisational barriers and facilitators and to develop, implement and assess the impact of strategies used to narrow the know-do-gap. Recently, some papers have reviewed the KT activities and research initiatives in the rehabilitation field. In the context of KTA framework, knowledge creation activities include literature synthesis, surveys, systematic reviews, and guideline development. Barriers to uptake of research outcomes in rehabilitation include both individual and organisational factors such as lack of time, lack of knowledge/skills, lack of motivation, limited confidence in critical appraisal and use of research information, reimbursement and cost-related issues, and limited environmental context and resources. Higher academic degrees, organizational or leadership support, positive perspective of clinicians, accessibility of related knowledge tools, close proximity between researchers and clinicians, and supportive environment are factors found to facilitate research implementation. Common KT interventions (generally multi-component) include educational workshops, development of online platforms to support implementation, expert or mentor consultation, audit and feedback strategies, and leadership strategies. Monitoring knowledge use, evaluating outcomes, and sustainability plans/activities have also been reported in some KT papers.

Engaging knowledge users (e.g. clinicians, educators, administrators, patients, caregivers, other consumers) in the implementation process can improve the success of KT interventions as shown by integrated KT models. A successful knowledge translation requires the contribution of all stakeholders to create an optimal physical and social infrastructure. Studies reporting on KT practice and KT research in

the field of rehabilitation (mostly conducted in high income countries) have considerably increased in the last 10 years. Rehabilitation is a complex multi-disciplinary dynamic process conducted within multi-level healthcare systems involving interactions between all stakeholders. Given this complex nature of rehabilitation, efforts to facilitate implementation of research into practice in the field of rehabilitation should be carried out with strategic planning at national and international levels.

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Recommendations for Outcome Measure Validation and Evaluation in Rehabilitation (ROVER) – Initiative in Collaboration With Cochrane Rehabilitation

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The reliability and validity of patient-reported outcome measure (PROM) can be viewed from many different perspectives. There are tens of terms used in psychometric research to describe the properties of PROMs. The use of these terms often requires profound knowledge of psychometric literature remaining hardly understandable for most of clinicians and even for some researchers. There are great diversity and inconsistency in psychometric taxonomy, term definitions and interpretation of results obtained through psychometric analysis. The lack of comprehensive, clear of excessive statistical jargon and easy-to-use recommendations for conducting psychometric research may result in developing and using PROMs that are not valid or reliable. This, in turn, may significantly complicate planning or executing rehabilitation interventions as well as produce imprecise data for decision makers when allocating limited rehabilitation resources.

In 2023, the Cochrane Rehabilitation founded a project group in order to develop Recommendations for Outcome Measure Validation and Evaluation in Rehabilitation (ROVER). The aim is to develop recommendations for testing the properties of both new and already used survey metrics. Recommendations are going to include the taxonomy of psychometric terms, checklists, tools for the assessment of risk of systematic bias in psychometric publications, and suggestions for the most common statistical methods that can be used for testing survey properties. The recommendations emphasize a clinical practical perspective. At ESPRM 2024, we present our initial proposal on the definitions and taxonomy of the most common psychometric concepts.

Oral Presentations

Rehabilitation After Stroke 1

Performing the Box and Block Test in Extended Reality To Assess Post-Stroke Manual Dexterity: Using Controllers or Hand-Tracking in Immersive Virtual-Reality, and Mixed-Reality

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BACKGROUND: Regular upper limb assessments are crucial for effective stroke rehabilitation. Virtual reality (VR) and mixed reality (MR) has emerged as an innovative tool, offering immersive experience, give the ability to repeat measurements, and to provide kinematics data.

AIM: This cross-sectional study addresses a gap in the literature by comparing the content and concurrent validity of different Box and Block Test (BBT) versions using hand tracking (BBT-VR-HT) and controllers (BBT-VR-C) devices in VR, and mixed reality (BBT-MR) among individuals with stroke (IWS). Hypotheses include larges correlations between these tests and traditional BBT, and potential differences in scores in favour of the traditional BBT. Secondary objectives involve assessing usability and reliability in IWS and healthy control subjects (HCS).

METHOD: 17 IWS, 21 HCS and 5 healthcare professionals in rehabilitation took part to the study. For the content validity, healthcare professionals were asked to perform the BBT, the BBT-VR-C, the BBT-VR-HT and the BBT-MR. They had to answer a questionnaire assessing the differences between the technological tests and the traditional BBT. HCS and IWS were asked to perform the BBT, the BBT-VR-C, the BBT-VR-HT and the BBT-MR three times with the dominant hand for HCS, and with the paretic hand for IWS. Statistical analyses included Pearson and Spearman correlations, repeated measure ANOVA test, and Friedman test. Short-term test-retest reliability was calculated using intraclass correlation coefficient (ICC) between the second and the third trial. Usability of the three technological tests were also evaluated by HCS and IWS with the System Usability Scale.

RESULTS: Regarding the content validity, healthcare professionals assessed the BBT-VR-HT (0 [0 – 1]) and the BBT-MR (0 [0 – 1]) as equally difficult to traditional BBT, and the BBT-VR-C (1 [0 – 2]) as more difficult to the traditional BBT. Concerning concurrent validity, there were large correlations between the third score of BBT and the third score of BBT-VR-C ($r = 0.741$; $p < 0.001$), BBT-VR-HT ($r = 0.944$; $p < 0.001$), and BBT-MR ($r = 0.953$; $p < 0.001$) among IWS. IWS rated the usability of BBT-VR-C as good (70 [42.2 – 80]). This of BBT-VR-HT (80 [53.75 – 93.75]) and this of BBT-MR (77.5 [46.25 – 92.5]) were rated as excellent. HCS rated the usability of BBT-VR-C (82.5 [67.5 – 92.5]), this of BBT-VR-HT (92.5 [82.5 – 97.5]) and this of BBT-MR (85 [76.25 – 93.75]) as excellent. Short-term test-retest reliability for BBT-VR-C (ICC = 0.928; $p < 0.001$), BBT-VR-HT (ICC = 0.976; $p < 0.001$) and BBT-MR (ICC = 0.989; $p < 0.001$) were rated as excellent for IWS. The same results were observed for BBT-VR-C (ICC = 0.923; $p < 0.001$), BBT-VR-HT (ICC = 0.860; $p < 0.001$) and BBT-MR (ICC = 0.758; $p < 0.001$) for HCS.

DISCUSSION AND CONCLUSION: The BBT-VR-C, the BBT-VR-HT and the BBT-MR are valid, usable, and short-term reliable tools to assess post-stroke gross manual dexterity. Those tests hold potential to be used both in research and clinical practice.

Immediate Effects of Training With Serious Games on Balance Boards on Symmetry and Limits of Stability After Stroke: Game-Paced Games and Self-Paced Games

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BACKGROUND: It is recommended to combine balance training after stroke with virtual reality (VR) – serious games (1, 2). Specifically, VR balance training in stance can be done with pressure-sensitive balance boards that provide information about the movement of the user's center of pressure (COP) (1). The game should correspond to the patient's therapeutic goals and promote desirable movement patterns. More symmetrical weight distribution within the legs and increasing limits of stability (LOS) are common impairment-level goals to improve balance in post stroke patients. An important factor for the usability of serious games in neurological patients, which determines the level of difficulty, can lead to frustrations, and affects game enjoyment and motivation (3), is the speed of the game. It determines how fast the user's movement response should be. Both custom and non-custom games can be divided according to the control of speed to (a) self-paced games in which speed is controlled by user; and b) game-paced games in which speed is set by the game. To our knowledge, no study has directly compared the effects of serious games on balance boards between self-paced and game-paced games.

AIM: Comparison of immediate effects on symmetry of weight distribution and LOS after playing game-paced and self-paced VR balance games in patients after stroke.

METHODS: 27 persons (56±10 years old) in 11.6±10.4 years post-stroke participated. A week before first intervention session they were familiarized with the 12 games (2 minutes each). Over 2 intervention sessions (randomized blocks of self- and game-paced games) in 2 consecutive weeks, participants played games that promoted movement of COP in comparable directions (each game 5 minutes), using the non-custom (Nintendo Wii Balance Board with Wii Fit games, Nintendo) and custom (Equio, Kinestica) balance systems. Before and after each session weight distribution symmetry between the affected and unaffected leg and LOS (50 % and 75 % of theoretical limit) were assessed with a force-plate (Equio, Kinestica). Paired t-test or Wilcoxon's test were calculated to test for differences in parameters (before-after) for the game-paced and the self-paced blocks, and between the blocks.

RESULTS: Symmetry of weight distribution was significantly greater after self-paced games than before ($p = 0.02$), but not after the game-paced games. There was increase in LOS reaction time after self-paced games and decrease of COP movement velocity after self- and game-paced games. COP excursions decreased, and COP directional control increased after both games groups (all $p < 0.05$). However, no statistically significant differences of induced changes in weight distribution symmetry ($p = 0.41$) and LOS parameters ($p > 0.13$) were found between the game-paced and the self-paced games. Conclusions: Self-paced games induced effects on more studied parameters than game-paced games. In general, both group of games are comparable in terms of facilitation of symmetry of weight distribution and improvement of LOS.

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Efficacy of Cerebrolysin and Extended Poststroke Rehabilitation on Upper Limb Motor Recovery in Subacute Stroke Patients With Severe Upper Limb Motor Impairment – A Randomized Clinical Study

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BACKGROUND: The recovery of stroke patients with severe impairment is usually poor and limited and, unfortunately, under-investigated in clinical studies. In order to support neuroplasticity and modulate motor recovery, Cerebrolysin combined with rehabilitation treatment has proven effective in the acute stroke phase in moderate to severe motor impairment (1).

AIM: The aim of this study was to determine the efficacy of extended poststroke rehabilitation combined with Cerebrolysin on upper limb motor recovery in subacute stroke patients with severe upper limb motor impairment.

METHOD: A randomized, double-blind, placebo-controlled study was conducted. Sixty patients at the early stage of severe sub-acute stroke who fulfilled all eligibility criteria were randomly assigned to the Cerebrolysin group or placebo group (n = 30 each). Both groups, after conducting three weeks of conventional rehabilitation treatment five days per week, continued to perform conventional rehabilitation treatment three times per week until 90 days of rehabilitation treatment. The primary outcome measure was Action Research Arm Test (ARAT), and the secondary outcomes were the Fugl-Meyer Assessment-Upper Extremity (FMA-UE) motor score, Barthel index (BI), and National Institutes of Health Stroke Scale (NIHSS). The outcome data were evaluated before, after three weeks of treatment, and on the 90th day of rehabilitation treatment and compared within groups and between the two groups. There were no adverse events.

RESULTS: Both groups showed a significant improvement ($p<0.001$) over time in BI, FMA-UE, ARAT, and NIHSS scores. Patients receiving Cerebrolysin showed more significant improvement in post-stroke upper limb motor impairment and functioning compared to the placebo group after only three weeks, and the trend was maintained after 90 days of follow up.

DISCUSSION AND CONCLUSION: According to the literature, maximum arm function is achieved by 80% of patients within three weeks after stroke and by 95% of patients within nine weeks of the post-stroke period(2). Only 5-20% of stroke patients achieve complete functional recovery of the upper limb after the rehabilitation(3). The functional impairment of the upper extremity at baseline after stroke is the strongest predictor of motor outcome three months after the stroke (4). In our study, patients receiving Cerebrolysin showed significantly more improvement based on the findings reported in post-stroke upper limb motor impairment compared to the placebo group after only three weeks, as measured by the FMA-UE, and the trend was maintained after 90 days of follow up. Similarly, the results of our study have also shown significant improvement in ARAT score as a measure of functional activities of the upper limb. Significant superiority in BI score was noted in the Cerebrolysin group compared to the placebo at the 90-day evaluation. The effect of Cerebrolysin could be explained by its multimodal impact on the mechanisms of immediate neuroprotection and long-term neuroregeneration enhanced by extended neurorehabilitation(1).

Cerebrolysin delivered in the early subacute post-stroke phase added to extended conventional rehabilitation treatment is beneficial and improves motor functional recovery in patients with severe motor impairment, especially on the paretic upper extremity.

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Rehabilitation Treatment Option for Post-stroke Patients With Soft Exosuits Robot Using a Treadmill

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BACKGROUND: Diseases of the nervous system often result in severe movement coordination disorders, asymmetry, and a decline in the overall quality of life. Gait rehabilitation stands as a primary objective in the management of stroke patients. Technological devices have emerged as innovative tools for neurological patient rehabilitation and, in recent years, various types of robotic devices have gained popularity in rehabilitation programs for these conditions.

AIM: The aim of our study is to investigate whether ReStore-assisted gait training (RAGT) is a more effective method for improving motor and walking skills than conventional training (CG) in chronic stroke patients. We hypothesize that robot-assisted training can effectively improve patients' movement, clinical symptoms, mobility, and quality of life.

METHOD: In this prospective, randomized, controlled study, 20 patients were randomized. (RAGT group, n=10, CG group, n=10) The experimental group did 15 sessions of 30 minutes of intensive robot-assisted walking training per treatment, while the control group participated in 30 minutes of traditional training. All patients were evaluated using 10-minute walk test (10MWT), the 4-meter Walk Test (4mWT), Timed Up and Go test (TUG), the Quality of Life Questionnaire (EQ-5LD) and posturography before and after treatment.

RESULTS: There were no differences in the baseline values between the groups of patients. Our robot-assisted treatment proved to be effective in improving motor walking skills of stroke patients after 15 training sessions. The RAGT group showed significant improvement in walking endurance, motor skills and walking performance compared to the control group (10-MWT (p=0.001), 4mWT, TUG (p=0.031), 5Q-5LD and walking speed (p=0.022) The RAGT group shows an average of 10-20% better results than the CG group. These results indicate that RAGT may benefit stroke patients with gait impairment and potentially improve their rospects for independent social living.

DISCUSSION AND CONCLUSION: Repeated intensive walking training appears to be a more effective treatment modality for improving endurance and walking speed in stroke patients, especially in those with severe walking disability. The results of our research suggest that repeated intensive gait training as a robot-assisted treatment offers an opportunity for the obilization of patients with severe gait and movement disorders and results in a significant improvement in the quality of life of stroke patients. Physical abilities are also improved by automatisms and individually adjustable load intensity. Robot-assisted treatments provide a good opportunity for the development of patients both in the early and chronic stages.

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Rehabilitation in Spine Disorders 1

Postural Analysis in Medical Students Versus Physiotherapy Students

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BACKGROUND: The posture and body alignment develop in a time when an increasing number of children and young adults are dealing with a variety of spinal deviations due to incorrect postures during study, leisure or work (1,2).

AIM: The main objective of our study was the comparative analysis of posture and body alignment in students of two different specialties (Medicine versus Physiotherapy program).

METHOD: 23 students of "Victor Babes" University of Medicine and Pharmacy, Timisoara, Romania (9 medical and 14 physiotherapy students) were included in the study. They were assessed using the GaitOn Posture Analysis System. The system evaluates the subjects from multiple views, offering a detailed report of abnormal deviations: anterior (lateral head tilt, shoulder drop, lateral trunk sway, lateral pelvic drop, Q-angle), posterior (rear foot eversion or inversion), right and left lateral (forward head angle, shoulder protraction, genu recurvatum).

RESULTS: When comparing the two groups, we noticed that there were no significant differences of all the parameters, except of the horizontal alignment of the head. The students in the physiotherapy program had a significant increased head inclination to right (p=0.01). Positive correlations were recorded between body weight and left Q angle (p=0.025), right rear foot (p=0.014) and left rear foot (p=0.02).

DISCUSSION AND CONCLUSION: The abnormal deviations in four different views (anterior, posterior and right and left lateral) are important to be identified and corrected. The students of two medical specialties (medicine versus physiotherapy) have particular features regarding the physical involvement. The physiotherapy students are more exposed to a physical work (for example when practicing massage or physical exercise) in contrast to medical students in the first study years. When analysing healthy students in two different specialties, no significant differences were registered, except for the head alignment. The prevention strategies with the increase of physical activity is envisaged in both study groups.

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Disability and Pain After Lumbar Decompression and Fusion – A Group-Based Trajectory Analysis

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BACKGROUND: Change in disability and pain after lumbar spine surgery has usually been assessed by following the changes in average estimates. Only a few studies have attempted to identify distinguished groups with different trajectories of changes in question.

AIM: To identify groups with different trajectories of changes in pain and disability after spine surgery and to establish the associations of age, sex, preoperative pain duration and obesity with probability to be classified into a particular group.

METHOD: Group-based trajectory analysis of register-based data (n=1,451).

RESULTS: Two kinds of group-based trajectories were identified for each of three factor variables (disability level and back and leg pain) – trajectories reflecting a substantial long-term improvement (long-term improvement group) and trajectories showing only a mild short-term improvement (short-term improvement group). The long-term improvement groups comprised around 2/3 to 4/5 of the cohort. Sex and age were not significantly associated with the risk to be classified into any of short-term improvement groups. Preoperative duration of pain was significantly associated with that probability, but only for back pain severity (RRR 1.28 [95% CI 1.01 to 1.61]). BMI≥30 kg/m2 was connected to a probability to be classified into of short-term improvement group for all three factor variables (disability and back and leg pain) with RRR varying from 1.26 (95% CI 1.02 to 1.56) to 1.45 (95% CI 1.10 to 1.90).

DISCUSSION AND CONCLUSION: The main limitation was related to a register-based design. Necessary information might not be unavailable (only a few variables accessible), data collection had not been done by the researcher, confounder information was mostly lacking, there was missing information on data quality. Also, the results obtained from as single highly specialized university clinic might not reflect the situation in primary health care or less specialized non-university clinics.
It seems that the majority of patients undergoing lumbar spine surgery experience relief of pain and functional improvement immediately after the surgery, and this effect lasts up to two years. However, there is a smaller group of patients who also experience temporary relief (three months after the operation), but that effect does not last long and at the end of the two-year follow-up, their pain and functional status is practically the same as it was before the operation. The patients who received only temporary relief from the operation reported particularly strong pain and functional limitations even before the operation. When examining the role of age, sex, preoperative pain duration and obesity in terms of surgical outcomes, only obesity was associated with a worse outcome. In other words, already in the planning phase of the surgery, we can expect that overweight, very painful patients whose functional ability is severely limited will experience only short-term relief and after two years will probably be in the same situation in terms of pain and functional limitations as before the operation. This information can affect patient selection, frequency of follow-up, use of medications, targeting of pre- and postoperative rehabilitation, etc.

REFERENCES: None

Retrospective Study of Rehabilitation after Lumbar Spine Surgeries

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BACKGROUND: Rehabilitation after spine surgeries can pose a challenge for the rehabilitation team, particularly if complications occur or after multiple spinal surgeries, especially if the patient has significant functional impairment, pain and neurological symptoms. In such cases, rehabilitation may not always meet the expectations of the patient and the rehabilitation team.

AIM: The aim of this study was to summarize the effectiveness of rehabilitation for lumbar spine surgery patients in our department over the last 10 years. We hope this can contribute to the rational planning of rehabilitation programs for similar cases in the future.

METHOD: Between January 2013 and September 2023, 112 patients who met our inclusion criteria, underwent lumbar discectomy, decompression, or fusion surgeries because of degenerative changes within the last 6 months and were rehabilitated in our department. These patients spent at least two weeks in the department. The longest-lasting stay was 107 days. Septic and traumatic cases were not included in the study. Rehabilitation was discontinued for three patients due to the need for reoperation due to mechanical complications. Using the available data, changes in rehabilitation outcome indicators (length of stay, pain, muscle strength, sensory changes, mobility, FIM, Barthel Index, autonomic dysfunction) were examined upon admission and discharge. Whether the complications were related to the spine surgery or pre-existing was considered during the evaluation. The number of previous surgeries and other factors (comorbidities, age, psychological difficulties, medications, pre-existing residual symptoms) were also considered.

RESULTS: We observed improvement in the significant majority of our patients. In cases with complications, the average admission FIM improved from 105 (48-126) points to 114 points (48-126), and the Barthel Index improved from 71 points (20-100) to 88 points (20-100). In successful spine surgeries, the FIM improved from 114 points (85-126) to 121 (109-126), and the Barthel Index improved from 84 (50-100) points to 96 points (75-100). 18 out of 23 patients with recent-onset severe paresis improved by at least 1 value on the MRC Grade muscle strength scale. Considering that the group of patients who underwent spine surgeries was not homogeneous (age, number and type of previous surgeries, complicated and uncomplicated spine surgeries, long-standing functional impairments, etc.), smaller, more homogeneous subgroups were compared with each other (e.g., complicated vs. uncomplicated surgery, number of spine surgeries, required assistive devices, orthoses).

DISCUSSION AND CONCLUSION: According to our investigations, rehabilitation for patients with complicated spine surgeries yields a significant challenge to the medical team, with a considerable number of permanent impairments. Nevertheless, a well-planned rehabilitation program is generally effective, although it may take longer. Further prospective research is planned to refine the data.

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Myths and Facts About Whiplash Injury of the Neck

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BACKGROUND: Whiplash injury is very common and known to cause chronic neck pain in up to 30-50% of people. There are a lot of controversies about diagnostic procedures and treatment of this condition. The gold standard to evaluate the injury and predict outcome are PROMs such as Neck Disability Index. However, PROMs are subjective and susceptible to malingering. Imaging methods (radiographs, CTs, MRIs of the cervical spine) showed to be unhelpful in detecting patients at risk of developing chronic neck pain. Shear wave elastography showed higher trapezius muscle stiffness after injury, but it is not valid to predict patient recovery after six months. Standardized treatment options like soft collar, myorelaxants, NSAID use, or physical procedures like TENS and therapeutic ultrasound don't change recovery trajectory. Although medical exercises are the basis of the treatment, there is still no evidence of their positive impact on recovery. However, adherence to exercise is a well-known problem, and lower adherence could minimize the effect of the exercises.

AIM: To analyse adherence to exercise and effect on recovery after the injury through smart phone application versus standard written exercise form.

METHOD: Randomized-controlled trial analyzing the effect of adding a mobile app to standard treatment on adherence and recovery after the injury. The intervention group received a once-a-day push notification via mobile app as a reminder to exercise. Questionnaires regarding adherence to exercise, NDI, and Pain Catastrophizing Scale were filled out initially and six months after the injury. Likert scale was used to assess recovery (no, partial or full recovery).

RESULTS: Until September 12th 2023, 40 participants were enrolled in the study, 34 allocated, and are in 6-month follow-up period.

DISCUSSION AND CONCLUSION: The results and conclusions of the study will be presented at the ESPRM congress 2024.

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Repercussions of Cervical Collars on the Respiratory Function in Healthy Volunteers – A Comparison of Collars Used in Common Practice

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BACKGROUND: Respiratory insufficiency and its complications increase morbidity and are the main cause of mortality in neuromuscular disorders (1). In these patients, emerging of neck weakness leads to head drop and prevents the compensatory recruitment of cervical accessory inspiratory muscles (2). Different cervical collars are used for head support. It is unknown if cervical collars further prevent that compensatory respiratory support.

AIMS: To compare the repercussions of different cervical collars on the respiratory function in healthy individuals and obtain normative data.

METHODS: Healthy volunteers, without respiratory or neuromuscular diseases, were recruited and evaluated with respiratory function tests - slow (SVC) and forced (FVC) vital capacity; peak expiratory (PEF) and cough (PCF) flow; maximal inspiratory (MIP) and expiratory (MEP) pressures; nasal inspiratory pressure during a sniff (SNIP), maximal voluntary ventilation (MVV), mean oxygen saturation by pulsed oximetry (SpO2). Cervical strength was calculated using a dynamometer. Pain, dyspnoea and comfort were also assessed (with numeric rating scale). The volunteers were sequentially evaluated without a cervical collar, and then with 3 different types of collars: foam, “Headmaster” and “Philadelphia”. The evaluations were performed after using each of the collars for 10 minutes and with a 10-minute interval in between. A randomisation in blocks of six was done to determine the order by which each of the collars was assessed to prevent a fatigue component. Differences were assessed with paired t-test and repeated measures ANOVA with Bonferroni correction. $P<0.05$ was considered as significant.

RESULTS: Fourteen healthy volunteers were recruited (11 women; mean age 63.3±16.5 years; body mass index 25.5±2.6 kg/m2). Significant differences between using or not the collars were found for FVC ($p<0.001$), SVC ($p=0.015$) FEV1 ($p=0.007$), PEF ($p=0.045$), MVV ($p=0.004$), MIP ($p=0.007$), MEP ($p=0.022$) and PCF ($p=0.024$), with worse results for the Philadelphia collar. The Headmaster did not limit the respiratory function as much as the foam collar in many of the parameters and was subjectively and significantly reported as being the most comfortable while the Philadelphia was the least comfortable. Dyspnea or pain were reported in 3 patients with the Philadelphia collar and 1 with the foam collar. Tiffeneau index, SNIP, SpO2 and cervical strength showed no significant differences ($p>0.05$).

DISCUSSION AND CONCLUSION: Cervical collars can significantly limit the performance of respiratory tests in healthy volunteers. The most comfortable collar with the least impact on the respiratory function was the Headmaster, which should be considered upfront when deciding on a cervical collar prescription. Further studies are needed in neuromuscular patients.

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Gait and Walking Analysis

Postural Balance Assessment After Total Hip Arthroplasty for Osteoarthritis

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BACKGROUND: Total hip arthroplasty (THA) is a surgical procedure with the aim of relieving pain and restoring functionality in patients with hip joint degeneration. Postural balance assessment plays an important role in the management of patients with THA since it impacts patient's stability (1).

AIM: The aim of this study it to evaluate postural stability in patients before and after THA.

METHOD: It's a prospective and descriptive study conducted in the department of Physical Medicine and Rehabilitation of university hospital « CHU Ibn Rochd » in Casablanca, Morocco. 38 Patients who underwent unilateral THA were recruited to assess postural balance before surgery, 3 and 6 months after THA using timed up and go test (TUG test) and time duration of single leg stance. We excluded patients with double THA, those who have a neurological condition or any other condition that would likely affect balance control. All patients had standard post operative functional training including muscle strengthening and proprioception.

RESULTS: The mean age was 58.3 years old with a male predominance. All patients had THA after hip osteoarthritis. Significant differences were observed concerning TUG test and time duration of single leg stance before and after surgery. The average TUG test before surgery was 45 seconds with 78.9% using assistive devices. Single leg stance was impossible for 31.5% and lasted only <5sec for 68.4%. 3 months after surgery, the average TUG test was 23 seconds with 42.8 % still using assistive devices. Single leg stance lasted in average 8 sec. 6 months after surgery, the average TUG test was 16 seconds with only 10.5 % still using assistive devices. Single leg stance lasted in average 10 sec.

DISCUSSION AND CONCLUSION: In our study, TUG test combined with time duration of single leg stance showed that THA can initially affect patient's ability to maintain postural stability. Thus, patient must undergo a structured rehabilitation program where balance assessment in an important component in order to monitor patient's progress in restoring stability. TUG test is a clinical assessment tool to evaluate mobility, balance and functional capacity and to provide valuable information about patient's risk of falling and to walk without any assistive devices (2).

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Spasticity and Dynamic Plantar Pressure Distribution Measurements in Hemiplegic Spastic Children

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BACKGROUND: The relationship between spasticity and modification of plantar pressure distribution in hemiplegic spastic children

AIM: The aim of this study was to analyse the plantar pressure distribution in eighteen hemiplegic spastic children to illustrate the dynamic alteration during stance phase linked spasticity grade

METHOD: The graduation of the lower limb muscle tone related to the Aschworth (Asch) spasticity scale enabled us to identify two groups of hemiplegics subjects. The groups Asch 1 and Asch 3 have respectively presented, a low and a strong spasticity. The peak pressures during consecutive gait cycles were determined under the feet of 30 healthy children and two cerebral palsy groups (respectively three and six children) using a wearable footprint analysis system.

RESULTS: A statistical study showed a similarity between the two disabled groups. Peak pressures under the midfoot were significantly higher compared to the control group. While the plantar pressure distribution profile was specific for each group under all other anatomical structures. The significant alterations were observed under the forefoot and hallux
A statistical study showed a similarity between the two disabled groups. Peak pressures under the midfoot were significantly higher compared to the control group. While the plantar pressure distribution profile was specific for each group under all other anatomical structures. The significant alterations were observed under the forefoot and hallux

DISCUSSION AND CONCLUSION: Spasticity modifies the foot contact to the ground and leads to a specific plantar pressure distribution profile linked to the spasticity grade (1). The equinovarus with clawed toe deformity due to higher spasticity seems to be an important factor in terminal stance phase perturbations (2). However spastic hemiplegic subjects seem to adopt a gait pattern in agreement with stability optimization criteria (3)

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Gait Variability Assessment Among Individuals With Previous Lower Leg Overuse Injury

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BACKGROUND: While walking is considered a rhythmic and cyclic activity, it's important to note that each step is not identical to the preceding or subsequent one (Pappas et al., 2018; Winter, 1984). Variations in consecutive strides, known as variability, are a direct result of the underlying mechanisms governing gait, as outlined by Nicholas Stergiou et al. (Stergiou et al., 2004). To evaluate gait variability, kinematic or spatiotemporal measures often employ the standard deviation and coefficient of variation (Brach et al., 2005). Although, substantial variations in gait parameters are commonly reported in movement disorders, limited research has investigated gait variability as either a risk factor or a consequence of injury (Strongman & Morrison, 2020).

AIM: This study was undertaken to explore differences in gait variability among infantry soldiers with prior lower leg overuse injuries when walking barefoot and when wearing tactical boots.

METHOD: Active-duty male infantry soldiers (n=32) from the Latvian Land Forces with medical-record of lower leg overuse injuries within the six months prior to the study. Throughout the study, the individuals were fully recovered, reported no functional limitations, and were able to engage in a wide range of physical activities without any restrictions. Gait analysis was conducted at the Rehabilitation Research Laboratory of Rīga Stradiņš University. Gait cycles (n=50) were recorded under both barefoot and shod conditions. Only straight walking patterns were included into the analysis. Stride time, stride length, and gait variability were assessed.

RESULTS: The length of the barefoot stride was reduced ($X^2(1)=15.87$; $p<0.001$), while the duration of the barefoot stride was extended ($X^2(1)=47.24$; $p<0.001$) in comparison to the shod gait. When compared to the shod walking, the barefoot gait exhibited increased stride length variability ($X^2(1)=22.12$; $p<0.001$). The stride time variability was 1.98 ± 0.79% during barefoot walking and 1.24 ± 0.01% during the shod walking ($X^2(1)=10.17$; $p<0.001$).

DISCUSSION AND CONCLUSION: Tactical boots usage significantly alters gait parameters, and the evaluation of shod gait can mask the musculoskeletal injury risk of a lower leg.

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Using Virtual Reality to Assess and to Treat Mobility, Cognitive, and Perceptual Impairments: A Canadian Clinical Perspective

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Background: Clinicians have adopted virtual reality (VR) for assessing and treating a wide range of motor, cognitive, and perceptual impairments. The CAREN-Extended VR system at The Ottawa Hospital Rehabilitation Centre consists of a large projection screen combined with a six degrees-of-freedom treadmill and has been an integral component of rehabilitation. This system has been used for more than 10 years among military and civilian clinicians to address treatment goals such as balance/spatial orientation, vestibular dysfunction, gait and dual-task training, pseudoneglect, and graded sensory integration. Although VR rehabilitation literature has shown many benefits [1-3], there are still no standard guidelines on how to integrate VR technology into clinical care.

Aim: To capture the valuable expertise gained through clinical pattern recognition by distributing a user-based survey to military and civilian clinicians using VR in their clinical care.

Methods: Clinicians at the Canadian Forces Health Services and The Ottawa Hospital (18 physiotherapists, 1 occupational therapist), who use the CAREN-Extended VR system, were invited to participate in a survey querying how the VR was used as a component for assessment, treatment, and how this technology improved patient care.

Results: Nine clinicians responded (8 physiotherapists and 1 occupational therapist) from military and civilian practice areas. Clinicians reported that VR complimented standard care by providing a multi-domain environment to assess dual-task performance, vestibular deficits, and spatial deficits; providing direct visual feedback on rehabilitation task; and providing a safe environment to challenge patients and providing reactive balance and gait training that cannot be performed in a clinic setting. Key lessons learned included 1) identify specific VR rehabilitation goal(s) for optimal outcomes, 2) be mindful of cognitive fatigue and overdosing on VR treatment, and 3) consider more clinical screening tools to capture range of issues.

Discussion: Three VR rehabilitation themes emerged from the survey responses: assessment, treatment, and education. Clinicians conduct a VR assessment by observing how mobility is affected with a single stimulus and progress by increasing complexity of sensory and balance stimuli. This allows clinicians to better define deficits or support clinical observation, which is beneficial for complex presentations. Clinicians use VR to treat a wide range of mobility, cognitive, and perceptual impairments. VR treatment is highly adaptive in real-time and provides treatment opportunities that were difficult to replicate in the traditional clinic setting. VR treatment is not considered a standalone rehabilitation program but was integrated into the patient's treatment program after considering patient-specific goals and limitations, community activity, and outcomes from standard clinical assessment tools. VR is also key in providing direct cause/effect for symptom management and pacing education, and providing patients with confidence in mobility activities, especially for patients whose impairments are less visible such as sensory or perceptual deficits. Clinical observations from VR can also lead to adding other clinical screening tools and/or modifying home programs to maximize patient functional outcomes.

Conclusion: The information presented will demonstrate how our rehabilitation centre successfully integrated VR into physiotherapy and occupational therapy programs to treat mobility, cognitive, and perceptual impairments.

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Advances in Robotic Rehabilitation

Development in Robotic Rehabilitation

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BACKGROUND:

AIM: How the European Robotic School worked to develop and expand robotic applications in rehabilitation. How is possible to overcome EBM criticisms in this field. How this educational methodology, mainly based in practical activities with robotic apparatus in real treatments in many different clinical conditions, can suggest educational upgrading for PRM doctors and team professionals.

METHOD: Four successfull School editions from 2017 created the possibility to share informations on clinical activities about robotic in rehabilitation in adult and young disabled people, connecting experiences and facilities, universities and research centers, Companies producers of robots ,specialists and engineers, disabled people associations to listen their opinions and rights. In these years Robotic School shared seeds to support a growing common cooperation in Europe in this field to try to overcome the EBM criticisms existing around this field and around these apparatus and their applications in rehabilitation. PRM . In PRM there is a growing opinion about positive effects of these treatments in many clinical conditions so it is needed to stimulate, together a developed education and competence, a great cooperation on research to reach great numbers, by valid research protocols and methodologies, to avoid actual negative condition regarding clinical evidence. So the school , connecting experts in health and technology, teachers, participants, companies offered the possibility to built a Community working together in an international perspective. Common treatment protocols using a specific robot in defined clinical conditions and patients , sharing problems and solutions, to connect datas and results.

RESULTS: Actually there are 236 registered participants in the Community, in 5 Continents, working in 19 Groups working by similar standards and similar tools. Research can receive a really great and positive advance . In the same way education can receive new contents to enrich competences for PRM doctors and for the other professionals involved in these treatments . Both these lines are relevant to promote dissemination of robotic treatments in many rehabilitation fields.

DISCUSSION AND CONCLUSION: Surely it is necessary to evaluate how the School could be encreased and developed in the future: for example creating some different editions every year, eventually in different places /countries , focused on different clinical fields and conditions applying indications from Community Working Groups to better share informations and practical indication. And to enlarge in the same time the research activities and the possibility to collects great number of qualified datas. European Congress can be a fruitfull moment for these evaluations to be suggested to the European PRM bodies.

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A Multifaceted Comparative Analysis of Treadmill and Overground Gait Training: High-Tech Innovations and Biomechanical Aspects

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BACKGROUND: Relearning to walk is crucial in restoring the mobility and functionality of patients with various musculoskeletal and neurological disorders. Integrating high-tech robotic systems into rehabilitation can significantly advance gait-relearning methods. (1) In-depth and objective analysis is essential for the effective development of the district so that the rehabilitation process can be guided in the most appropriate direction. For this, it is necessary to have a precise knowledge of the biomechanical characteristics of gait on different surfaces to ensure the highest level of support for therapy. (2)

AIM: This overview aims to demonstrate the therapeutic benefits of high-tech in both methods and analyse the biomechanical differences between treadmill and overground gait.

METHOD: The authors describe the possibilities of supplementing gait training with modern technological tools for neurorehabilitation. Also, a literature search was performed in the PubMed and Web of Science databases. The authors followed the PRISMA Extension for Scoping Reviews (PRISMA-ScR) statement. Studies were selected by two assayers, and a third reviewer resolved disagreement. The following keywords were used as inclusion criteria to extract data: overground and treadmill and biomechanics or kinematics. Papers published between 2018 and 2023 in English were included. PubMed had 9 articles, and Web of Science had 161 articles. After merging the two databases and excluding duplications, 164 papers remained. Seven exclusion criteria were determined: not an original article (review, letter, etc.), not aimed at gait as biomechanical aspects, treatment done in children (under 18), drug trial, participants were not only healthy people and case studies.

RESULTS: One of the key benefits of advanced technological devices in neurorehabilitation is that they provide a safe and controlled environment for performing movements and tasks that may be difficult or even impossible to achieve in a traditional therapeutic environment. The therapy is highly complemented by dynamic body weight support, virtual and augmented reality, and visual and auditory feedback.
In analysing the biomechanical differences between treadmill and ground-based therapy, the authors concluded that it is important to keep these differences in mind as they may influence the effectiveness of the therapy and are not negligible factors in gait analysis.

DISCUSSION AND CONCLUSION: This overview provides a detailed presentation of the similarities and differences between therapies conducted on a treadmill and overground training, considering the complementary high-tech and biomechanical aspects. The overview offers valuable insights for clinicians and researchers by outlining the effects on different biomechanical parameters.

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Usability Evaluation of the T-grip Thumb Exoskeleton to Support Lateral Pinch Grasp in Sci Patients

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BACKGROUND: The human thumb is the most important finger to establish opposition, what enables the application of precise grasping and object manipulation(1). T-GRIP is a very lightweighted robotic hand exoskeleton that supports the lateral pinch grip by actuating the thumb movement(2). This frequently used grasp (certainly in SCI patients) allows patients to complete a wide variety of tasks, including picking up and manipulating objects.

AIM: To assess the usability, performance, user acceptance and satisfaction of T-GRIP.

METHOD: A feasibility study was conducted, in which five SCI individuals with hand function problems (C5-C6 lesion) performed a usability protocol. The System Usability Scale (SUS) and Usefulness, Satisfaction and Ease of use (USE) questionnaire were used to measure the subjective usability. Also unilateral hand performance was tested both with and without T-GRIP. User acceptance (Technology Acceptance Model) and satisfaction (Quebec User Evaluation of Satisfaction with Assistive Technology) were measured with questionnaires.

RESULTS: Both usability questionnaires showed a good usability (SUS score (mean (sd)): 80 (15.7); USE (mean (sd)): Usefulness 5.28 (0.95), Ease of use 5.42 (1.11), Ease of learning 6.65 (0.52) and Satisfaction 5.4 (1.17)). The Grasp and Release Test showed that T-GRIP especially supported participants during the manipulation of heavier objects (weight, fork and tape). All participants were not able to grasp these objects without using T-GRIP. In addition, a high level of user acceptance and satisfaction was measured. Participants were most satisfied with the safety and weight of the device. Comfort was rated lowest.

DISCUSSION AND CONCLUSION: T-GRIP seems an interesting assistive device for SCI individuals, since the current prototype scored good on usability, performance, user acceptance and satisfaction.

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Always On Time Assistance Achieved with a Biomimetic Ankle Exoskeleton: A Proof of Concept

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BACKGROUND: The main source of propulsion in healthy human gait are the muscles and tendons that plantarflex the ankle [1]. During walking, the ankle behaves similarly to a spring-loaded mechanism; energy is stored within the Achilles tendon during the stance phase and subsequently released in a short burst during push-off [2]. Impaired individuals (e.g. post-stroke) often struggle to generate propulsion due to muscle weakness and loss of voluntary muscle control [3]. Various ankle exoskeletons have recently been developed to address this [4]. Precise timing of the exoskeleton assistance has turned out to be crucial.

AIM: We created a novel ankle exoskeleton named ANkle EXoskeleton using TReadmill Actuation for Push-off assistance (AN-EXTRA-Push) [5]. Using a brake and an elastic tendon, AN-EXTRA-Push harnesses energy of a moving treadmill during stance phase, then releases it during push-off to aid with plantarflexion torque generation. Our goal with these measurements is to show that the biomimetic design of our device ensures automatic synchrony between the device and its wearer's own efforts.

METHOD: One healthy adult male (38 years, 181 cm, 78 kg) walked on an instrumented treadmill at 0.6 m/s. He wore AN-EXTRA-Push on his left leg. Kinematics, EMG signals and assistance torques were recorded. Measurements were made at multiple assistance levels.

RESULTS: Kinematics remained substantially similar across all conditions. A gradual decrease in soleus activity corresponding with increased assistance was observed. Activity of tibialis anterior was increased while the assistance was present. Gastrocnemius muscle group was largely unaffected. The shape of the torque profile of the device was substantially similar to the wearer's biological torque.

DISCUSSION AND CONCLUSION: AN-EXTRA-Push functions as an external Achilles tendon. The mechanical design of the device dictates the torque profile of the assistance, therefore no complex control algorithm is necessary to synchronize the device with the body's own efforts. Soon, we plan on conducting a study on 15 healthy participants and a few stroke subjects.

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Artificial Intelligence Method for a Holistic View on Functioning

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BACKGROUND: Patients benefit from a wide, biopsychosocial perspective on functioning when making rehabilitation assessments. The ICF framework is developed to understand functioning profoundly [5], and its use should be enhanced, both for clinical purposes and knowledge-based management [2,3]. Low back pain (LBP) is the leading cause globally for years lived with disability. Non-specific LBP is a symptom without a known pathoanatomical cause, and its treatment needs a biopsychosocial approach. [1]

AIM: The aim of the study was to develop a technological method to support the decision-making for the tailored biopsychosocial rehabilitation of patients with non-specific LBP, in accordance with the ICF framework.

METHODS: A patient sample of 93 chronic non-specific LBP patients was gathered. The data used was free text from Electronic Health Records. A semantic network-based machine learning engine, Graphmind by HeadAI, which has the capability to imitate human reading and processing of texts [2,4], was applied to determine semantically best matches between the ICF code definitions and natural language of the data. The results of Graphmind was tested against the findings of a domain expert, which was regarded as the golden standard.

RESULTS: The algorithm reached sensitivity of 83.1% (95% CI 79.9 to 86.3) and specificity of 99.84% (95% CI 99.80 to 99.89) in the analysis dataset of 20 patients. Furthermore, when comparing the content of the codes, the domain expert found 119 distinct codes from the analysis dataset, whereas the algorithm found 112 codes. [4]

DISCUSSION AND CONCLUSIONS: Graphmind performed the factor recognition of ICF information from texts of patients with LBP with convincing sensitivity and specificity. The limitations of the study were that the data was narrow, since it focused on one diagnosis group and contained only physicians' notes. Secondly, the training data was prepared and the analysis made by only one domain expert. In future, new larger and richer datasets will be tested, and analyzed by multiple experts.
In conclusion, the study suggests that the method developed has the capability to be used as an interface in the computing architectures of health care for making holistic tailored decisions based on disability.

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Rehabilitation After Stroke 2

Interhemispheric Paired Associative Electromagnetic Stimulation Treatment in Upper-Limb Sub-Acute Ischemic Stroke Patients

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BACKGROUND: Unilateral stroke disrupts the activity balance between the hemispheres, causing excessive inhibition of one hemisphere over the other and hinder brain's recovery and rehabilitation effectiveness [1,2]. Thus, a unique paradigm of transcranial magnetic stimulation (TMS) using interhemispheric paired associative stimulation (PAS) protocol, known to influence the connectivity between the two stimulated areas, may benefit patients by regaining the interhemispheric balance [3,4].

AIM: To evaluate the feasibility and safety of a multi-session cc-PAS treatment using a dual-channel deep transcranial magnetic stimulation (dTMS) system on the rehabilitation outcomes of subacute ischemic stroke patients.

METHOD: First-ever ischemic sub-acute stroke patients with moderate-to-severe upper limb hemiparesis are randomized to receive 15 sessions of Active or Sham PAS delivered to the two motoric areas, as add-on to occupational therapy. The order of stimulation (which hemisphere is stimulated by the 1st paired pulse and which by the 2nd) is individually determined, according to the order which enhances the evoked motoric response of the affected hand or decreases the response of the healthy hand. Motor function is evaluated before and after treatment, as well as following 1 and 2 months by an occupational therapist, blinded to the randomization. Outcome measures include the Fugl - Meyer for Upper Extremity (FGM-UE), Action Research Arm Test (ARAT), Box and Blocks Test (BBT), and eTMS-evoked potentials.

RESULTS: Interim analysis of the first 20 patients indicates statistically significant improvement in BBT performance of the affected hand following three weeks of active treatment (P=0.05). Additionally, FGM-UE significantly improved following active treatment in patients affected in their non-dominant hand (P=0.004). Finally, improvement in the affected hand seems to be associated with baseline functioning and resting motor threshold of the healthy hand.

DISCUSSION AND CONCLUSION: dTMS cc-PAS was found to be safe and feasible in the post-ischemic sub-acute stroke population. Further data collection will determine whether our PAS procedure enhances motoric rehabilitation in post-ischemic sub-acute stroke patients. Baseline motor functioning and motor threshold of the healthy hand may reflect stroke severity and rehabilitation prognosis.

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Assessment and Rehabilitation of Unilateral Spatial Neglect using Haptic Feedback and Virtual Reality

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BACKGROUND: The syndrome of UNILATERAL SPATIAL NEGLECT (USN) is a complex and heterogeneous syndrome characterized by reduced awareness of stimuli on one side of space, despite no sensory loss. Patients with USN experience a wide range of functional spatial deficits, including eating food from only one side of the plate, bumping into objects while walking, and shaving only one side of their face. The diagnosis and rehabilitation of USN pose challenges due to its complexity and variability across different sensorimotor modalities [1]. Traditional typically involve paper and pencil procedures that isolate cognitive functions from real-life contexts.

AIM: The aim of this study is to assess the effectiveness of an innovative and effective approach and explores the potential of Virtual Reality (VR) technologies for the evaluation and rehabilitation of USN syndrome in ecological environment.

METHOD: We use our homemade haptic device with a virtual hospital - based tool, different modules and difficulty levels [2]. Two groups were examined: the first group comprised of USN patients with post-right ischemic stroke (number=12; mean age=61.2 years; 9 males, 3 females), while the second group served as healthy controls (number=30; mean age=44 years; 22 males, 8 females). The experiments followed standard ethical practices . The ecological assessment of the USN was conducted using the Catherine Bergego Scale (CBS) [3], across various levels of difficulty during 90 days.

RESULTS: The experiment shows a statistically significant difference between Day 30 and Day 90 compared to Day 1 (probability-values ranging from
0.002 to 0.003). The analysis of the compared absolute variations of Day 90 compared to Day 1 and Day 30 of the different tests shows that maintaining the gain obtained was possible and could even last over time.

DISCUSSION AND CONCLUSION: The overall analysis of the CBS revealed the possibilities of transfer of acquired knowledge from the test situation to daily life were satisfactory, particularly in improving phenomena of neglect centered on the body (such as toileting and dressing) or on distant spaces involved in travel. Maintaining the obtained results was possible, which demonstrates the positive impact of the technique.

The proposed approach validates the effectiveness of the experimental method using virtual reality as a diagnostic and therapeutic tool. VR offers advantages such as ecological validity, reproducibility, and measurability compared to traditional methods. This approach goes beyond traditional paper and pencil procedures and considers the challenges associated with USN since it integrates cognitive functions with real-life contexts and enhances patient outcomes and quality of life using VR technologies.

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Contribution of Hemineglect, Lateropulsion and Motor Impairment on Balance Disturbance in a Right Stroke Population With Acquired Standing: A Cross-Sectional Study

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BACKGROUND: One of the consequences of the aftermath of a stroke is balance disturbance that leads to an increased risk of falls and loss of autonomy (1). To date, the factors involved in this balance impairment, particularly in patients with right stroke, remain a subject of discussion, including the implications of spatial cognition disorders (2).

AIM: To identify factors related to balance disturbances in a cohort of patients with right-sided stroke

METHOD: A cross-sectional multicenter randomized trial involving patients with right stroke in the subacute phase was conducted. This study assessed lower limb motor function, spasticity, sensitivity, lateropulsion, and spatial cognition (hemineglect test, straight ahead, and longitudinal body axis). Balance was evaluated using the Berg Balance Scale (BBS), with a threshold of less than 45/56 chosen to signify balance disturbance (3). Factors at the initial time point were analyzed using both univariate and multivariate logistic regression techniques.

RESULTS: 82 patients were analyzed (mean age (years):59.3 (10.3); time post-stroke (days):91.3 (59.6)), of whom 61 had a BBS score <45. Multivariate analysis revealed a significant association between BBS and lower limb motor function (odds ratio [OR] =0.8; p=0.002), lateropulsion (OR= 6 ; p=0.03), and hemineglect tests (OR = 19 ; p=0.02).

DISCUSSION AND CONCLUSION: The presence of lower limb motor function, hemineglect, and lateropulsion induce a loss of balance capacity and should be taken into account in rehabilitation.

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Muscle Ultrasound Assessment of Spasticity in Post-stroke Patients From Acute to Chronic Phase: Preliminary Results From a Prospective Observational Study.

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BACKGROUND: Due to muscle overactivity, upper motor neuron syndrome (UMNS) may lead to muscle stiffness, a disease-related alteration in tissue properties. Ultrasonography (US) reveals morphological changes in muscle architecture.

AIM: To evaluate the association between US muscle modifications and clinical assessment, and its possible predictive role in estimating spasticity onset in post-stroke patients.

METHOD: This is a prospective observational study. US echointensity (EI) was examined by the Modified Heckmatt Scale (MHS), a 4-point ordinal scale where the normal muscle is Grade 1 and Grade 4 shows extreme fibrosis (hyperechoic like bone). Grade 2 estimates increase in EI tissue of 10-50%, Grade 3 a marked increased EI, 50-90%, with reduced distinction of bone echo from muscle. Clinical spasticity was assessed with the Modified Ashworth scale (MAS). US images of extremities were taken using standardized locations and positioning for each muscle. Muscles included were elbow, wrist and fingers flexors; rectus femoris, triceps surae. Clinical and US measurements were assessed over 15 days following stroke, then after 3, 6, and 12 months. Spearman's coefficient correlation was recorded between MAS and MHS.

RESULTS: 50 participants were enrolled in this study. 13 women and 37 men, mean age of 57 years, 31 ischemic, 19 hemorrhagic stroke. MAS and MHS scores were found to be correlated for upper limb flexors ($p< 0,00005$), rectus femoris ($p<0,0005$) and plantarflexor muscles ($p<0,0001$).

DISCUSSION AND CONCLUSION: These preliminary results may suggest that US could be a valid approach to study spasticity from the early UMNS stage. The HMS can reliably evaluate echogenicity in spastic muscle, indicating the level of fibrotic change, according to MAS assessment. These are effective tools in identifying individuals needing treatment for spasticity.

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Evaluating the Impact of Transcranial Stimulation on Quality of Life in Stroke Survivors: An Assessment Using the International Classification of Functioning, Disability, and Health (ICF) as an Outcome Measure

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BACKGROUND: Stroke survivors often face significant challenges related to functional impairments and reduced quality of life [1]. It is imperative to utilize common effective tools, such as transcranial Electrical Stimulation (TES), as a therapeutic intervention for improving these outcomes in stroke survivors [2]. However, the effectiveness of transcranial stimulation on real data of stroke survivors has not been tested.

AIM: To determine the impact of TES on the International Classification of Functioning, Disability and Health (ICF) scores of stroke survivors, which includes body functions and structures, participation restrictions, activity limitations, and environmental influences.

METHOD: A retrospective secondary data using hospitalisation data analysis involved 120 stroke survivors from various rehabilitation centers in Jazan, Saudi Arabia. TES was introduced as a part of the patients' rehabilitation regimen. ICF scores were measured at baseline, and then at six and twelve months post-intervention. TES was administered across all centers with identical dosages and session durations. A physical therapist reviewed patients' records before and after administering TES to compare the patients' condition before and after the intervention, and isolate the effects of TES. Specifically, 58.3% of participants had their stroke in the 6 to 12-month range prior to the study, while 41.7% had their stroke within the first six months before enrolling. Each session of TES lasted approximately 30 minutes, five times a week, for four weeks. The intensity of the stimulation was set at 2 mA, and applied across all treatment sessions in the study. Paired t-tests and one-way repeated measures ANOVA employed for comparative analysis.

RESULTS: The study revealed significant improvements in the ICF scores over time, suggesting beneficial effects of TES on the functional status and quality of life of stroke survivors. The mean ICF score improved from 50.2 at baseline to 36.4 at six months and 28.8 at twelve months post-intervention. The improvements were statistically significant in various domains of health and well-being, including body functions, participation restrictions, activity limitations, and environmental influences.

DISCUSSION AND CONCLUSION: TES appears to be a promising therapeutic intervention for improving functional status and quality of life in stroke survivors, particularly when introduced in the early stages of rehabilitation. The findings suggest a need for further research to examine the long-term effects of this intervention and to compare its effects with other rehabilitation therapies. The study supports the incorporation of transcranial stimulation in stroke rehabilitation protocols to enhance functional recovery and quality of life in stroke survivors. Future studies should explore the potential long-term effects of this therapy, compare it with other therapeutic interventions, and replicate the study in different geographical and cultural contexts to further substantiate these findings.

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Diagnostic Ultrasound

Ultrasound Findings for Diagnosis and Staging of Adhesive Capsulitis of the Shoulder in a Rehabilitation Consultation.

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BACKGROUND: Adhesive capsulitis (AC) is a common shoulder condition characterized by pain and decreased range of motion (ROM) with unclear pathogenesis. It is classified into two categories; primary or secondary and is associated with a wide variety of systemic conditions. Its diagnosis is primarily clinical, based on medical history and physical examination. However, high-resolution ultrasound has been demonstrated as a valuable imaging test for assessing shoulder pathology (1). It is a quick, cost-effective tool that allows for dynamic assessment of the shoulder; however, its role in the diagnosis of AC is not fully described.

AIM: The primary objective of this preliminary study is to establish an ultrasound assessment protocol for patients clinically diagnosed with AC in rehabilitation clinics. We aim to assess the correlation between the disease and ultrasound findings.

METHOD: This preliminary case-control study has been conducted since November 2022 in a musculoskeletal unit within the Physical Medicine and Rehabilitation Service. Shoulder ultrasounds were performed on 72 subjects. Of these, 36 had AC (cases), and 36 subjects exhibited no shoulder pathology (controls). We recorded measurements of coracohumeral ligament (CHL) thickness, subcoracoid fat area, and the presence of Doppler signals in the rotator interval. Statistical analysis was performed using SPSS version 29.0.

RESULTS: We observed statistically significant thickening ($p < 0.001$) of the CHL in the cases group compared to the control group. The presence of vascularization in the rotator interval (RI) was statistically significantly higher in cases compared to controls. Additionally, we found statistically significant differences in the subcoracoid fat triangle area, with it being larger in phase I than in phase III. The results obtained allow us to establish an optimal cutoff value for CHL thickness for diagnosing AC, with high sensitivity and specificity.

DISCUSSION AND CONCLUSION: Ultrasound assessment provides comprehensive support at clinical, diagnostic, and therapeutic levels in adhesive capsulitis of the shoulder (2). Thickened CHL and the presence of Doppler uptake in the rotator interval suggest adhesive capsulitis of the shoulder, making it an accessible test to support the diagnosis of AC in a rehabilitation consultation (3, 4, 5). However, further studies are needed to validate these findings.

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Ultrasound-Guided Collagen Injections in the Treatment of Chronic Supraspinatus Tendinopathy: A Randomized Controlled Trial

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BACKGROUND: Collagen injections have been recently proposed for the treatment of different musculoskeletal disorders such as osteoarthritis[1] and tendinopathies[2]. Following the results of experimental studies conducted by Randelli and collaborators on cultured human tenocytes[3],[4], in 2019 we performed a prospective observational pilot study to verify the effects of a series of 4 collagen ultrasound-guided injections in a group of 18 patients with chronic supraspinatus tendinopathy[5].

AIM: To investigate whether administration of collagen is superior to dry needling in reducing pain, improving function and favouring tissue repair in patients with supraspinatus chronic tendinopathy.

METHOD: Forty patients with chronic supraspinatus tendinopathy were recruited. Twenty patients received a series of 4 type 1 collagen ultrasound-guided injections at weekly intervals (Group A) while the remaining twenty underwent a series of dry needling following the same protocol (Group B). Primary outcomes included the Constant Murley (CM) score and the DASH questionnaire and were collected at baseline (T0) and at 2 weeks (T1), 1 month (T2) and 3 months (T3). Sonography was performed at the enrolment and at 3-month follow-up in order to verify changes in the tendineous structure by means of a standardized ordinal grading scale.

RESULTS: We obtained improvements in almost all the enrolled patients but we achieved stronger effects in group A compared to group B at T2 and T3, with statistical significance. About the ultrasound evaluation, we analysed the percentage variation of the grading scale score and we reached better results in group A compared to group B.

DISCUSSION AND CONCLUSION: Dry needling is used in the treatment of tendinopathy because it improves blood flow and enhances tissue repair[6]. The aim of the present RCT was to compare dry needling with type 1 collagen injections in the treatment of chronic supraspinatus tendinopathy. Results were almost equivalent at early follow-up both in terms of clinics and ultrasounds. At medium and late follow-ups collagen injections proved to be more effective than dry needling. Moreover, in the treatment group ultrasonography showed a more complete regeneration of the tendon structure compared to control group.
Collagen injections could be a valid alternative for the treatment of chronic supraspinatus tendinopathy. More trials are needed to confirm our preliminary data.

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Ultrasound-Guided Hydrodistension Infiltrative Treatment in De Quervain's Disease

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BACKGROUND: De Quervain's disease is a painful condition of the wrist that causes difficulty in daily activities. It is a stenosing tenosynovitis of the first dorsal compartment of the extensors. It is caused by inflammation of the tendon sheaths of the long abductor pollicis longus (APL) and extensor pollicis brevis (EPB) which leads to an abnormal gliding of these tendons at the wrist. In about 2% of cases, there is a fibrous tendon septum that divides the first compartment into two compartments.

AIM: The aim of this study was to evaluate the efficacy of ultrasound-guided hydrodistension treatment in patients diagnosed with De Quervain's stenosing tenosynovitis [1].

METHOD: Ninety-five patients with ultrasound diagnosis of De Quervain's disease underwent infiltrative treatment of ultrasound-guided hydrodistension of the first extensor compartment [2]. If a compartment was present within the tendon sheath, the needle was redirected into the sub compartment and half of the material was injected into each compartment to effect hydrodistension of the two structures and break the dividing septum.

RESULTS: Ninety patients achieved a significant clinical improvement in pain symptoms after the infiltration procedure. The VAS score before the infiltration treatment was 7.65 ± 1.31, and the mean VAS score at 2 months follow-up was 1.65 ± 2.32. Twelve patients needed a second infiltration after 1 month due to persistent symptoms (VAS 6.35 ± 1.22), which resolved after the second hydrodistension.
In five patients, who presented with a fibrous septum dividing the two compartments at the level of the first extensor compartment on ultrasound, ultrasound-guided infiltrative treatment was not conclusive and surgery was necessary.

DISCUSSION AND CONCLUSION: The results of this study demonstrated that ultrasound-guided infiltrative treatment into the dorsal first compartment of the wrist was clinically effective in patients with De Quervain's disease [3]. The presence of an intra-compartmental septum poses a risk both for the development of De Quervain and for the failure of corticosteroid treatment. In conclusion, about 95% of patients undergoing ultrasound-guided infiltrative treatment in De Quervain's disease achieved a marked improvement in pain symptoms already after the first infiltrative treatment, with consequent improvement in joint ROM.

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Sonoanatomical Median Nerve Changes in Moderate-Severe Carpal Tunnel Syndrome After Surgical Release: Preliminary Results

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BACKGROUND: Carpal tunnel syndrome (CTS) is the most common upper limb compressive neuropathy. Sonography has burst into the diagnosis of this process, providing multiple advantages over traditional neurophysiological studies (1, 2). However, studies exploring potential sonography median nerve modifications over time after a surgical nerve release are still lacking (3).

AIM: To explore the changes over time of the sonoanatomical changes of the median nerve after surgical release in patients with moderate to severe CTS.

METHOD: Quasi-experimental study of a consecutive sample of patients with moderate/severe CTS undergoing surgical treatment by median nerve release. Prospective follow-ups were performed 15 days, 3, and 6 months post-surgery. The primary outcome measure was the median nerve cross-sectional area at the entrance of the carpal tunnel (AST), which has been shown to have the highest sensitivity and specificity for diagnosing CTS. The Boston Carpal Tunnel Questionnaire (BCTQ) was used to evaluate symptoms (4).

RESULTS: 13 patients (2 males and 10 females) with a mean of 49,2±8,1 years of age were included in the study. The mean number of months since symptoms onset in percentiles was 36 (24; 18). The AST at baseline was 16,2±3,7 mm2. The AST at 15-days, three, and 6-month follow-up were 13,8±3,9, 12,4±5,1, and 11,9±3,7, respectively. The results of the BCTQ at baseline, 3 and 6 months were the following: Symptom Severity Scale 36,8±11,1, 19,3 ±7,3, and 17,5±7,6; and Functional Status Scale 23,4±6,8, 15,5±5,6, and 14,1±6,8. We observed a relationship between the difference in AST at baseline and 6 months and the functional BCTQ at the 6-month follow-up (p=0,046).

DISCUSSION AND CONCLUSION: The results of this study demonstrate that the median nerve has the capability to reverse the anatomical changes produced by nerve entrapment once surgical release is performed. The main changes were detected 15 days and 3 months after surgery. We consider ultrasound a harmless and helpful test to evaluate the results of surgical release in CTS. Based on our results, the optimal time to assess the impacts of surgical nerve release by sonographic examination is after three months.

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Ultrasound Evaluation of Tendinopathy in Hemophiliac Patients for the Purpose of Rehabilitation Indications

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BACKGROUND: Hemophilia is a inherited bleeding disorder that is characterized by recurring bleeding episodes. Hemophilic arthropathy is a secondary form of osteoarthritis that is characterized by an ultrasound level with the presence of intra-articular blood effusion, which can cause synovitis and synovial hypertrophy and causes damage to the articular cartilage.

AIM: The aim of the study was to evaluate the state of the satellite tendons of the target joints in the patient with hemophilic arthropathy and propose rehabilitation
treatment with eccentric exercises.

METHOD: The tendons of the joints mainly affected by hemophilic arthropathy were evaluated by ultrasound: biceps and triceps brachii tendons were assessed at the elbow, quadriceps and patellar tendons at the knee, and Achilles tendons at the ankle. The ultrasound examination was performed with a linear probe with musculoskeletal presets for elbow's tendons evaluation (7–16 MHz). The following ultrasound parameters were evaluated: maximum tendon thickness, echogenicity and echostructure alteration, signs of hyperemia on power color Doppler and presence/absence of calcifications [1]. The ultrasound evaluation is associated with the use
of evaluation clinical scales, such as the Hemophilia Joint Health Score, the Functional Independence Score in Hemophilia, the Hemophilia Activity List, the DASH, the VISA-A, the VISA-P and the VAS scale.

RESULTS: Twenty patients, all male, with hemophilic arthropathy were enrolled according to the study criteria. The thickness of all the tendons that were examined was normal. For the biceps tendon, there were no echostructural alterations, signs of hyperemia on the color Doppler and no intratendinous calcifications detected.
One patient had grade-two echostructural
changes in the triceps tendon, for the quadriceps tendon, grade-one echostructural changes were present in both quadriceps tendons in one subject. For the patellar tendon, no echostructural alterations were found and for
the Achilles tendon in one subject, grade-one echostructural alterations were present. For the triceps tendon one patient had grade-two neovascularization, but there were no color
Doppler signal changes in the quadriceps tendons of the studied subjects. For the patellar and the achilles tendon there was the presence of a grade-one neovascularization signal in one subject. In one subject, intratendinous calcifications were present
in both triceps tendons. For the patellar and Achilles tendon insertional tendon calcifications were present bilaterally in one subject.
In one subject, there were intratendon calcifications bilaterally in the patellar tendon [2].

DISCUSSION AND CONCLUSION: The tendons of the target joints in patients with hemophilic arthropathy are compromised by the indirect biomechanical damage caused by the joint disease, and rehabilitation treatment with eccentric exercises can be considered safe and effective in improving the tenso-elastic properties of the tendons [3].

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Rehabilitation in Spine Disorders 2

Efficiacy of Back School Program Amongst 14–17 Years Old Hungarian Adolescents

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BACKGROUND: Postural disorders have become incredibly common amongst children and adolescents due to the modern lifestyle. Low-back pain (LBP) is frequent in adolescents, partially due to their sedentary lifestyle and partly because of their ill-adapted physical activity (PA) (Fejérdy, 2001).

AIM: We aimed to measure the back care and spine disease prevention knowledge of adolescents in comparison with the results of children taking part in a back school program and in correlation with their PA.

METHOD: 253 adolescents between the ages of 14-17 years were selected into the cross-sectional study. Spine disease prevention knowledge was assessed with the HEBACAKNOW questionnaire (Monfort-Pañego et al, 2016). Furthermore, a subgroup of 22 individuals took part in a 45 minute long back school program, whose results were compared with the results of the main group. Independent T-test and chi-square test were used to analyse the data with the SPSS v.28.0 software. P-values lower than 0.05 were considered significant.

RESULTS: In the surveyed population the average spine prevention knowledge was measured as 59.26%, whereas the children's average knowledge participating in the back school program was 89.58%. Back care knowledge of the Hungarian adolescents is better than the previous studies indicated it to be. Additionally, the knowledge of children participating in the back school program is significantly better ($p<0.001$), although there was not any significant difference in the spine disease prevention knowledge age-wise ($p>0.05$). Both groups stood out with fairly good anatomical knowledge compared to the other knowledge groups evaluated in the questionnaire. Children participating in the back school program scored greatly in areas measuring knowledge about carrying school bags and also in carrying heavy objects. The other group presented great scores in the questionnaire about carrying school bags as well. Additionally, their back care knowledge stood out during the standing position. The results display no significant difference in the spine prevention knowledge between adolescent athletes and non-athletes ($p=0.165$). In addition to that, there was not any significant difference between adolescent athletes and non-athletes in any of the seven knowledge category assessed in the questionnaire ($p>0.05$). Significant difference cannot be detected in the knowledge between the ones, who suffer from spine disease and those who do not ($p=0,102$), and also in any of the seven knowledge categories assessed in the questionnaire ($p>0.05$).

DISCUSSION AND CONCLUSION: The results depicts, the spine disease prevention knowledge of children is above 50%, yet it is still considered a relatively low-score. However, the knowledge of children participating in the back school program is better than the general knowledge assessed in the young population. Spine disease prevention knowledge of the Hungarian adolescents is slightly better than we previously expected it to be. In conclusion, the knowledge of the assessed population is still insufficient to prevent spine diseases manifesting in the adulthood.

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Impact of Clinical Pilates Program in Healthcare Workers With Low Back Pain: A Within-Subjects Study

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BACKGROUND: Work-related musculoskeletal disorders (WRMD) are multifactorial, characterized by pain and functional disability(1). Musculoskeletal spine pain are the most common WRMD throughout Europe(2).
Chronic low back pain affects 23% of individuals (3), contributing to one of the major causes of physical and psychological distress, leading to work absenteeism and disability (3).
Healthcare workers are susceptible to chronic musculoskeletal injuries caused by progressive spinal overload, due to rotating shifts, demanding tasks, scarcity of rest and physical exercise(3).
Pilates seems promising in reducing chronic low back pain in adults, by centering on core stabilization, strength, flexibility, posture and breathing control (4). Recently, Clinical Pilates guided by physiotherapists has emerged, allowing the fundamental principles to be adapted to each individual's specific conditions (5).

AIM: Determine the impact of a 3-month Clinical Pilates program on 4 parameters among healthcare workers with chronic lumbar pain: quality of life, kinesiophobia, balance and lumbar spine flexibility.

METHOD: For this study enrolled 13 healthcare workers from various sectors within the same institution. The Clinical Pilates classes were held biweekly over a 3 months period. Participants were recruited through the referrals of their Physiatrist, who had been managing their chronic lumbar pain.
Prior to and following the program's initiation, the participants filled the Visual Analogue Scale (VAS), the Short Form Health Survey Questionnaire (SF-36), the Tampa Scale of Kinesiophobia (TSK) and the Patient Global Improvement Change Scale (PGIC). Equilibrium and lumbar spine flexibility were assessed using the Single Leg Stance Test and Fingertips to Floor Distance, respectively.

RESULTS: The VAS decreased for 55.6% of the participants. Significant improvements were observed in the SF-36 and TSK scores ($p<0.05$), along with notable gains in lumbar spine flexibility ($p < 0.05$). The PGIC demonstrated a positive perception of change, with 55.6% reporting feeling better or much better that prior the classes.

DISCUSSION AND CONCLUSION: Limitations of this study include the small sample size and lack of a control group, which poses challenges in discerning whether the enhancements in low back pain are only attributable to the Pilates intervention.
Healthcare professionals are at high risk for musculoskeletal disorders like chronic low back pain. Therefore should be part of preventive programs supported by their institutions, that should invest in resources and personnel to implement these programs. Incorporating Clinical Pilates classes can be valuable, promoting a healthy lifestyle, quality of life and professionals' productivity, reducing absenteeism.

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What Can I Do for My Low Back Pain? The Work in Progress Questionnaire!

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BACKGROUND: The 2018 Series on Low Back Pain (LBP) showed how to address the crippling impacts of lumbar ache, by delivering knowledge to people, consumers, clinicians, researchers, and policy makers through media [1]. Nonetheless, LBP (ICF: s760;b280) remains the number one reason for disability, retrieved in people of all countries, despite their ages, physical functioning, thoughts, behaviors, or incomes [2]. A proposed action to improve care of people with LBP draw our attention, and precisely its fourth statement which asserts that people with LBP "should be taught to self-manage and seek care only when really needed" [1]. There is growing evidence as for Commitment Therapy for people with LBP. However, we are not aware of a questionnaire which evaluates Commitment (ICF: d240) of people with LBP.

AIM: Describing the development and preliminary psychometric validation of the Work In Progress (WIP) questionnaire in the context of people with LBP, as a means to evaluate Commitment.

METHOD: The WIP was developed by item generation followed by reduction/selection. Psychometric testing included acceptability, face validity, reliability by internal consistency (Cronbach's alpha) and test–retest measurement (Intra-class Correlation Coefficient, ICC2.1), and construct validity by comparing the WIP questionnaire with the Pain Catastrophizing Scale (PCS) [3], the Oswestry Disability Index (ODI) [4], and a pain intensity Numerical Rating Scale (NRS) [5] (Spearman's correlation) [ClinTrials.gov NCT05932043].

RESULTS: The WIP, which includes ten items, was administered to 50 people with LBP (32 females, mean age of 53.4±12.8 years [range 25-80], median duration of LBP 54.1 weeks [range 3-360]). The tool was considered adequate as for face validity, appropriateness, acceptability and feasibility. The instrument's internal consistency was good (α =0.78), and its test–retest assessment excellent (ICC2.1 =0.84). Construct validity demonstrated a moderate correlation with the PCS (r =0.36), the ODI (r=0.49), and the NRS (r =0.44).

DISCUSSION AND CONCLUSION: The WIP questionnaire achieved a satisfactory degree of interrelatedness among items; a larger sample is advised to conduct an exploratory factor analysis. As for test-retest reliability, the questionnaire showed excellent performances, and this was mainly due to its relatively reduced variability (Confidence Interval [CI] at upper bound – CI at lower bound =0.24). The WIP questionnaire is moderately related to PCS, ODI and NRS, and this was as expected due to the different constructs of the other outcome measures.
The WIP questionnaire, an instrument which evaluates the level of Commitment in persons with LBP, was developed. This new tool showed satisfactory psychometric properties, and can be recommended for clinical and research purposes.

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Effects of Individually Designed Stabilization Exercises and Cognitive-Behavioral Therapy on Pain and Quality of Life in Patients With Chronic Low Back Pain

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BACKGROUND: Chronic low back pain (CLBP) is a complex bio-psycho-social condition. Therapy should address both physical and psychological consequences of CLBP.

AIM: To examine the effectiveness of individually designed exercise program and cognitive-behavioral therapy (CBT) on pain and overall quality of life in patients with CLBP.

METHOD: The prospective randomized clinical study included 130 patients divided into four groups. The group G1 had individually designed strengthening and stretching exercises with a set of stabilization exrecises plus CBT for chronic pain. The group G2 had the same exercise program but without CBT. The G3 had the standard exercise protocol without stabilization exercises. The G4 was a control group without any treatment. The therapy was carried out during 3 weeks. It was progressive in duration and number of repetitions. Numerical Rating Scale (NRS) and World Health Organisation Quality of Life – BREF Questionnaire (WHOQOL-BREF) were used to assess the therapy effectiveness, and they were administered before, right after and three months after the therapy.

RESULTS: After completion of therapy and on the control after three months, pain and quality of life was improved in both groups that had individually designed exercise program, but the improvement was more pronounced in G1. Pain was significantly reduced 2.77±1.31 (after/before Th) and 3.77±1.77 (after 3 months/ before Th), and QoL significantly improved 9.17±7.17 (after/before Th) and 8.91±6.67 (after 3 months/ before Th) in G1.

DISCUSSION AND CONCLUSION: Individally designed exercises and CBT for chronic pain were highly effective in pain reduction and improvement of QoL in patients with CLBP.

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A Back Muscle Surface Electromyography-Based Fatigue Index as a Biomarker of Human Neuromuscular Aging

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BACKGROUND AND AIM:
As part of our quest for non-invasive biomarkers of neuromuscular aging and encouraged by recent findings in healthy volunteers, in this study, we investigated if the instantaneous median frequency (IMDF) derived from back muscle surface electromyographic (SEMG) data recorded during cyclic back extensions could differentiate between younger and older individuals with cLBP.

METHOD:
A total of 243 persons with cLBP participated in three experimental sessions: at baseline, one or two days after the first session, and then again approximately six weeks later. During each session, study participants used a dynamometer to perform a series of three isometric maximal voluntary contractions (MVC) of back extensors, followed by an isometric back extension at 80% MVC, and - after a break - 25 slow cyclic back extensions at 50% MVC. SEMG data was recorded bilaterally at L5 (multifidus), L2 (longissimus dorsi), and L1 (iliocostalis lumborum). A linear mixed-effects model with fixed effects for “age”, “sex”, and “test number” and random effects for “person” was used to test for age and sex specific differences in the slope of the IMDF-SEMG, as derived from the regression line of the IMDF-SEMG estimates computed for the concentric phases of the cyclic back extensions. The Generalizability Theory was used to examine the reliability of the SEMG measures.

RESULTS:
Perceived back muscle fatigue at the end of the test was moderate in both groups. The IMDF-SEMG time-course showed more rapid changes in younger than in older individuals, more prominently in male participants. Absolute and relative reliability of the SEMG time-frequency representations were comparable in older and younger individuals with overall good relative reliability but variable absolute reliability levels.

DISCUSSION AND CONCLUSION:
IMDF-SEMG estimates derived from data collected during moderately demanding cyclic back extensions proved successful in reliably distinguishing back muscle function in younger vs. older men and - to a smaller extent - in women with cLBP. We look upon these findings as the basis for further research with focus on assessing if an IMDF-SEMG-based index could be utilized as a tool to achieve early detection of back muscle aging and possibly predict the development of sarcopenia.

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Upper Limb Disorders

The Implementation of Ichom Congenital Upper Limb Anomalies Set in Daily Care

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BACKGROUND: Care for children with Congenital Upper Limb Anomalies is complex for several reasons. There is a large variety of differences, a small number of children involved and a small number of institutes worldwide involved in the care for these children and their families

AIM: To implement the ICHOM Set of Patient-Centered Outcome Measures for Congenital Upper Limb Anomalies. (https://www.ichom.org/)

METHOD: The ICHOM set was the result of work by a group of leading physicians, measurement experts and patients. It was urged to start measuring these outcomes to better understand how to improve the lives of our patients.
We have implemented the use of the ICHOM care pathway and further improved this within the hospital widely use of VBHC.

RESULTS: We started using ICHOM as a reference guide to build our care monitor, a web based system which was build to send a digital link by email to the participant which led them to a personal environment for the at that time point appropriate questionnaires. Reality proved otherwise as we noticed that care pathways were not parallel to our measurement pathways. Either the doctor was absent, or the child was ill which led to a different timeline in the care pathway and assessments. Since the original health monitor was sending out the questionnaires automatically it created a very confusing situation for the parents and the children. The questionnaires were not linked to their visit so these questionnaires became less relevant to the patient and so their value decreased. And in addition, the outcomes were not discussed anymore during there actual visit due to the difference of filling in the questionnaire and and the actual visit to the hospital.
So we started implementing VBHC by using the Global health and more disease specific PROMIS questionnaires, like upper extremity functioning, peer relations, esthetic, but also the IT QoL have been added to gain more specific information but also to meet the ICHOM guidelines.
So we have incorporated the use of PROMIS questionnaires in our daily practice; PROMIS = Patient reported outcomes measurement information system (in Dutch). The 'Patient-Reported Outcomes Measurement Information System' (PROMIS®) is a system with which patient-reported health outcomes (PROs) can be measured in a highly efficient, valid and reliable manner. The PROMIS system consists of generic Patient-Reported Outcome Measures (PROMs). This means that the PROMs can be used in children with and without one or more disorders. PROMIS can be used to measure outcomes that are relevant to many patients and people in the general population.

DISCUSSION AND CONCLUSION: The experiences with the implementation of the ICHOM set led to the conclusion we needed to engage in another combination existing of PROMS and a standardized hand assessment to gather as much information on the child's function and it's (and parents) expectations.

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Rotator Cuff Calcific Tendinitis: From Management to Complications

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BACKGROUND: Calcific tendinitis is a painful shoulder disorder characterised by either single or multiple calcium deposits in the rotator cuff tendons, with the critical zone of the supraspinatus as the most affected area.
Although the disease subsides spontaneously in most cases, a subpopulation of patients continue to complain of pain and shoulder dysfunction and the deposits may not show any signs of resolution, leading to possible complications.

AIM: To understand and describe the presentation patterns, reported treatments and possible complications in calcific tendinitis.

METHOD: An exhaustive search was conducted using PubMed and Cochrane databases. The search terms used were “rotator cuff”, “calcific tendinitis”, “intraosseous migration” and “calcific bursitis”.

RESULTS: Rotator cuff calcific tendinopathy has been reported in 2.5%-7.5% of healthy shoulders in adults, occurring in women in about 70% of cases.
Pathogenesis can be divided into 3 stages, as reported by Uhthoff et al. (1):
- Pre calcific stage, with tendon transformation in fibrocartilaginous tissue which acts as a substrate for calcium deposition.
- Calcific stage. It is composed of the formative and resorptive phase.
The resorptive phase can present with acute pain, occasionally associated to fragmentation of the calcium deposits (2). This phase is characterized by edema and increased intratendinous pressure with possible extravasation of calcium crystals to different areas.
- Post calcific stage, with tendon tissue remodelling by fibroblasts after calcium deposition, which can last several months.

Several treatments are currently in use, including non steroidal anti-inflammatory drugs as first approach to relieve pain in the acute phases, physiotherapy to prevent articular stiffness, bursal steroid injections, ultrasound-guided percutaneous irrigation and extracorporeal shock wave therapy (3).

A possible complication of this relatively common entity is the migration of calcific deposits into adjacent tissues. Migration to subacromial bursa can occur causing a calcific bursitis. Adjacent bone (usually the humeral head) and muscular structures are other sites of migration. The supraspinatus and infraspinatus muscles seem to be more commonly affected by the migration of calcium crystals, generally occurring at or close to the myotendineous junction. Intraosseous migration can be classified as cortical erosion, subcortical calcium migration, and intramedullary diffusion. However, these are far less frequently encountered than other complications (4).

DISCUSSION AND CONCLUSION: In conclusion, calcific tendinitis is a common and well-documented disease in the literature. Some patients show persistent clinical symptoms requiring medical attention. Several treatment options are available and they depend on the biologic stage of the disease.
The intraosseous and intramuscular migration of calcific tendinitis are possible complications and may cause diagnostic challenges.

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Evaluation of Abdominal Muscle Thickness, Strength and Endurance in Patients With Rotator Cuff Syndrome: A Case-Controlled Study

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BACKGROUND: The importance of core muscles in providing spinal stabilization, maximal force production and transferring force from proximal to distal during sports and many daily activities is increasingly understood. Rotator cuff syndrome (RC), one of the most common painful shoulder conditions, lack sufficient literature on their relationship with core stability.

AIM: To investigate the relationship between abdominal muscle strength, endurance, and muscle thickness measurements in individuals with RC.

METHOD: The study involved 64 patients with RC (38 affected on the right and 26 on the left shoulder) and 64 healthy controls. The Shoulder Pain and Disability Index (SPADI) was used to assess shoulder pain and disability, the Flexion Endurance Test (FET) was employed to evaluate abdominal muscle endurance, and manual muscle strength measurement was conducted to assess abdominal muscle strength. The muscle thickness of bilateral rectus abdominis (RA), external abdominis oblique (EO), internal abdominis oblique (IO), and transversus abdominis (TrA) were measured using ultrasound.

RESULTS: The average age of the patients was 48.43 ± 12.71 years, and in the control group it was 52.4 ± 11.46 years. It was observed that abdominal muscle strength ($p=0.001$) and FET ($p<0.001$) in the RC group were significantly lower than the other group. In the RC group, there was a significant negative correlation between all SPADI scores and abdominal muscle strength and FET. Among the abdominal muscle thickness measurements, there was a significant difference only in the right RA muscle thickness, which was higher in the control group ($p=0.048$).

DISCUSSION AND CONCLUSION: Treatment for managing RC often focuses solely on the affected area (1). However, the kinetic chain theory suggests that the efficient transfer of energy from the core region to the extremities is crucial in achieving optimal upper body movements (2). In our study, we observed a negative correlation between SPADI scores and the endurance and strength of abdominal muscles. We also found that FET times were longer in the control group than in the RC group. Yorukoglu et al. found that core endurance showed a significant negative correlation with pain in people who underwent rotator cuff surgery (3). Our study did not find any significant difference in muscle thickness between the two groups, except for the right RA. This result may be related to the fact that the RC group was divided almost equally between the right and left shoulders, with 38 and 26 respectively, as well as other factors such as the dominant extremity. As a result, our research shows that patients with RC should have their core muscle strength and stability evaluated functionally. Additionally, endurance and strengthening exercises for core muscles should be included in their exercise prescriptions.

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Rehabilitation After Stroke 3

Short and Long-Term Impact of Stroke in Everyday Life of Patients and Caregivers

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BACKGROUND: Stroke is one of the most disabling chronic diseases. and has a significant impact on individuals, families, and public health. Family members or close relatives are often required to assist patients at home with their post-stroke care needs. These caregivers have to cope with the devastating effects that stroke had on their partner, and they may experience high levels of burden (1). Many outcome assessments are available to measure the consequences of stroke on patient's quality of life, and others have been developed to evaluate the burden of the caregivers.

AIM: The aim of this study is to investigate the short and long-term impact of stroke on patient's and caregiver's everyday life, and the possible relationship between the perception of the patients and the caregivers.

METHOD: 30 stroke patients (21 M-9F) and their caregivers (6 M-24 F) were assessed by a structured interview; the short version (8 questions) of the Stroke Impact Scale (SIS) (2) and the Caregiver Strain Index (CSI) (3) were administered to the patient and the caregiver, respectively. The Barthel Index (BI) was also calculated to assess the patient's functional level.
19 pts/caregivers were assessed by 2 years (mean 528 days) after discharge from the rehabilitation unit (Short Term Assessment, STA) and 11 pts/caregivers after more than 2 years (mean 3602 days) from stroke (Long Term Assessment, LTA).

RESULTS: Mean Age: STA group mean 68.4 years (SD 12.89; LTA group 72.4 (SD 10.6).
Median BI: STA group: 70; LTA group 62.5. Median SIS: STA group: 30; LTA group 26.5. Median CSI: STA group: 6; LTA group 9. No significant differences were found between the two groups.
In group 1, the BI was negatively correlated with age ($r=-0.37$, $p=0.03$), CSI ($r=-0.32$, $p=0.01$) and positively with the SIS ($r=0.89$, $p<0.00$). The SIS score was negatively correlated with Caregiver CSI ($r=-0.42$, $p=0.02$). In group 2 the BI was negatively correlated with the CSI ($r=-0.55$, $p=0.04$) and the CSI negatively correlated with the SIS ($r=-0.62$, $p=0.03$).

DISCUSSION AND CONCLUSION: The burden of stroke on both the patient and family members persists in the long term. The analysis of the data seems to confirm that a greater degree of disability corresponds to a perception of greater impact on the patient and greater stress in the caregiver. These findings may not be generalizable to a larger population due to the limited sample size, therefore further studies are needed.

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Impact of a Home-Care Physiotherapy Protocol for Stroke Survivors With Severe Sequelae: Effects on Patients and Primary Caregivers

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BACKGROUND: Stroke is an acute vascular event that is a major public health problem in developed countries. Returning home after hospitalization is a particularly critical period for patients and their families because they must face a new situation full of stress and fear due to the barriers associated with dependency. Providing an early response from Public Health Systems at home can improve health-related outcomes and decrease primary caregivers' burden (1).

AIM: To assess the effect of an early home-based individualized physiotherapy intervention on the functional capabilities and primary caregiver's burden after discharge in severe stroke survivors.

METHOD: Study Design: a quasi-experimental study including patients admitted to the hospital due to a first stroke and derived to the Physical Medicine and Rehabilitation Department with a Barthel Index ≤ 60 points at discharge. Intervention: 3 therapeutic and educational physiotherapy sessions at home (45-60 minutes once a week). Outcome measures: functional independence measured by the Barthel Index (BI) and modified Rankin Scale (mRS) at discharge and 3-month follow-up, and the extent of burden experienced by caregivers measured using the 22-item Zarit Burden Interview (ZBI) one week after discharge and at three months. Sample size: Considering an attrition rate of 10%, at least 26 subjects were needed to detect a BI difference of ≥ 20 points. The study has obtained the approval of the ethics committee. SPSS software version 22 was used to enter and analyze patient data.

RESULTS: 31 patients were recruited in the study (recruitment period 2022-2023); 4 did not complete the study. The mean age was 75.6±13.1 years, 18 males and nine females. BI at discharge was 23.5±17.4 points. We observed an improvement in the BI, which increased to 53.1±28.7 and decreased the mRS in 14 of 27 patients. Regarding the ZBI, it was increased from 45.5±15.3 to 58.5±11.6 at 3 months. The decrease in caregiver burden is greater in caregivers who take care of males than females (18.1±6.9 vs. 10.0±9.2 respectively, p=0.04).

DISCUSSION AND CONCLUSION: The transition from the hospital to the home setting of patients who have had a severe stroke is one of the main challenges the public health care system must approach in this population (2). At that point, not only the patients but also the caregivers will face a new reality with barriers that did not exist prior to hospitalization. The intervention evaluated in this study showed functional improvement and reduced caregiver perceptions of burden.

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The Use of Functional Electrical Stimulation and Botulinum Neurotoxin in Chronic Stroke Patients

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BACKGROUND: Functional electrical stimulation (FES) is established in post-stroke rehabilitation. FES uses both somatosensory inputs and passive or active assisted movements. Literature describes a potential of FES to induce neuroplasticity. Less known is the antispastic effect, though several authors have advocated the use of FES as a complementary therapeutic method for spasticity reduction.

AIM: The aim of this study was to determine how much FES was prescribed in combination with Botulinum neurotoxin (BoNT) for the long-term treatment for stroke patients at home.

METHOD: A pragmatic retrospective cohort study was conducted at the Department for rehabilitation of patients after stroke in University Rehabilitation Institute of Republic of Slovenia Soča between January 2010 and December 2019. The study included 373 stroke patients that performed inpatient rehabilitation program, and used single channel FES devices at home after discharge.

RESULTS: FES was most frequently prescribed (51.8%) in patients with mild poststroke disability with severely impaired upper limb (FIM > 80, Brunnstrom stages 1-3). Almost one third (29.8%) of patients used a combination of FES and BoNT as a spasticity treatment of the affected upper limb. Forty-seven (42.3%) of them used the combined therapies (BoNT and FES) for more than 1 year, on average 3.9 years (SD 2.06; range 2 to 9 years). In the group that used FES for more than one year, BoNT treatment was statistically significantly more frequent (chi-squared test, P=0.000).

DISCUSSION AND CONCLUSION: Our study has shown that FES is a feasible method for the home use even many years after stroke, as it is a simple and safe treatment approach in neurorehabilitation. Long-term users with a good adherence to FES treatment most commonly used a combination of BoNT and FES, with the main aim to reduce spasticity, which suggests they felt effectiveness of combined treatment. Synergistical effect of FES may enhance the neuromuscular blockade effect of BoNT by increasing and accelerating the toxin uptake at the motor nerve terminals and could also prolong the effect of BoNT. Further research should be performed to assess the long-term effects and indications for FES treatment in patients after stroke.

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Hand-Arm Bimanual Intensive Therapy Including Lower Extremities (HABIT-ILE) in chronic stroke: clinical changes.

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BACKGROUND: With a worldwide population becoming older and 12.2 million of stroke each year, the number of stroke patients will increase over coming years, leaving them with life-long impairments that in turn limit activities of the daily life (ADLs), reduce social participation, and decrease the quality of life. Based on strong evidences for goal-oriented, task-specific, and intensive training, neurorehabilitation programs have been developed to enhance post-stroke recovery. However, these therapies focus on rehabilitating the upper limb(s) without including the lower extremities or trunk that are crucial for ADLs (e.g. static or active balance). To fill the gap, Hand-Arm Bimanual Intensive Therapy Including Lower Extremities (HABIT-ILE) has been developed. This intensive therapy is based on motor skill learning principles: hands off, goal-oriented, shaped progression, task-specific and positive feedbacks. HABIT-ILE, organized as a group of patients performing supervised functional activities during two weeks, has been proven effective for children with cerebral palsy from 6-18 years old. It is currently unknow whether HABIT-ILE is also efficient in adult with chronic hemiparetic stroke.

AIM: This randomized controlled trial aimed to establish the feasibility and clinical effectiveness of HABIT-ILE compared to daily motor activities including usual rehabilitation for adults with chronic hemiparetic stroke by inducing improvements within the impairments, limitations and restrictions domains of the International Classification of Functioning, Disability and Health (ICF).

METHOD: Thirty-six adults with hemiparetic chronic stroke were randomized to participate to a 50 hours HABIT-ILE camp-setting program in Brussels (Belgium) or continue with their usual regular neurorehabilitation during two weeks. Participants were assessed before, after intervention and 3 months later. The main outcome was the Adult Assisting Hand Assessment Stroke (Ad-AHA stroke). Secondary outcomes were the Fugl-Meyer Assessment for upper extremities (FMA-UE), the Box and Block Test, the modified Ranking scale, the Wolf Motor Function Test, the ABILHAND for chronic stroke patients, the ACTIVLIM specific for stroke adults, the Six-Minute Walk Test, the Stroke Impact Scale (SIS) and the Canadian Occupational Performance Measure (COPM). In addition, baseline cognition level were assessed (Montreal Cognitive Assessment, Stroop test, Corsi Block-Tapping Test, Bell test, arithmetic and code test).

RESULTS: The preliminary results showed a statistically significant difference between groups with an interaction of time × group for the Ad-AHA stroke, the COPM (performance and satisfaction), the ABILHAND, the SIS (hand and participation sections) and the FMA-UE. Other outcomes presented no significant differences between groups or will be shown at the congress.

DISCUSSION AND CONCLUSION: In chronic stroke patients, HABIT-ILE intervention significantly induced the spontaneous use of both hands in ADLs, improved the motor function of the hemiparetic upper extremity and enhanced the participation. The satisfaction and the performance of both upper and lower

extremities goals from ADLs were significantly improved through the HABIT-ILE intervention compared to usual rehabilitation.

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Virtual Reality Relaxation Exercises Can Reduce Shoulder Pain in Post-Stroke Patients, Undergoing Inpatient Rehabilitation.

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BACKGROUND: Virtual Reality (VR) immersive training is an innovative approach with potential benefits for upper extremity hemiplegia in post-stroke patients. Our objective was to assess the impact of VR relaxation exercises during the subacute phase of post-stroke rehabilitation, specifically focusing on shoulder pain levels.

AIM: We aimed to compare this effect to standard therapy alone. This prospective pilot clinical study holds significance as a foundation for subsequent research based on its findings and conclusions.
METHOD: A total of 20 post-stroke patients in the subacute phase, admitted to the rehabilitation department, were randomly divided into control and intervention groups. All participants received standard in-patient rehabilitation therapy, including physical therapy and occupational therapy for Hemiplegic Shoulder. The control group received an additional 10 minutes of therapy, while the study group was given 10 minutes of immersive VR training, including choosing and watching one of three virtual sceneries. Clinical measures included the visual analog scale (VAS) for pain assessment. Assessments were conducted over the initial five days and weekly for two weeks after the final session, resulting in a total of 12 evaluations.

RESULTS: All patients, with 10 in the intervention group and 10 in the control group, successfully completed the study without any adverse events. The VR group demonstrated a larger reduction in VAS score, as indicated by the larger effect size score (VR = 0.12 vs. control = 0.03). Analysis of the two-week post-treatment follow-up assessments revealed that VAS decreased in both groups between treatment and 1-week follow-up (VR = 1.29 vs 1.00, p = 74; control = 2.09 vs 1.30, p = .41), and further decreased after 2-week follow up (VR = 1.00 vs 0.50, p = .43; control = 1.30 vs 0.50, p = .30).

DISCUSSION AND CONCLUSION: This pilot study explored the effects of VR training on hemiplegic shoulder symptoms in post-stroke patients. Employing a randomized control trial, the study hypothesized that VR could enhance pain relief of the hemiplegic shoulder. Follow-up assessments confirmed significant pain reduction in both groups. The VR group demonstrated a larger reduction in VAS score, as indicated by the larger effect size score. The study underscored VR's potential advantages for pain alleviation in post-stroke patients. Despite limitations such as a small sample size, the study established the safety and feasibility of VR training in post-stroke rehabilitation, warranting further investigation.

CONCLUSIONS: VR training, a technology under exploration across various domains including post-stroke rehabilitation, demonstrates potential benefits, notably in pain reduction. This, in turn, can enhance patient functional gains and mental well-being. Future research is imperative to incorporate VR training as an integral component of rehabilitation protocols and to augment conventional treatment methods.

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Prevalence Estimations of Selected Motor Dysfunction and Non-motor Impairments Among Stroke Survivors in a Tertiary Healthcare Institution in Nigeria

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BACKGROUND: Stroke is widely acknowledged as a significant source of disability and a factor that diminishes the quality of life among the older adult population across the globe (1). The aftermath of a stroke is characterised by both motor and non-motor impairments, which include pain, spasticity, balance disturbances, and cognitive decline (2). However, there is a noticeable knowledge gap in the prevalence of these post-stroke symptoms. The extent to which these symptoms occur in the stroke-affected population and their distribution patterns remain largely unexplored. This lack of comprehensive prevalence data hampers the development of targeted interventions and rehabilitation strategies. Therefore, there is an urgent need for studies focusing on the prevalence of post-stroke symptoms to enhance our understanding and inform healthcare practices.

AIM: To investigate the prevalence of pain, balance impairment, and mild cognitive impairment and their associated factors among older adult patients with stroke at a teaching hospital in Nigeria.

METHOD: The pain was assessed using Face Pain and the Numeral Rating Scale (NRS). This scale was used to assess the pain levels of the patients. It is a vertical numerical pain rating scale supplemented with a face pain scale. The scale ranges from 0 (no pain) to 10 (worst possible pain), with corresponding facial expressions. The motor dysfunctions were checked with Time Up and Go (TUG) test to check motor dysfunctions and assess balance. The cognitive status of the patients was assessed using the Mini-Mental Status Examination tool. The maximum total score is 30, mild cognitive impairments (MMSE score of 18 to 23), with lower scores indicating more cognitive impairment. .

RESULTS: The majority of the participants reported pain (70.1%), balance impairment (93.9%), and mild cognitive impairment (80.8%). The odds of having these symptoms were higher among those aged 65-75 years, males, and those with lower education levels.

DISCUSSION AND CONCLUSION: This study revealed a high prevalence of pain, balance impairment, and mild cognitive impairment among older adult patients with stroke in Nigeria. These symptoms may affect the functional recovery and quality of life of stroke survivors. The findings also suggest that age, gender, and education level may influence the occurrence and severity of these symptoms.
This study highlights the need for comprehensive assessment and management of post-stroke symptoms, especially pain, balance impairment, and mild cognitive impairment, among older adult patients with stroke in Nigeria. The study also calls for more research on the risk factors and interventions for these symptoms in this population.

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Scoliosis

Exploring the Multifaceted Landscape of Adolescent Idiopathic Scoliosis Research: Implications for Rehabilitation and Future Directions

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BACKGROUND: Adolescent idiopathic scoliosis (AIS) is a three-dimensional spinal deformity typically occurring during adolescence, predominantly affecting females during their growth spurt and skeletal maturation. This condition has garnered extensive attention from the medical and rehabilitative communities due to its significant impact on physical health, necessitating a comprehensive understanding of its etiology, evaluation, management, and potential complications.

AIM: This review aims to provide an overview of the extent to which various aspects of scoliosis have been explored in the last 10 years.

METHOD: We conducted a comprehensive review of AIS research articles published in the past ten years, from January 2013 to the present. We focused on clinical trials, systematic reviews, and meta-analyses related to AIS. Our systematic analysis involved searching various databases for relevant publications, including PubMed, Scopus, and Web of Science searching for research related to AIS etiology, evaluation, management, and associated complications. We used a structured data extraction approach to collect pertinent information from the selected articles, including key findings and methodologies. Subsequently, we employed dynamic interconnected graphs to visually represent the interdisciplinarity of AIS research.

RESULTS: Our investigation indicates that AIS has garnered considerable attention in research and clinical domains in the last 10 years, with a robust commitment from scholars and healthcare practitioners to comprehend the condition and develop effective therapeutic methods. An important number of papers have considered rehabilitative management and have utilized the Cobb's angle variation as an outcome measure. Nevertheless, we unearthed little-explored areas within this topic, with a notable paucity of research addressing the assessment and management of respiratory issues in AIS patients. Furthermore, we observed a lack of research integrating neurophysiological findings as part of the analysis and treatment of AIS.

DISCUSSION AND CONCLUSION: Although AIS, particularly when severe, can impact respiratory function, our analysis uncovered a lack of studies addressing this aspect of the condition. Given that respiratory complications can significantly affect the quality of life for individuals with AIS, future research should investigate the role of respiratory function in AIS management. Additionally, the absence of neurophysiological measures in AIS investigations points to an intriguing opportunity for the scientific community. By fostering synergy between neurophysiological research and AIS management, researchers and clinicians can delve deeper into the neurological underpinnings of scoliosis. This, in turn, may open doors to more comprehensive and effective treatment strategies.
In conclusion, our in-depth literature review reveals the multifaceted nature of AIS research, demonstrating considerable interest in the condition, but also revealing some areas that require further investigation. The emphasis on addressing respiratory issues and integrating neurophysiological measures into AIS research and practice represents an opportunity for future investigation. By embracing a comprehensive approach to the evaluation and management of AIS, we can look forward to improved outcomes and patient care.

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Effect of Home Exercise Programs in Patients with Adolescent Idiopathic Scoliosis: A Systematic Review and Meta-analysis

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BACKGROUND: Home exercise programs following adolescent idiopathic scoliosis (AIS) may be beneficial. However, neither a systematic review nor a meta-analysis has been published regarding the effectiveness of home exercise programs for the management of AIS.

AIM: The purpose of this systematic review and meta-analysis was to evaluate the effectiveness of home exercise programs for patients with AIS.

METHOD: This review was designed according to PRISMA and registered in PROSPERO (CRD42023462151). PubMed, Web of science, The Cochrane Library, Embase, Medline, and Scopus were searched until September 15, 2023. Inclusion criteria were defined following PICOS strategy. Methodological quality was assessed with the Jadad scale and the risk of bias with the Cochrane Risk of Bias Assessment Tool. Two investigators independently searched articles, extracted data, and assessed the quality of included studies. Primary outcomes were Cobb angle and SRS-20/SRS-22/SRS-23 total score.

RESULTS: Eight RCTs involving 371 patients were included in the meta-analysis. Overall, compared with control intervention for AIS, home exercise program was found to significantly improve Cobb angle [standard mean difference (SMD)=-0.38, 95% confidence interval (95% CI) (-0.66, -0.09), P=0.009], SRS-20/SRS-22/SRS-23 Questionnaire Total Score[SMD=0.41, 95% CI (0.11, 0.72), P=0.008] , increase the incidence on curves improved≥5° [risk ratio(RR)=4.42, 95% CI (1.13, 16.00), P=0.03], reduce the incidence of curves progressed≥5 °[RR=0.30, 95% CI (0.11, 0.84), P=0.02], but resulted in no significant influence on Biering-Sørensen test [SMD=1.09, 95% CI (-0.46, 2.64), P=0.17], curves stable[RR=1.02, 95% CI (0.65, 1.61), P=0.93].

DISCUSSION AND CONCLUSION: In conclusion, the findings of this meta-analysis indicate that home exercise programs have a positive impact on spinal structure and quality of life among individuals with AIS. Therefore, home exercise programs serve as a viable alternative for individuals with AIS.

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Functional Based Assessment and Goal Setting

Assessing the Use of Scales in Daily Rehabilitation Practice: A National Survey

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BACKGROUND: Outcome measures are an essential part of the rehabilitation practice since they focus attention on identifying treatment objectives and provide information on treatment outcomes, therefore offering insights into the benefits of interventions. However, treatment outcomes are often poorly described and measured. Lack of time is frequently reported by clinicians as a reason for the limited use of outcome measures, although literature supports the existence of other factors such as education or inadequate knowledge of outcome measures.

AIM: Evaluating the use of scales in consultations for physical medicine and rehabilitation in Spain.

METHOD: A prospective longitudinal descriptive study was designed through the completion of an online survey, consisting of 11 compulsory questions with Likert-type responses and open-ended answers, using the REDCAP computer system. The survey was directed at various specialists or trainees in Physical Medicine and Rehabilitation (PRM). An online survey was distributed via email among PRM physicians who are members of our national society. The study was approved by the Gregorio Maranon Institutional Review Board.

RESULTS: 390 of 1900 (20.52%) PRM Spanish society members participated anonymously. 54.8% (n=212) were part of specialised units. 61.8% (n=241) reported using scales systematically in consultations. 72.5% of new patients were assessed in the consultation room in less than 20 minutes and 49.57% (underwent systematic scale evaluations . 37.5% spent more than 20 minutes in consultation to assess a new patient, and among them, 78.63% passed scales systematically. The most frequently used scale was Barthel scale (42.32%, n=102) followed by Medical Research Council (40.7%, n=98). 75.6% (n=95) of the professionals who did not use scales objectified their evolution and pathology by means of the anamnesis. 62.4% (n=237) reported problems in carrying out the scales in the consultation room. The main barrier reported was lack of time (78.4%, n=185). 74.4% of the specialists considered a solution to increase consultation time. 76.9% (n= 297) reported a lack of training on the scales used, with 94.8% (n= 365) disclosing they wanted training. When a comparative study was carried out, we found that the professionals who had more time in the consultation room routinely used scales significantly more ($p<0.001$).

DISCUSSION AND CONCLUSION: This survey of current practice of using validated outcome measures in Spain suggests that they are underutilized in consultations. This might result in a lower quality of care due to the inability to objectify the results.
Advocacy for increase training on scales among PRM physicians should be accompanied by further research to explore potential solutions that facilitate their daily use in clinical practice.

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Implementation of an Icf-Based Rehabilitation for Patients With Spinal Cord Injury and Disorder to Enhance Quality at the Individual, Health Services, and National Level

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BACKGROUND: The Section and Board of the European Union of Medical Specialists Physical Medicine and Rehabilitation (UEMS-PRM) set up a plan to strengthen rehabilitation, and established the definitions of rehabilitation services (International Classification of Services in Rehabilitation ICSO-R 2.0), clinical assessment schedules (CLAS), and the individual rehabilitation project (IRP).
Spinal cord injury/disorder (SCI/D) is a complex health condition that can serve herein to demonstrate the first implementation steps of the UEMS-PRM initiatives.

AIM: The goal was to study how implementing ICF-based rehabilitation management in SCI/D can be achieved at the individual, health service, and national levels. The first aim was to develop a CLAS for persons with SCI/D during the initial rehabilitation. The second aim was to describe current rehabilitation services in Switzerland caring for persons with SCI/D. The third aim was to describe a rehabilitation service specialized for SCI/D using the ICSO-R 2.0.

METHOD: Aim 1: Interdisciplinary consensus process in a rehabilitation clinic specializing in SCI/D.
Aim 2: Interdisciplinary consensus process with representatives of SCI/D relevant medical societies in Switzerland.
Aim 3: Consultation of various rehabilitation centre stakeholders, collection of data using the centre's digital quality management system and institutional management tool, a structured internet search identified the national health reporting and certification systems relevant for SCI/D rehabilitation and subsequently mapping with ICSO-R 2.0 categories.

RESULTS: Aim 1. The Nottwil Standard was based on the outcome guideline; cohort studies and national quality requirements align with the World Health Organization's classifications. As a first step, a multidisciplinary group of clinicians agreed on 10 examinations, 23 assessments, and two questionnaires that make up the Nottwil Standard. In total, 55 ICF categories are covered, including most of the ICF Generic-30 Set categories. The implementation strategy included executive board commitment, a structured improvement project, guidelines for documentation and assessments, a manual control system, and staff training on the Nottwil Standard.
Aim 2. To conceptualize ICF-based rehabilitation at the national level, the European framework for rehabilitation services served as a starting point. Representatives of 12 national medical societies, one political body on rehabilitation, one national interprofessional rehabilitation society, the Swiss representative of two international rehabilitation societies, and the heads of four SCI/D specialized centers participated in the multistage consensus process to define a framework of rehabilitation service types for SCI/D in Switzerland ("SCI/D Framework"). The resulting "SCI/D Framework" version encompasses 19 rehabilitation service types structured into nine clusters, of which six are subdivided into general, other specific, or SCI/D-specific rehabilitation service types.
Aim 3. ICSO-R 2.0 could be used to comprehensively describe a specific SCI/D-specialized center in Switzerland. Despite some challenges, ISCO-R 2.0 facilitated national health reporting and certification, in line with international requirements.

DISCUSSION AND CONCLUSION:

The implementation of ICF-based rehabilitation in cases of SCI/D is feasible when the micro, meso, and macro levels are addressed. Experience with these methodological steps can also inform other rehabilitation specialties. Finally, quality management aspects of process-based management and integrated outcome measures in line with national and international requirements fostered trust in this change process, in line with WHO's action plan for rehabilitation.

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Patient-Reported Outcome Measures and Experience Measures in Spinal Cord Injury: How to Drive Changes in Healthcare

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BACKGROUND: To evaluate the association between patients reported outcome (PROMs), patients reported experience (PREMs) scores and every association with Spinal Cord Injury (SCI) patient's characteristics: to determine the relationship of experiences with effectiveness of care; to develop abilities to manage the new situation and judgement of the personal experience in intensive care unit in patients with spinal cord injury, in which the clinical complexity adds to personal suffering, relational, empathic and resilience aspects are extremely relevant for prognosis.

AIM: To evaluate association between PROMs and PREMs in acute SCI patients

METHOD: This observational cross- sectional , single-centre study was carried out in Montecatone Rehabilitation Institute and included patients with SCI admitted to Critical Care Unit.
Two PREMs scales (CAREm CD-RISC 10) and two PROMs (SCIM-SR, NRS) were administered to 138 patients before discharge from ICU to collect informations on management of SCI and the impact on daily living.
To explore the effects of patient's characteristics on the relationship between PROMs and PREMs, an interaction term was introduced in the regression models.

RESULTS: Patients aged < 50 years old showed lower satisfaction than those aged > 50 (p= 0.019). The median lenght of hospitalization was 38 days (range 7-738 IQR= 23-60). All items except "Anxiety" were significantly associated with the satisfaction reported. Patients reported a minimal level of pain at discharge (median NRS=1, IQR 0-3).
SCI patients strongly value those elements of care that pertain to emotional and interpersonal relationships. We can confirn an inverse relationship between patients experience and complication rate. Even effectiveness of health care seems to depend on emotional and interpersonal relationships. Aspects of experience must strongly associated with better outcome were communication and trust in doctors. The frequency distribution of CD-RISC item indicates a variability of responses according to the aspect of resilience investigated: higher scores were found in the ability to cope with adversities, not easily discouraged by failure and thinking about themselves as strong people , while the ability to find the humorous side of the problem was very low.

DISCUSSION AND CONCLUSION: These data can improve current quality of our service and they offer more patient-centred care. Our findings suggest that further enquiry is needed to understand more about those patients who report a good outcome but a bad experience (and vice versa). Increasing evidence suggests that use of these indicators facilitates the planning of patient-centered interventions and organisational solutions.

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Systematic Data Collection in Patients Admitted for Primary Rehabilitation After Lower Limb Loss

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BACKGROUND: Comprehensive and complete data are required for patient follow-up, outcome prediction and clinical decision-making. There have been some attempts for systematic data collection in patients with lover limb loss (LLL), such as the Scottish Physiotherapy Amputee Research Group (SPARG) (1), Swedish Amputation and Prosthetic Registry (2), and the International Society for Prosthetic and Orthotics (ISPO) Reporting guide (3).

AIM: The aim of our project was to decide which data we will systematically collect for all patients with LLL admitted for inpatient rehabilitation.

METHOD: All team members working with patients with LLL held several meetings where we discussed which data are important for our aim, and we developed precise coding rules.

RESULTS: We decided to include 417 different data values for each patient: 86 provided by the physical and rehabilitation medicine specialist, 31 by the internal medicine specialist, 85 by the nurses at admission and the same number at discharge, 25 by the physiotherapist, 54 by the occupational therapist, 31 by the social worker, 9 by the psychologist and 11 by the prosthetists. So far, we have collected data on 500 patients. The database is presently implemented as a complex Excel workbook, which is shared over the intranet and easy to use.

DISCUSSION AND CONCLUSION: We are using the collected data to compare patients admitted in different years and would like to use them in the future to find out which are the best predictors for prosthetic fitting, wound development, falls and general rehabilitation outcome. The main downside of our project, but at the same time its strongpoint, is the huge number of data that we have to enter in the database for each patient. Similarly, the Excel implementation has a potential security disadvantage, but brings many advantages (zero development and maintenance costs, sufficient data validation, nearly no training of team members required, flexibility in case of subsequent changes, easy data export).

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A Single Machine Learning 'Supermodel' Can Predict Pain Improvement for a Multitude of Rehabilitation and Surgical Treatments in the Hand and Wrist

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BACKGROUND: Predicting individual pain improvement after rehabilitation and surgical treatments can facilitate shared decision-making in hand and wrist surgery (1, 2). However, a prediction model for every condition-treatment combination is 1) time-consuming to develop, 2) underpowered in rare conditions, and 3) impractical to implement in daily care.

AIM: to evaluate if we can develop a single machine learning 'supermodel' that can accurately predict post-treatment pain improvement in a large number of hand and wrist condition-treatment combinations.

METHOD: In a training dataset (N=14,707), we developed different potential models to predict the probability of improvement in pain after treatment beyond the minimal clinically important difference on a Numeric Pain Rating Scale. In a separate test dataset (N=4902), we evaluated the optimal models' performance (discrimination and calibration) on the entire dataset and for each of the 37 specific condition-treatment combinations.

RESULTS: The best prediction model, a gradient boosting machine model, showed good discrimination (AUC=0.87) and calibration in the test dataset. When evaluated per condition-treatment combination, this model showed sufficient discrimination (AUC≥0.75) and good calibration for 26 of the 37 combinations.

DISCUSSION AND CONCLUSION: We can accurately predict post-treatment pain improvement for 26 condition-treatment combinations using a single model. This model was recently implemented in a real-time clinician dashboard and helps patients and clinicians on a daily basis to decide on the most suitable treatment option.

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Rehabilitation of Persons With Cancer Diagnoses

Breast Cancer Rehabilitation and Reconditioning

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BACKGROUND: Breast Cancer (BC), a prominent oncological disease, has become an increasing concern for countless women across the globe. The rising incidences underscore the urgent need for a comprehensive post-treatment rehabilitation strategy to address the challenges posed by intensive treatments. This rehabilitation is not merely about physical recovery but requires a holistic lens, considering disability as an overarching loss of functional integrity. Embracing this perspective enables healthcare professionals to devise strategies that focus on the entirety of a patient's well-being.

AIM: The aim of this abstract is to assess the role of Rehabilitation Medicine in BC care.

METHOD: Central to this approach is the Individual Rehabilitation Project (IRP), a tailored program designed to elevate the post-treatment quality of life. It stresses the importance of early interventions, particularly after surgery, to mitigate potential complications and functional deficits. Physical activities, curated and executed under professional guidance, form a cornerstone of the rehabilitation process.

RESULTS: Depending on each patient's specific condition and stage of recovery, a range of exercises is recommended. Beyond the immediate post-surgical phase, patients are introduced to adaptive physical endeavors like fencing and dragon boating. Such activities are not merely for physical recovery but also play a significant role in enhancing self-esteem, self-perception, and overall mental resilience. Once acute and post-acute care has been completed, and a clinical functional stability is reached, BC patients, now better defined as person with BC disability (PwBC).

DISCUSSION AND CONCLUSION: As the narrative unfolds, it becomes clear that BC rehabilitation is an intricate dance between physical recovery and psychological well-being, necessitating an individualized, patient-centric approach. Furthermore, this opinion paper highlights the urgency for rigorous research, especially randomized trials, to refine and validate the efficacy of these rehabilitation procedures, ensuring that patients not only survive but thrive post-treatment.

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Instrumental Evaluation of Upper Limb Functional Movements Pre and Post Preventive Mastectomy in Women With BRCA 1–2 Mutation

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BACKGROUND: Given the high incidence of aggressive Breast Cancer (BC) (G3, Triple Negative) and the risk of controlateral recurrency, preventive bilateral mastectomy is a widely accepted surgical procedure in patients with BRCA 1-2 mutation. However, it is well known that women undergoing surgical mastectomy (with or without reconstruction) develop a worsening in spine posture, as well as a decrease in their Quality of Life (QoL). On the other hand, it is still to determine the impact of this procedure on functional motor tasks of the upper limb.

AIM: The main purpose of our study is to evaluate how much preventive mastectomy affects performance of the upper limb during functional movement (specifically, reaching and hand to mouth) and investigate correlation between kinematic data and results from clinical scale questionnaires.

METHOD: A group of female patients (25-60 y.o.) with BRCA 1-2 mutation was evaluated with both functional assessment and motion analysis. Clinical evaluation was initially performed measuring ROM and muscular strength of the upper limbs. Then a series of clinical tests were administered: DASH (The Disabilities of Arm, Shoulder and Hand Questionnaire), VAS (Visual Anolgue Scale) and EuroQoL (EQ-5D). Afterwards, we evaluated patients' performance in functional motor tasks (reaching and hand to mouth) with an optoelectronic system (SMART-DX4000, BTS Bioengineering); both clinical and kinematic evaluations were performed at three different times: T0 (before surgery), T1 (2 weeks after surgery, prior to physical therapy) and T2 (6 week after surgery, after 4 weeks of physical therapy). The sample size was evaluated by considering the following parameters: Jerk, Range of Motion (ROM) of the upper limb, velocity parameters. The jerk, as it measures the fluidity of the upper limb movement, was then regarded as the primary outcome.

RESULTS: The data show that the normalized jerk before preventive mastectomy (T0) was higher than at 2 weeks after surgery (T1). Later, after rehabilitation program (T2), kinematic data improved but did not pair pre-surgery performance.Moreover, we noticed from T0 to T1 a change in shoulder and elbow ROM values during functional movements: the first showed a decreased mobility and the latter revealed higher angles performing reaching and hand-to mouth.Clinical scales showed better scores in VAS and DASH after rehabilitation period then after-surgery.

DISCUSSION AND CONCLUSION: The results of our prospective study are still at a preliminary stage, since our data collection is still ongoing.Upper limb disability after BC surgery is frequently associated to a reduction of the QoL, the clinical scales are valid tools for quantying this deterioration post surgery and post rehabilitation. We expect the final data collection will confirm the preliminary results, showing an improvment at the same time of the kinematic parameters and clinical scales questionnaires post physical therapy period, underlying the importance of the correlation between them.

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Miguel-Andrés I. et al.The Importance of the Kinematic Evaluation Methods of the Upper Limbs in Women with Breast Cancer Mastectomy:A

Shoulder Pain and Breast Cancer: Experience of the Physical Medicine and Rehabilitation Department in Morocco

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BACKGROUND: Shoulder pain after treatment of breast cancer is a frequent reason for consultation and management in physical medicine and rehabilitation. It impact both the function and the patient's quality of life.

AIM: The objective of this study is to present the results of the management of shoulder pain occurring after oncological treatment of breast cancer.

METHOD: Retrospective, descriptive and analytical study about 88 patients suffering from shoulder pain after breast cancer and seen during orthopedic consult at the Department of Physical Medicine and Rehabilitation of Casablanca
The rehabilitation program consisted of 20 sessions focusing on passive mobilisation, strengthen exercices and transcutaneous electrical nerve stimulation (TENS)
Range of motion, visual analogue score (VAS) and QuickDASH score was assessed before and after rehabilitation.

RESULTS: The diagnosis was rotator cuff tendinopathy in 56 cases, adhesive capsulitis in 32 cases, Lymphedema of the upper limb was noted in 66 cases, All patients had benefited from rehabilitation care and analgesic treatment. Improvements have been observed for pain and range of motion. The functional handicap remained significant in case of lymphedema.

DISCUSSION AND CONCLUSION: Shoulder pain and joint stiffness, particularly of the shoulder, is frequent after oncological management and especially breast surgery. The need and contribution of functional rehabilitation in cancerous conditions have been reported in numerous studies. It has both therapeutic and diagnostic interest.

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Interesting Case Presentations 1

Prothesis for Lower Limb: Is New Better Than Old? A Case Report

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BACKGROUND AND AIM: Prosthetics has evolved thanks to new technologies, offering better functionality and quality of life for patients who have suffered a lower limb amputation. However, for decades, prothesis have given satisfactory functionality, participation in society and quality of life. To accurately gain back the lost functionality, personal health and thereby improve the overall quality of life, Physical and Medicine Rehabilitation (PMR) physicians and the whole Rehabilitation team must take into account patients' needs and expectations. The aim of this case report is to highlight the importance of considering the user's preferences for a good functional result, even if high quality technologies are omitted.

METHOD: We present a case of transtibial amputation after traumatic accident in 1985. The patient received prosthetics just after the amputation and clinical follow-up was lost due to change of country of residence.

RESULTS: A 58-year-old man was firstly assessed in clinical consultation more after than thirty-five years after amputation. He was pleased with functionality given by the first prothesis but complained for worn material. He could walk extra-domiciliary distances using a crutch and was independent for activities of daily living. Due to the deterioration, we decided to change the whole prothesis. Once the new prothesis (made by lighter and new materials) was properly adapted, he recovered the same functionality. Activity and participation were similar with both prostheses. Patient's satisfaction was also similar despite lighter and more performant prosthetic components.

DISCUSSION AND CONCLUSION: To achieve success in prosthetics, patients' preferences must be considered into the first place. Although new technologies have given more functional possibilities, analyzing each user' needs is mandatory for PMR physicians to make good decisions. In our case, new prothesis allowed our patient to maintain the same functionality, meeting patient's expectations.

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Prosthetic Rehabilitation of the Patient With Traumatic Below-Knee Amputation and Accidental Fracture of the Femoral Neck – Case Report

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BACKGROUND: Traumatic amputations are usually caused by road traffic injuries involving a motorcycle, car or truck. The patients participated in the accidental events as drivers or front-seat passengers. Stump fractures do occur, but according to our data, they are not so common([1]).

AIM: To present effectiveness and complexity of the prosthetic rehabilitation in patients with below-knee amputation and accidental fracture of the femoral neck.

METHOD: Male patient V.S. born in 1974, was injured as a driver in a road accident after trying to avoid hitting a dog. He sustained a traumatic amputation of the left lower leg. He obtained the medical care in General Hospital Loznica. After the wound healing process and formation of the scar tissue on the residual limb, the patient was admitted to the Specialized Hospital for Rehabilitation and Orthopedic Prosthetics and the preprosthetic preparation began. He underwent functional assessment and according to AMP score was classified as a K4 level. Measurements were taken for a below-knee prosthesis which included a temporary PTS socket, a liner, a skeletal structure, a high-performance water-proof prosthetic foot and silicone cosmetic cover([3]). When the test phase was completed, the final prosthetic fitting was scheduled with the team. The night before the prosthetic limb delivery, the patient sustained an accidental fall and femoral neck fracture on the side of the amputation([2]). He was transferred to the Military Medical Academy where he was operated on: Arthroplastica totalis coxae l.sin. After obtaining the consent of his surgeon, he was returned to SHROP and wound bandaging continued. After the first follow-up and stabilization of the residual limb volume, with the orthopedist's permission, the prosthetic delivery was performed.

RESULTS: The patient received a below-knee prosthesis with a plastic socket, a liner and a high-performance prosthetic foot. He was provided gait training and is now able to use the prosthesis with a help of a cane or a crutch.

DISCUSSION AND CONCLUSION: Preprosthetic preparation lasted for 2 weeks. The patient had to undergo surgical treatment because of an accidental fall. After the return, wound bandaging was performed again and with patient activation led to the below-knee prosthesis delivery and start of the gait training program. Adherence to the orthopedist's recommendations, adequate management of the rehabilitation program by a physiatry specialist and team collaboration led to successful completion of the prosthetic rehabilitation.

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Design of an Adapted Set-Up To Practice Para Rowing at a High Level of Performance for a Bilateral Trans-Femoral Amputee: A Case Report

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BACKGROUND: Para Rowing is rowing open to individuals with disabilities (1). During rowing, the upper and lower body are active to balance, steer and propel oneself. Forbilateral trans-femoral amputees, these parameters are modified. To our knowledge, no adapted set-up to practice para rowing has been described before for a bilateral trans-femoral amputee(2).

AIM: To describe an adapted set-up to practice para rowing at a high level of performance for a bilateral trans-femoral amputee.

METHOD: This study is a case report.

RESULTS: Mr S, 24years, received a bilateral trans-femoral amputation in 2019 because of a highway accident while riding a motorcycle. He can walk with two prostheses. He practices para-rowing in the PR2 single sculls category. Two prostheses consisting of a liner(Iceross Seal-In® X5 TF), an adapted socket, a knee (aqua-knee 3WR95®) and a prosthetic foot (RushHiPro®). A seat made of plastazote and thermoplastic polymer footrests.With the adaptation and design of the equipment made Mr. S is able to practice para-rowing in competition (3).

DISCUSSION AND CONCLUSION: Many improvements are still possible concerning the material. The weight of the current material hinders Mr. S in his search for performance(4). Further studies should investigate about carbon blades to improve performances.
We adapted the equipment to enable an individual with a double trans-femoral amputation to the practice of para-rowing in competition (5).

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Treatment of Stump Hyperhidrosis With Botulinum Toxin: A Case Report

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BACKGROUND: Stump hyperhidrosis, the excessive sweating condition, can significantly impact the quality of life of individuals with (lower) limb amputations. It can contribute to skin discomfort, irritation, and prosthetic instability. Botulinum toxin (BTX), a neurotoxin that temporarily inhibits nerve signals to the sweat glands, has emerged as a promising treatment for hyperhidrosis in stump amputees. This minimally invasive approach can provide significant relief by reducing sweating in the affected area. However, it is important to consider individual factors such as the type and severity of hyperhidrosis, patient preferences, and potential side effects when deciding on the use of BTX.

AIM: To present the outcome of hyperhidrosis treatment with BTX in the case of a patient with a traumatic above-knee amputation.

METHOD: A 43-year-old patient, who had undergone a right above-knee amputation following a traffic accident, participated in the rehabilitation program at our institute from July to September 2023. She was fitted with a prosthesis allowing her to walk with the assistance of crutches. We assessed issues related to sweating using a subjective evaluation (Hyperhidrosis Quality of Life Index (HidroQoL©)), the time until the onset of problems, and the need for prosthesis removal due to sweating. Approximately one month after she was fitted with a prosthesis, we administered 250 IU of incobotulinum toxin, divided into 50 injection sites on the stump, equating to 5 IU per injection site. She completed the HidroQoL© and reported disturbing symptoms again after one week and one month.

RESULTS: At baseline, before the application of BTX, she scored 12/12 in Domain 1 and 20/24 in Domain 2 on the HidroQoL scale. Sweating became bothersome on average after 30 minutes of walking, with poor socket suspension after 45 minutes, making walking unsafe, and requiring her to remove and wipe the prosthesis. In a resting state, sweating became excessive within one hour, necessitating prosthesis removal. Over the nine hours she had the prosthesis on during the day, she had to repeat the removal and wiping process 12 times.
One week after the application, she scored 3/12 in Domain 1 and 6/24 in Domain 2. Sweating during walking became bothersome on average after five hours, with the socket suspension remaining optimal. Problems due to sweating subsided in a resting state, and she only had to remove the prosthesis once in nine hours.
After one month, she scored 4/12 in Domain 1 and 7/24 in Domain 2, and she experienced sweating-related issues only during intense walking (physiotherapy).

DISCUSSION AND CONCLUSION: In conclusion, hyperhidrosis of the stump can be a challenging issue. The use of BTX represents a promising solution, offering relief from excessive sweating and associated discomfort. The effect of BTX on stump hyperhidrosis is well described in the literature but the case described in Slovenia is the first of its kind. Continued research and clinical evaluation will contribute to a more comprehensive understanding of the treatment's effectiveness, safety, and potential impact on the lives of individuals living with limb amputations.

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Decompression Sickness: Case Report

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BACKGROUND: Decompression Sickness (DCS) is a medical condition that can affect individuals who engage in underwater activities and ascend to the surface too quickly after being exposed to high pressure conditions below the water. This condition is primarily a result of the excessive formation of gas bubbles in the bloodstream and tissues during the ascent and upon resurfacing. Severe cases of DCS often lead to injuries in the central nervous system, with the spinal cord being the most commonly affected area. The symptoms associated with spinal cord involvement can range from mild sensory issues to more severe neurological deficits, which can result in incomplete recovery and potentially permanent disability in a significant percentage of cases (1).

AIM: The purpose of this case report is to illustrate the effects of an intensive rehabilitation program intervention on a patient with decompression sickness (DCS), without prior treatment in a hyperbaric chamber.

CASE DESCRIPTION: We present a case of a 32-year-old male who presented at the emergency department after scuba diving to a depth of 45 meters in São Tomé Island, Africa, in 2018. He complained of abdominal pain, weakness and paresthesia in the lower limbs, when he returned to the boat.
Seeking further evaluation and guidance, the patient traveled to Portugal in 2021, with a diagnosis of Type II decompression sickness. After the first medical evaluation, the patient presented: Paraplegia AIS C, thoracic level T12. He exhibited preserved motor function in the upper limbs and a motor score of 4 in the lower limbs overall, except for a motor score of 3 for right hip flexion and 2 for left hip flexion. He had pain anesthesia from L1 to the right and L3 to the left, as well as hypoesthesia in the S2 to S5. The patient maintained voluntary anal contraction and deep anal pressure. Spasticity present in the lower limbs, globally grade 3. He also had increased achilles and patellar osteotendinous reflexes, with bilateral extensor plantar cutaneous reflex.The patient experienced urinary urgency with frequent leakage, without intestinal losses. He required a wheelchair for mobility.

METHOD: 5 years post-onset, a 8 week intensive rehabilitation program was iniciated.

RESULTS: Following completion, functional improvements were demonstrated on the Timed-Up-and-Go test, 10 Meter Walk Test, 6 minutes walk test , muscle strength grading in the lower limbs.

DISCUSSION AND CONCLUSION: The standard treatement involves the administration of 100% oxygen, followed by a hyperbaric chamber. In many instances, this approach proves effective in preventing long-term complications (1).
The risk of enduring injuries remains a concern, particularly when access to hyperbaric chamber therapy or oxygen treatment is limited, as was the case with this particular patient.
Despite the near absence of initial-line treatments and the prolonged duration since the injury occurred, the patient made notable progress during the rehabilitation program.

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Life Without Femoral Nerve

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BACKGROUND:
Schwannomas are benign, usually encapsulated tumors of the nerve sheath. In most cases they are treated surgically with local resection and preservation of the nerve fibers.
In this case report we present a patient with retroperitoneal Schwannoma of the femoral nerve that extended do the mid tight. Due to the neural infiltration femoral nerve could not be spared and was resected together with the tumor. Unfortunately nerve reconstruction was not an option.

AIM:
Rehabilitation goals were set to reduce impairment, improve ambulation and facilitate return to work and recreational activities.

METHOD:
After initial healing process extensive rehabilitation process started. At the beginning patient had problems ambulating, rising from the chair, climbing and descending steps. Physical therapy was started with exercises to improve gait, balance and proprioception to strengthen various muscle groups, overall to reduce impairments. During rehabilitation we also used muscle electrostimulation and biofeedback to enhance function of the unaffected muscle groups in order to improve function.

RESULTS:
After a year long rehabilitation process patient was able to walk with out a visible limp. However there was still some difficultly while using stairs and raising from a squat. Now he is working and is fully enrolled in the family and social activities. Using ICF categories in a minimal generic set of functioning and health we detected only mild impairment in b280 Sensation of pain and due to sporadic knee pain.
DISCUSSION AND CONCLUSION:
Treating neural lesions if often challenging especially if the whole nerve is resected. This case shows that proper rehabilitation can lead to satisfactory results despite radical surgical treatment.

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Miller Fisher Syndrome: Case Report

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BACKGROUND:
Miller Fisher syndrome (MFS) is a rare variant of Guillain-Barré syndrome (GBS). The worldwide incidence of GBS is approximately 1 to 2 in 100,000, with the MFS variant representing a tiny subset of the cases (1 to 2 in 1,000,000) (1). Viral and/or bacterial infection often precedes the classic triad of areflexia, ophthalmoplegia, and ataxia (2). Bulbar involvement is uncommon but can lead to extensive workup to rule out stroke, myasthenia gravis (MG), and other neuromuscular disorders (3).

AIM: The purpose of this case report is to illustrate the effects of an intensive rehabilitation program intervention on a patient with severe MFS-GBS.

CASE DESCRIPTION: We present a case of a 47-year-old healthy male with a past medical history of conjunctivitis and upper respiratory infection one week before. He presented to the hospital with intermittent diplopia, dysphonia, dysarthria and gait imbalance.
Exam on presentation revealed supraversion of the gaze; limitation of gaze abduction (mainly on the left); skew deviation in infraversion; diplopia in infraversion and levoversion with convergent strabismus of the right eye in the primary gaze position; bilateral peripheral facial paresis; mild dysarthria; severe dysphagia; right lower limb muscle strength grade 4; abolition of osteo-tendinous reflexes and gait with ataxic pattern.
Lumbar puncture revealed cerebrospinal fluid (CSF) with albuminocytological dissociation (ACD). Immunoserology was positive for anti-GM1 and anti-GQ1b IgG antibody. Electromyography compatible with demyelinating sensorimotor polyneuropathy.
During hospitalization, the patient developed episodes of dysautonomia with constipation, blood pressure lability and AF with RVR leading to chemical and electrical cardioversion. He also required a long period of invasive mechanical ventilation with tracheostomy and PEG feeding, because of airway safety.
After 4 months ICU stay and 7 weeks of intensive inpatient rehabilitation, the patient could do most of the activities of daily living independently.

METHOD: 5 months post-onset, a 7 week intensive rehabilitation program was initiated. The rehabilitation program includes evaluation and monitoring by: physiatrist, rehabilitation nurse, physiotherapist, speech therapist, occupational therapist, neuropsychologist and nutritionist

RESULTS: Following completion, functional improvements were demonstrated on the Timed-Up-and-Go, 10 Meter Walk Test, 9 Hole Peg Test, DOSS scale, grip strength and Functional Independence Measure (FIM).

DISCUSSION AND CONCLUSION: Rehabilitation program demonstrated improvement in functional outcomes for a patient with a diagnosis of MFS-GBS. The rehabilitation program should be as personalized as possible to each patient's functional deficits and should be started when the patient is clinically stable. Due to a sometimes long and demanding recovery period, patients with MFS-GBS may benefit from maintaining neuropsychological follow-up after completing the rehabilitation program.

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Rehabilitation After Surgical Treatment of Bilateral Quadriceps Tendon Rupture: A Case Report

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BACKGROUND: Simultaneous bilateral quadriceps tendon rupture is rare, particularly in individuals with no prior medical history. This is a case report of a 47 years old man presenting with a bilateral quadriceps tendon rupture.

AIM: Evaluation of the effects of our rehabilitation program after surgical treatment of bilateral quadriceps rupture.

METHOD: CASE PRESENTATION: The patient was an active 47 year old man with an injury acquired during a sudden misstep i.e. leap over a low wall while carrying a load, resulting in an immediate severe pain in both knees and inability to walk. Bilateral quadriceps tendon rupture was diagnosed during clinical examination, radiography and magnetic resonance imaging assessment. Quadriceps tendon repair with suture anchor was performed on both knees two days after the injury. Both knees were immobilized in extension using hinged ROM knee braces for six weeks. The rehabilitation was started four weeks after surgery and carried during a four week period. The rehabilitation protocol included kinesiotherapy, patella mobilization and physical modalities. The exercises progressed from isometric quadriceps and protected weight bearing for the first two weeks to full weight bearing, balance and proprioception exercises. The patient was verticalized during the sixth week of surgery and started moving with a walker. Physical modalities were used from the start of rehabilitation. Sonotherapy and interferential currents were applied in the course of the first three weeks. Magnetotherapy was being applied during the first two weeks, followed by low intensity laser therapy for two weeks.
The clinical outcome was measured by the KOOS score (Knee Injury and Osteoarthritis Outcome Score) and by the degree of knee flexion.

RESULTS: Flexion in both knees progressed from 0° at the start to 105° at the end of the rehabilitation. No extension lag was observed two months postoperatively. The patient started walking without support after four weeks of rehabilitation.
Three months post-surgery the patient had a full range of knee flexion and normal gait, enabled to go up and down stairs and return to normal daily activities. KOOS score was 63% (100% -no knee problems, 0% -extreme knee problems). He was still unable to run, squat or jump.

DISCUSSION AND CONCLUSION: Early functional mobilization with full weight bearing after bilateral quadriceps tendon repair is safe, leads to good clinical outcome and improves patient's quality of life.

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Rehabilitation after Stroke 4

Compensation Strategies in Post-Stroke Individuals: Insights from Upper Body Kinematics Analysis Using Inertial Sensors

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BACKGROUND: The Box and Block Test (BBT) is a clinical assessment used to evaluate manual dexterity in people with neurological conditions [1]. The use of Inertial Measurement Units (IMUs) for kinematic analysis during the BBT provides a precise and objective assessment of upper limb and trunk movements, allowing for the identification of potential compensation strategies (CoS) [2,3].

AIM: To assess movement patterns and identify potential CoS, both in the affected and unaffected sides of individuals with stroke using IMU sensors to analyze movement during the BBT and to make a comparative evaluation between individuals with stroke and healthy peolple.

METHOD: 31 individuals with subacute stroke (SG) and 31 age-matching healthy people (CG) were recruited. Kinematic data was collected at a rate of 60 Hz using a Motion Capture system, which included 7 Inertial Measurement Units (IMUs). An in-house software developed in MATLAB R2020a was used to analyze main joint angles. Three-dimensional trajectories were estimated through calibrated quaternions and anthropometric data.

To compare the data between the control group (CG) and the stroke group (SG), the Mann-Whitney test was employed, with statistical significance set at $p < 0.05$. To evaluate compensatory movements, differences in mean angles were calculated and expressed as a percentage of the standard values observed in the CG. Subsequently, min-max normalization was applied, with 0% mapped to 0 and 100% mapped to 10 on the desired scale. This method standardized the data, making it more easily comparable and clinically interpretable.

RESULTS: The kinematic analysis showed statistically significant intergroup differences in mean joint angles and range of motion. Notably, on the paretic side of persons with neurological condition, there was a tendency to overuse the wrist and shoulder as a CoS due to the underutilization of the elbow and trunk movements. Similarly, on the unaffected side, overuse of the wrist and shoulder was observed, reflecting CoS.
By quantifying the extent of compensation for each individual of the SG, this study found that 88% compensate at the wrist and trunk levels, while 68% compensate at the shoulder level. The development of a compensation scale facilitated the objective assessment of these compensatory mechanisms and allowed for significant comparisons between SG's participants .

DISCUSSION AND CONCLUSION: This study pinpointed specific CoS employed by stroke survivors in their upper limbs. It is evident that an excessive reliance on these strategies can potentially impede the recovery process, emphasizing their significance.

The evaluation of these mechanisms holds the potential to enhance the quality of life for post-stroke individuals by promoting more effective rehabilitation approaches.

Moreover, the study's development of a compensation scale represents a significant clinical contribution. This scale enables the quantification of individual CoS, providing a structured means of assessing and measuring these adaptations. This standardized approach is a valuable tool for healthcare professionals, allowing them to tailor rehabilitation strategies to each patient's specific needs, ultimately improving the recovery process for individuals with neurological conditions.

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Combined Use of Robot-Assisted Therapy and Non-Invasive Brain Stimulation in Post-Stroke Survivors with Upper Limb Impairment: A Systematic Review of the Literature

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BACKGROUND: Robot-Assisted Therapy(RAT) in rehabilitation promotes recovery of sensorymotor skills through peripherical stimulation and enhance the mechanism of synaptic plasticity in the cortex. Upper Limb(UL)-RAT alone in stroke survivors does not have demonstrated homogeneous results in literature due to the altered connectivity in the brain caused by stroke. However, Non-Invasive Brain Stimulation(NIBS) techniques modulate cortical plasticity by enhancing or inhibiting pre-synaptic plasticity. This cause changing in local cortical excitability and activation of cortical interneurons, correcting inter-hemispheric maladaptive imbalance.

AIM: To define the actual state-of-the-art about combining UL-RAT&NIBS in stroke patients, analyzing motor functional outcomes and kinematic parameters.

METHOD: Revision protocol has been drawn up considering PRISMA statement. Database searched were: Pubmed, Medline, Embase, Cochrane, Web-of-Science, PEDro, IEEE-Xplore. Meta-analysis and systematic reviews,RCTs and prospective or cohort studies were taken into account. Eligibility criteria were: cortical or subcortical stroke patients with UL paresis in subacute or chronic phase, with mRS<4(P); combined use of NIBS protocols before, during or after RAT(I); RAT rehabilitation before, during or after NIBS sham protocols, conventional rehabilitation or no physical therapy(C); functional outcomes assessed by motor functional scales(ie,Fugl-Meyer Scale, Wolf Motor Function Test) and kinematic parameters(velocity, smoothness, accuracy)(O). Exclusion criteria were: patients with acute or cerebellar stroke; paralysis of the UL;mRS> 4; kinetic parameters assessed. Articles were divided into specific subgroups based on the different robotic devices used (exoskeleton or end-effector) and on the NIBS paradigms (TMS or tDCS). Primary motor and secondary kinematic outcomes were assessed in another subgroup.

RESULTS: Search strategy with Boolean operators has resulted in 409 total articles.After duplicates were removed, a total number of 267 articles were screened. A total of 253 records were excluded after reading title and abstract. A total of 14 studies were included in the qualitative synthesis (3 systematic reviews, 10 RCTs, 1 Cohort Study). A total of 361 participants were assessed for this review. About the robotic devices used in the RCTs, almost all used an end-effector robot with different degree-of-freedom. Some studies recorded kinematic data with the robot device during rehabilitation sessions (velocity, smoothness, accuracy and efficiency). tDCS was used in 9 studies with anodal stimulation on the ipsilesional M1 cortex, instead, rTMS of the affected hemisphere was done in 2 studies.

DISCUSSION AND CONCLUSION: tDCS combined with RAT in stroke patients with UL impairment did not demonstrated a statistically gain of motor function or improving in kinematic data compared to sham group interventions of only RAT in all the studies selected in this review. Neuromodulation of motor areas delivered by TMS paradigms combined with RAT did not resulted in a statistical amelioration of functional scales or kinematic parameters compared to sham groups where RAT where delivered alone. There is a need for homogeneous clinical trials regarding participants' characteristics, kind of robotic device, NIBS paradigm, duration of treatment, and primary end-points.

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Telerehabilitation-Based Exercises with or without Transcranial Direct Current Stimulation for Pain, Motor and Cognitive Function in Older Adults with Mild Cognitive Impairments Post-Stroke: A Multi-Arm Parallel-Group Randomized Controlled Trial

Tolulope Adeniji, Oladapo Olagbegi, Thayananthee Nadasan, Olumide Dada

BACKGROUND: The management of older adult stroke survivors presents a significant challenge, primarily because these individuals frequently experience a multitude of physical and mental impairments as a result of their stroke. While both telerehabilitation and transcranial direct current stimulation (tDCS) hold promise for enhancing the recovery of stroke survivors, the precise extent and mechanisms of their therapeutic effects remain inadequately elucidated, warranting further investigation.

AIM: This study aimed to investigate and compare the effects of telerehabilitation alone (TRB), telerehabilitation combined with tDCS (TRB/tDCS), and conventional physiotherapy (CON) on pain, motor function, and cognitive function in older adults with mild cognitive impairments after stroke:

METHOD: This study is a randomised control trial design with the primary outcome of motor function was measured using the Berg Balance Scale (BBS), the Timed Up and Go Test (TUG), and the Brunnstrom Recovery Scale (BRS). The secondary outcome measures includes pain intensity (using the face pain scale and numerical rating scale), cognitive function using the Mini-Mental State Examination (MMSE) and the Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE). This study randomized 87 participants into three groups: TRB, TRB/tDCS, and CON. Measurements were taken at various points (baseline, 4th and 8th week after intervention).

RESULTS: The TRB group reported significantly lower pain intensity (1.53(0.16-3.04)) than the other groups. The TRB/tDCS group showed a significant improvement in BRS upper limb scores compared to the CON group (0.3(0.08-0.52)), but no significant difference was observed between the TRB and TRB/tDCS groups. All groups showed significant improvements over time in pain score, BRS_upper limb, BRS_Hand, BRS_lower limb, and MMSE scores. The differences between groups were significant for pain score (p=0.036), BRS_upper limb (p=0.005), BRS_Hand (p=0.038), BRS lower limb (p=0.005), and MMSE (p=0.009).

DISCUSSION AND CONCLUSION: The findings suggest that telerehabilitation with or without tDCS can be an effective and feasible alternative to conventional physiotherapy for older adults with mild cognitive impairments after stroke. Adding tDCS to telerehabilitation may have an additional benefit for upper limb function, which is often more difficult to recover than lower limb function. Telerehabilitation may also have an advantage for pain and cognitive function, which are essential aspects of quality of life for stroke survivors.
Telerehabilitation and tDCS can improve post-stroke rehabilitation outcomes, but their effects may vary depending on the domain of function.

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Gait Analysis of Hemiparetic Adult Patients With a Quadripod Cane and a Rolling Cane

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BACKGROUND: Stroke and traumatic brain injury consequences include hemiparesia and difficulty to walk [1][2][3]. It is known that gait alteration leads to a sedentary lifestyle and an increased risk of falling [4]. Several types of canes exist to overcome these alterations, but little data compares the quadripod cane and the rolling cane in hemiparetic patients [2].

AIM: To determine if gait speed –the most often used parameter to assess gait performance– depends on the type of cane (between quadripod cane and rolling cane) and to establish which spatiotemporal parameters have the most influence.

METHOD: Thirty-four hemiparetic patients (n=1, TBI; n=33, stroke) from two rehabilitation centers were recruited.
All patients executed the 10 meters walking test (at a comfortable and quick speed) with both canes on two different days: the first day with one cane and the next day with the other type of cane. The order of use of the two types of canes was randomized.
Gait spatiotemporal parameters were extracted from signals recorded by a tri-axial Inertial Measurement Units (IMU)-based system. We focused on the affected limb and compared its patterns when patients walked using the quadripod cane and with the rolling cane. Our analyses focused on speed, stride length and durations of stance phase, swing phase, and double support.

RESULTS: At both speeds, hemiparetic patients walked faster with the rolling cane. Compared to the quadripod cane, the speed was 35% faster at comfortable walk and 38% faster at fast speed. Based on our results, these differences are related to (1) the decrease in the stance phase duration of the affected leg, (2) the decrease in the double support duration, and (3) the increase of the cadence.

DISCUSSION AND CONCLUSION: Patients are walking faster with the rolling cane. Our findings suggest that it is reasonable to include the rolling cane in a rehabilitation program because it allows a safe and faster walking. Future research should compare gait spatiotemporal parameters before and after therapeutic intervention.

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Upper Limb Orthosis in Stroke Rehabilitation: The Role of 3D Printing

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BACKGROUND: Stroke is the third leading cause of long-term disability worldwide. Approximately 80% of stroke patients have impaired motor function and more than half do not regain arm function, resulting in impaired motor control and severe loss of social independence [1]. Rehabilitation specialists widely prescribe orthoses and assistive devices as part of the post-stroke rehabilitation programme. Traditional commercially available devices come in few standard sizes, leading to comfort issues and complications such as skin lesions, vessel and nerve compression. This can have a negative impact on treatment compliance. 3D printing (3DP) has shown interesting improvements in field of orthotics, thanks to the possibility to produce customized, environmentally sustainable and cost-effective devices [2].

AIM: This study investigated the clinical use of 3DP orthoses in post-stroke rehabilitation compared to traditional orthoses, focusing on the relationship between 3DP technology, therapy and outcomes.

METHODS: We screened 138 articles from PubMed, Scopus and Web of Science, and selected the 10 articles that met the inclusion criteria, which were then included in the systematic review.

RESULTS: The results showed that 3DP offers significant advantages in terms of upper limb orthoses designed around the patient's needs. 3D printed devices were found to be effective and safe, with good patient satisfaction [3] and increased time of use [4]. In addition, seven research activities used biodegradable/recyclable materials, underlining the great potential of validated 3DP solutions in a clinical rehabilitation setting.

DISCUSSION AND CONCLUSION: This review has highlighted how 3DP can overcome the limitations of standard medical devices to support clinicians, bioengineers and innovation managers in implementing Healthcare 4.0 [5].

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Mirror Neuron System as a Resource in Post-stroke Patients Rehabilitation: Electrophysiologic Responses Modulation to Optimize Action Observation Therapy

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BACKGROUND: The motor functions of individuals with limited mobility can be rehabilitated thanks to the adaptive and dynamic responses to external stimuli or environmental experience. Action Observation Therapy (AOT) is an innovative post-stroke rehabilitation treatment stimulating and facilitating the reorganization of the neural network, triggered by the sensory-motor integration realized through the Mirror Neuron System (MNS) activation [1,2]. In the last decades, neural substrates common to the action observation and execution led to a treatment planning consisting of visual stimuli containing individuals performing a motor task. However, AOT protocols are still heterogeneous regarding modalities and video contents of observed actions [3].

AIM: To find the most appropriate strategies to enhance stroke patients' performance, to integrate knowledge on neural stimulation triggered by the MNS, and to clarify mechanisms underlying neural activity modulation after AOT.

METHOD: In this study, electroencephalographic (EEG) oscillatory activity acquired during the observation of different task-specific upper limb movements displayed on a monitor allowed us to indicate which actions category elicits a stronger cortical activation. 19 subjects with left or right hemiparetic sides observed customized videos of daily living activities divided into 5 categories: Feeding Actions, Self-Care Actions, External Actions, Non-Finalized Actions, and Control Videos.
Subsequently, event-related dynamics of cortical rhythms from 15 right-handed healthy subjects and 15 patients affected by right hemiparesis after stroke in chronic status were statistically analyzed and compared. A new AOT program spread over 5 weeks was determined by the clinicians based on their experience and the previous findings and tested on chronic stroke patients with a randomized controlled trial. EEG-based indices obtained from a standardized motor task executed by 10 patients examined functional recovery after therapy.

RESULTS: Feeding and Self-Care video categories appeared more efficient to stimulate neuronal recruitment during action observation. EEG signals analysis from Motor Areas encouraged the definition of an AOT protocol composed of the tested stimuli videos, characterized by a frontal visual perspective, neutral background, and short gestures of object manipulation.
After optimized AOT administration, a positive additional impact on functional recovery of motor functions of chronic stroke patients emerged. The Experimental Group making AOT in a hospital setting returned enhanced neuronal activity (a stronger event-related desynchronization of beta rhythm in the affected hemisphere, p=0,037) with respect to the Control Group making a sham AOT. EEG-based biomarkers supported clinical assessment (significant average increase of 2 points of the Fugl-Meyer Assessment scale).

DISCUSSION AND CONCLUSION: The description of cortical response opens a new possibility for an advanced study of the therapeutic recovery of stroke patients. Thanks to the present research, a great

step toward a more appropriate AOT program was accomplished to ensure a personalized treatment that employs stimuli maximizing cortical responses and efficiently activating residual brain resources. By increasing the sample size, the classification of patients based on lesion site and clinical status will be useful to understand to whom optimized AOT is addressed with the greatest potential.

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Rehabilitation of the Patients With Rheumatic Diseases and Osteoarthritis

Stromal Vascular Fraction Treatment for Knee Osteoarthritis in Women: A Cohort Study

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BACKGROUND AND AIMS: Knee osteoarthritis (KOA) is a chronic degenerative joint condition characterised by the progressive destruction of the articular cartilage. Women have consistently been shown to be at higher risk of KOA, and some studies have even reported a lower joint space width and higher narrowing in females (1). Treatment with stromal vascular fraction (SVF) contains adipose derived mesenchymal stem cells and is among the new strategies to treat KOA. Gender has proven to be a factor affecting cell yield and viability of the SVF (2). Even SVF efficacy and safety has already been proven, clinical improvements in women with KOA still need further assessment.

METHOD: 27 women with unilateral or bilateral chronic KOA who underwent a standardised SVF treatment (CelStem) were enrolled in a prospective cohort study between May 2018 and June 2022. The treatment was made from the autologous adipose tissue acquired via liposuction and prepared by biotechnologists in a clean room manufacturing environment. Few hours after, the SVF treatment was injected intraarticularly in the affected knees. Pain and functional outcomes (VAS, KOOS and SF-36) were assessed before and 1-year after the treatment. Adverse effects were reported.

RESULTS: 27 women, middle aged (mean age 59), mean body mass index 26.31, were treated with SVF: 14 left and 13 right knees (8 women bilaterally). Mean cell count was 2.37E+06 containing 10.36% SVF with 84.26% of mean viability. VAS and KOOS improved significantly (from 6 to 3, $p<0.001$; 63.07 to 71.42, $p=0.001$). Concerning SF-36, all 8 subscales improved, being social functioning and role limitations due to emotional problems statistically significative. 29.6% of the sample reported minor adverse effects (abdominal hematoma) after liposuction. No adverse effects due to the injection were reported.

DISCUSSION AND CONCLUSION: A manufacturing standardised SVF product is safe and seems to be effective in terms of pain, functionality and quality of life for KOA in women.

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Quantum Molecular Resonance Inhibits NLRP3 Inflammasome/Nitrosative Stress: Potential Therapeutic Effect in Knee Osteoarthritis In Vitro and In Vivo

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BACKGROUND: In knee osteoarthritis (KOA), studies have demonstrated that synovial macrophages could make up around 30–40% of the cellular content exhibiting an activated phenotype and producing pro-inflammatory cytokines1.
Also, instrumental physical therapy is used in KOA rehabilitation: Quantum Molecular Resonance (QRM) is a non-ionizing, low-potency technology that uses high-frequency waves in the range between 4 and 64 MHz (alternating electric fields).

AIM: to investigate the anti-inflammatory effects of QMR in vitro model and in vivo in KOA related to inflammation and pain.

METHOD: In Vitro, the QMR effect, was assessed respect to the impact on inducible nitric oxide synthase (iNOS) and cyclooxygenase-2 (COX-2) expression/activity and peroxynitrite generation on differentiated (macrophages) human immortalized monocyte-like cell line (THP-1). We tested whether QMR exposure could promote changes in the macrophage phenotypes related to M1/M2 macrophage polarization, too. Exposure was performed using a QMR generator supplied by Telea (Telea Electronic Engineering, Sandrigo, VI, Italy).
In Vivo, sixty patients with KOA were recruited, randomized into the three groups (Group 1= QRM intensive protocol; Group 2= QRM extensive protocol; Group 3= sham).
Patient evaluations were conducted at baseline (T0) and after 2 (T1) and 4 (T2) weeks of treatment. A follow-up evaluation was conducted 6 weeks after treatment (T3): the Visual Analogue Scale (VAS)2, the Knee Injury and Osteoarthritis Outcome Score (KOOS)3, and the Lysholm Score4 were used as outcome measures.

RESULTS: A descriptive statistics, for each scales were performed. We conducted a 3 (time series) × 3 (gonarthrosis treatment) mixed ANOVA to assess how the effect varied across three different time periods.
In Vitro, results showed that QMR treatment significantly decreased NLRP3 and activated caspase-1 protein expression levels and down regulated IL-18 and IL-1β protein expression and secretion. A switch in macrophage polarization from the M1 phenotype to the M2 phenotype was observed. In Vivo, the results showed that pain were significantly affected by QRM over time more in Group 1 (VAS T0= 4.3 ± 1.4 and VAS T1 = 0.4 ±1.2, $p < 0.05$) and a concurrent better response at T2 in terms of functional recovery and pain reduction (VAS T2 = 0.6 ± 0.8 $p < 0.05$).

DISCUSSION AND CONCLUSION:
The results suggest that QMR reduces proinflammatory mediators and nitrossidative stress by inhibiting COX-2 and iNOS protein expression as well as reducing NF-κB activity and peroxynitrite levels. The

reduction of inflammation, translates in vivo with a good response on pain reduction and recovery of function in patients with KOA.

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Results From the Application of Radial Extracorporeal Shock Wave Therapy in Patients With Knee Osteoarthritis

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BACKGROUND: Knee osteoarthritis is a common musculoskeletal disorder. (1) Radial extracorporeal shockwave therapy (RECTUB) comes as a new effective conservative method.

AIM: Present results of RECTUB application in patients with knee osteoarthritis.

METHOD: Prospective, monocentric, interventional, non-randomized clinical study of 40 RECTUB treated patients (totalling 5 weekly sessions with 5-minute application of 2000 impulses, 2 Bar intensity, 10 Hz frequency at painful knee points) and kinesitherapy. The patients' progress was monitored on the Numeric scale of pain, the WOMAC Index, and by clinical examination. The clinical findings were evaluated before the treatment started; immediately after its completion and 3 and 6 months afterwards.

RESULTS: Statistically significant differences were found at physical examinations at the beginning of the treatment and at the three subsequent controls where patients experienced significantly less pain on palpation and when performing knee flexion, including improved flexion and extension movements. Numeric Scale of Pain scored a mean of 7, 4, 2, and 2, respectively, before treatment and at the three follow-up examinations after treatment. It was found that reduced pain intensity was maintained even for 6 months after the applied physical treatment. Regarding the WOMAC index total median value, it decreased from 43.5 before the start of the treatment, to 17 at the first control; 10 at the second, and 11 at the third. The three subscale WOMAC index median was 9, 4, 2, and 2 respectively for subscale 1; 3 and 0 for subscale 2; 34.5, 12.5, 7.5 and 8 at baseline and the three follow-up examinations and subscale 3 respectively, at the beginning and the three follow-up examinations. The values of the total WOMAC index and its three subscales were statistically significantly lower in patients at the end of the first, second and third control.

DISCUSSION AND CONCLUSION: RECTUB is becoming a treatment option for knee osteoarthritis with insufficient scientific papers published on its effectiveness. In a systematic review and meta-analysis of 14 randomized studies published in Spain, RECTUB was found to contribute to greater reduction of pain and improvement of WOMAC index values in a short time.(2) Regarding the effectiveness of RECTUB treatment in patients with knee osteoarthritis for 6 months, as per Shieh meta-analysis measuring pain intensity according to the VAS scale and the degree of functionality according to the WOMAC index, it was found that pain reduction and improvement of the patients' functionality were maintained up to 6 months after the application of this physical modality.(3)
The results of this study demonstrate that RECTUB therapy has a longer-lasting effect on improving knee joint movements, reducing pain and improving the functional ability of patients with knee osteoarthritis in a period of at least 6 months after the application of RECTUB therapy.

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Multisite Pain Is Longitudinally Associated With Increased Risk of Fall Among Older Adults With or at Risk of Knee Osteoarthritis: Data From the Osteoarthritis Initiative

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BACKGROUND: Individuals with knee osteoarthritis (OA) have high prevalence of multisite pain (having pain in more than two sites) [1]. Multisite pain involving three or more sites may indicate a higher level of symptom severity with a greater impact on daily functioning, quality of life, and treatment approaches. Using three sites or more is related to the complexity of chronic pain and widespread pain [2, 3]. However, limitations in previous research related to multisite pain as a risk factor for fall in older adult included different designs (i.e., cross-sectional design and limited longitudinal follow up to 3 years) and the variability of defining multisite pain across studies.

AIM: To examine the association between baseline multisite pain (two and three sites or more) and longitudinal risk of fall and recurrent falls among older adults with or at risk of knee OA.

METHOD: This study used multisite longitudinal data from the Osteoarthritis Initiative. Only older adults were included (≥65 years). Main outcome measures related to fall included history of fall, number of fall, and recurrent falls that were assessed at baseline and during six follow-up visits at 12, 24, 36, 48, 72, and 96 months. Multisite pain was examined using self-reported questionnaire for a total of 20 sites using both sides. Multisite pain was categorized into four categories as follows: no pain, 1-site, 2-sites, ≥3-sites. Generalized Estimating Equations with binary logistic regression was utilized to account for the follow up time points for fall incidence after adjustments for covariates.

RESULTS: This study included a total of 2585 older adults. Baseline 2-sites (Odds Ratio (OR) 1.48, p=0.023) and ≥3-sites (OR 1.83, p<0.001) were significantly associated with increased risk of fall over time when compared to no pain sites in this population. Baseline 2-sites (Incidence Rate Ratio (IRR) 1.42, p=0.029) and ≥3-sites (incidence Rate Ratio (IRR) 1.67, p<0.001) were significantly associated with increased number of falls over time in this population. Only ≥3-sites were associated with the recurrent falls in this population (OR 2.05, p=0.006).

DISCUSSION AND CONCLUSION: Baseline multisite pain (≥3-sites) was longitudinally associated with increased fall incidence, number of falls, and recurrent falls over seven years of follow-up. Our results were consistent with previous reports examining multisite pain and risk of fall [4].

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Perceptions of Visually Impaired Older Adults About the Future After Two Years of Individual Low Vision Rehabilitation

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BACKGROUND: Aging of populations poses growing needs to eye healthcare and low vision rehabilitation services. Chronic eye diseases such as age-related macular degeneration, glaucoma and diabetic retinopathy are mainly responsible for permanent visual impairment in western countries. Visual impaiment threatens independence, functioning and psychosocial well-being of older adults. Holistic and multiprofessional low vision rehabilitation services can support adaptation to disability and survival in everyday life. This study is part of a larger research project describing the quality of life of visually impaired older adults and their individual LVR processes (1). The results can be utilized by social, healthcare and rehabilitation professionals supporting visually impaired older people in different settings.

AIM: To describe the thoughts of visually impaired older adults about the future after two years of individual low vision rehabilitation services.

METHOD: In this qualitative study, the data was collected through semi-structured interviews between 5/2018-7/2019 at hospital premises. The participants (n=28) were home-dwelling older adults aged >65+. They were asked what perceptions they have about the future. The interviews were recorded and transcribed. The data was analyzed by inductive content analysis.

RESULTS: Participants' perceptions about the future were identified in three main categories: 1) Living environment, 2) Functioning 3) Eye healthcare and rehabilitation. Participants reflected on the possibilities of being able to continue living at home and future housing. Participants consider all aspects of physical, social, and mental functioning in relation to their future. Movement, health, activity and performing daily activities were reflected on related to physical functioning. Receiving help, attending family gatherings, maintaining social relationships, hopes for cultural experiences and even a romantic relationship was embraced related to social functioning. Participants expressed many feelings regarding mental functioning. They lived one day at a time and stated being positive and content in the current situation. Some targeted a specific chronological age. Many had faith and trust for the future while others lacked perspectives and even hoped for death. Related to vision and eye disease treatment in the future wishes were set for improved vision and experiences about treating age-related macular degeneration with intravitreous medicine were shared. Wishes for the continuity of low vision rehabilitation were expressed as well as intentions to use mobility aids in the future.

DISCUSSION AND CONCLUSION: Visually impaired older adults viewed the future both with positive hope and neutral realism, but also with dark and depressed feelings. In low vision rehabilitation, attention should therefore be paid particularly in supporting the psychosocial adaptation to disability and mental well-being. Sosial participation and active agency in society should also be engouraged and emphasised. Based on the results, it is important to support adherence to treatment to ensure positive outcomes and to avoid unnecessary deterioration of vision. Supporting future-orientation in low vision rehabilitation of older adults emphasizes their resources and promotes active and successful aging with disability.

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Prerehabilitation and Rehabilitation of Patients After Surgery

Preoperative Factors, Post-surgical Condition and Functional Outcome After Rehabilitation for Lower-Limb Joint Replacement

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BACKGROUND AND AIM: Knee and hip arthroplasty (KA, HA), are widely diffused techniques to manage pain and dysfunction for osteoarthritis (OA), or repair hip fractures (HF). In Italy, the numbers have grown over the last decades, and a further increase is expected in the future. Preoperative factors that may influence functional recovery have been investigated, with conflicting levels of evidence (1,2). The aim of this retrospective study is to further investigate the role sarcopenia, other patient-related factors and performance indicators on admission to rehabilitation, as possible predictors of functional outcome in patients after KA or HA.

METHODS: Population: 86 patients (54F), consecutively admitted to our inpatient rehabilitation unit after KA or HA from Jan. 2023 to Mar. 2023.
Data collected from the clinical records:

- Demographic
- Preoperative level of functioning
- Type of surgical procedure and etiology
- Serum albumin (SA), total protein (TP), BMI and risk of sarcopenia (SARC-F) on admission to rehabilitation
- Clinical/functional measures on admission and discharge: Barthel (BI); Handgrip (HG); Tinetti score (TS); Sit-to-Stand (StS); Timed Up and Go test (TUG); 10 meters walking test (10mWT); 6 minutes walking test (6minWT) at discharge; functional ambulation category (FAC); technical aids at discharge; disposition at discharge
- Length of Stay in Rehabilitation (LOS)

A follow-up phone call was carried out 6 months after discharge for 40 patients.
A backward stepwise regression analysis between each dependent variable and independent ones that previously demonstrated a significant correlation was carried out to identify pre-op and factors on admission that may influence the outcomes. A comparison was made between two groups according to the presence-absence of risk of sarcopenia (SARC-F >=4).

RESULTS: Age: 74 years (SD 9.9); Type of intervention: 35 KA; 38HA in OA; 13 HA after HF.
40 pts. (46.5%) were at risk of sarcopenia. BI median: adm.50, disch.90; HG mean: adm.27, disch.29.
The backward stepwise regression analysis showed a relationship between SA, TP on admission and BI, TS at discharge, and between SA on admission and 6MWT at discharge.
In the comparison between low and high-risk pts. for sarcopenia, the latter group was older, had lower SA, lower HG and worse BI and TUG on admission, worse BI, HG, TUG, TS 6MWT at discharge and longer LOS. The functional status at follow up was unchanged.

DISCUSSION AND CONCLUSIONS: Our findings, based on these preliminary data from the regression analysis, confirm the possible predictive role of sarcopenia, SA and TP on functional recovery in patients who underwent hip or knee replacement. These data should be confirmed with a CHART analysis to develop a predictive flow diagram.

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Can Early PROMs Be Used to Detect Patients at Increased Risk for Delayed Functional Recovery After TKA

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BACKGROUND: Orthopedic procedures on the extremities can result in severe postoperative pain [1], which can impair early functional outcomes, increase complications, and lead to chronic postoperative pain. Despite the various efforts to improve postoperative management, acute pain is still often undertreated [2].

AIM: The study aimed to investigate the impact of two different levels of postoperative pain management on pain-related patient reported outcome measures (PROMs) and functional scores up to 3 months after TKA and investigate the association between pain-related PROMs on postoperative day (POD)1 and POD5 and functional scores obtained on POD5 and 3 months after total knee arthroplasty (TKA).

METHOD: The study aimed to investigate the impact of two different levels of postoperative pain management on pain-related PROMs and functional scores up to 3 months after TKA and investigate the association between pain-related PROMs on POD1 and POD5 and functional scores obtained on POD5 and 3 months after total knee arthroplasty (TKA).

RESULTS: Patients receiving scheduled treatment had significantly better outcomes than those on 'on demand' treatment. Scheduled treatment led to reduced pain severity and interference on both POD1 and POD5, better function, extension, and flexion ranges, Barthel index, and 6 minutes walking test on POD5, and a better Knee Injury and Osteoarthritis Outcome Score (KOOS) 3 months later. Pain-related PROMs assessed on POD1 and POD5 were associated with better knee range of motion, faster gait speed, better performance in activities of daily living, less pain, and higher knee-related quality of life 3 months post-surgery.

DISCUSSION AND CONCLUSION: Our results emphasize the importance of adequate pain management regarding early and late functional outcomes after TKA, which is in line with previous research [3, 4]. Furthermore, our study highlights that PROMs other than the worst pain can be effectively used to assess the recovery in the days after surgery.

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Knee Extensor Strength and Functional Performance in Patients With Knee Arthroplasty

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BACKGROUND: Deficits in functional abilities begin early and progressively aggravate in people with knee osteoarthritis, but also persist after total knee arthroplasty (TKA). At the same time, a loss of muscle strength at the knee level is observed throughout the evolution. As TKA is performed more and more frequently in always younger and more active patients, a better understanding of the functional importance of muscle strength is required.

AIM: The purpose of this study was to evaluate the relationship between functional performance and knee extensor strength in patients after TKA.

METHOD: 35 patients (16 men and 19 women) at six months after TKA were included in this cross-sectional study. Knee extensor strength was measured by the isokinetical method at the velocities of 60o/s, 90o/s and 120o/s, using a Gymnex Iso 1 Dynamometer. The recorded parameters were quadriceps peak torque, power and work. Functional performance was assessed by the timed up-and-go (TUG), stair climbing test (SCT) and 6-minute walk (6MW) tests. Analyses of the relationships between functional performance and strength parameters were done.

RESULTS: Quadriceps peak torque, power and total work significantly correlated ($p<0.05$) with all three functional performance tests. The higher level of correlation was found between knee extensor power and TUG. Significance was met for all the three angular velocities used.

DISCUSSION AND CONCLUSION: Knee extensor strength and in particular the quadriceps power essentially contribute to improve functional performance. Therefore, the rehabilitation programs after TKA should emphasize corrective muscle strengthening in order to prevent disabilities and to maintain long term autonomy.

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Prevalence of Sarcopenia and Its Relationship With Nutritional Status on Elderly Patients With Musculoskeletal Concerns: Implications for Rehabilitation

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BACKGROUND: Sarcopenia, the progressive loss of skeletal muscle mass, strength, and function, is a common age-related condition. Elderly individuals often experience musculoskeletal aging, which can be intertwined with sarcopenia and obesity (1).

AIM: This study aims to explore the prevalence of sarcopenia in a real-world cohort of patients aged 65 and older with musculoskeletal issues referred to a Rehabilitation Unit. Additionally, the study aims to investigate potential associations between sarcopenia and alterations in nutritional status and Body Mass Index (BMI).

METHOD: In this study, 247 patients aged 65 and older with musculoskeletal concerns were enrolled. Bioelectrical impedance analysis was used to measure total skeletal muscle mass (SMM) and appendicular muscle mass (ASMM). Hand grip strength of the non-dominant hand was assessed. Outcome measures included the Mini Nutritional Assessment (MNA) and the 12-Item Short Form Health Survey (SF-12).

RESULTS: The study found that 46.1% of the subjects exhibited evident sarcopenia, with 10.1% showing severe sarcopenia. Patients with severe sarcopenia had significantly lower BMI and MNA values. In terms of SF-12 scores, only the physical score demonstrated slight but significant differences. Specifically, individuals affected by probable or severe sarcopenia scored lower than their non-sarcopenic counterparts.

DISCUSSION AND CONCLUSION: The findings of this study shed light on the significant prevalence of sarcopenia among elderly individuals with musculoskeletal concerns, emphasizing the need for tailored rehabilitation approaches in this population. Our study revealed that nearly half of the subjects exhibited sarcopenia, with a notable proportion demonstrating severe sarcopenia, which can substantially impact their overall health and quality of life.
The observed associations between sarcopenia and nutritional status, as reflected in BMI and MNA scores, highlight the intricate interplay between musculoskeletal health and nutritional well-being in the elderly. In conclusion, this study, conducted with a real-world cohort of elderly individuals with musculoskeletal concerns, underscores the high susceptibility of these subjects to sarcopenia. Consequently, rehabilitation for elderly patients with musculoskeletal issues must be tailored and multidisciplinary. Future research should further investigate these aspects to enable early sarcopenia identification and the development of personalized rehabilitation programs.

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Quality of Life in Patients With Sarcopenia in Republic of North Macedonia

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BACKGROUND: According to the literary definition used for sarcopenia, the prevalence in 60–70-year-olds is reported as 5–13%, and the prevalence ranges from 11 to 50% in people >80 years. Sarcopenia since 1989 when Irwin Rosenberg proposed the term has been defined as a loss of skeletal muscle mass and strength that occurs with advancing age. Sarcopenia, although is a part of normal aging, leads to disability, falls, injuries, hospitalization, and increased mortality.
According to the population census from 1994 in R. of N. Macedonia 13% of the population is over 60 years old, in 2002 15 % and 2008 is 16, 6%. Although sarcopenia is dominantly a geriatric condition our community does need a concept for increased awareness regarding recognizing the symptoms, treatment and most importantly actions for preventing the condition. There is a lack of knowledge regarding recognition of diseases among health professionals and often stays undiagnosed health issue.

AIM: To assess quality of life through SF-36 QUESTIONNAIRE in patients (who are not in wheelchair and 'bed-thigh') age 60 and over, diagnosed with sarcopenia in relation to Muscle Quality and Muscle Strength.

METHOD: This is a prevalence study with expected 70 patients with sarcopenia included in the period of 5 months. The patients included are mostly from Nursery homes in R. of N. Macedonia, who are not in wheelchair and bed-thigh and ambulatory patients aged 60 and over. The patients included must be diagnosed for sarcopenia through assessment of muscle mass (bioimpedance analysis); physical performance (gait speed), muscle strength (handgrip strength) and must have SARC-F score equal or over 4. Those patients diagnosed with sarcopenia fulfill the - 36 QUESTIONNAIRE for assessment of quality of life. It is expected that around 200 patients will be screened for sarcopenia in a period of 5 months.

RESULTS: Results are expected to present the prevalence of sarcopenia in patients aged 60 and over and to assess their quality of life in relation to Muscle Quality and Muscle Strength.

DISCUSSION AND CONCLUSION: This research is a great challenge in this field because R. of N. Macedonia doesn’t have any published research or clinical trial on sarcopenia among elderly and its social and economic burden to society. The aim is to present that this health issue is not rare and we as physicians face the consequences in our daily practice. Therefore, this trial will be a baby step for presenting the need of public health approach to the patients diagnosed with sarcopenia to comprehend this disease which in turn will lead to better care and quality of life for our elderly population.

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Rehabilitation of Adults and Children With Disabilities 1

Tackling the Complexity of Rare Genetic Metabolic Disorders With a Dedicated Care and Rehabilitative Pathway

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BACKGROUND: In Europe, a disease is categorized as "rare" when its prevalence is as low as 0.05% of the population. The number of known and diagnosed rare diseases worldwide ranges between 7,000 and 8,000; about 70% of these manifest in childhood, and most of them are characterized by a clinical complexity from the beginning, demanding multifaceted interventions aimed at preventing fatal complications and growing disability and enhancing the quality of life of children and parents. There is evidence that the most effective approach to this challenge is an integrated care pathway delivered by a multi-professional, interdisciplinary team.

AIM: This study aimed to identify the prerequisites for planning a dedicated care pathway to manage highly complex metabolic rare diseases, to reduce the occurrence of short- and long-term complications.

METHOD: A retrospective observational study was designed to collect data on the clinical-functional profile and care received after diagnosis by children with rare genetic metabolic diseases referred to the Pediatric Clinic-Rare Diseases Unit of a University Hospital between 2017 and 2022.
Inclusion criteria were: diagnosis of a rare disease (mandatory condition) and at least two of the following: intellectual or psychomotor delay, mild, moderate, severe dysphagia and/or need for artificial feeding, and malformations involving at least two organs or systems.

RESULTS: Of 450 patients hospitalized during the study period, 148 met the inclusion criteria. 97/148 (66%) received a genetic diagnosis in the prenatal period (10.3%), neonatal period (16.4%), or later (73%). 34% are still undiagnosed, even many years after birth. Diagnoses included Di George syndrome (15%), Charge syndrome (3%), achondroplasia (4%), osteodystrophy/chondrodysplasia (8%), various anomalies including genetic syndromes, chromosomal abnormalities, and congenital malformations (35%).

Only 13% of cases presented single malformations, 88% had multi-organ malformations; 81% had facial dysmorphisms suggestive of a syndromic picture. The most prevalent malformations at birth were cardiac (63%) and skeletal (61%), with cardiac malformations being subject to early correction, while skeletal malformations predominated in the follow-up (65%).

Despite a very high prevalence of facial dysmorphisms, there is no systematic evaluation of swallowing; the analysis revealed that only 11% of infants at birth benefited from artificial feeding: 17% via nasogastric tube, 63% via PEG, and 39% via parenteral nutrition. Only 5% of children received PRM assessment and counselling immediately after diagnosis.

DISCUSSION AND CONCLUSION: Our sample presented clinical and functional features overlapping the ones already described in the literature. The care pathway analysis reveals high-quality aspects, such as early management of cardiac issues, but also important gaps, including the lack of referral of patients to a multi-professional interdisciplinary rehabilitation team. The inclusion of the rehabilitation component

in the present care pathway, with the implementation of an early dysphagia screening and the provision of an individual rehabilitation plan could help preventing and managing developmental abnormalities and ensure a swift and fitting response to the needs of patients with rare diseases and their families.

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Does the Intensity of Robot Assisted Gait Training in Children With Cerebral Palsy Matter?

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BACKGROUND: Children with cerebral palsy (CP) are characterized by impaired gross motor function, including standing and walking. One of the already well-established methods for improving the functions of gross movement in children with CP is the robot-assisted gait training (RAGT).

AIM: We wanted to compare the effects of two different intensity training programs.

METHOD: We retrospectively analyzed the data of 114 children (35 female, 11.2 ± 3.6 years, who were included in RAGT in the period of 10 years. They were assigned in one of two gait training programs: more (n = 88; 4-5 sessions/week, 4 weeks) and less intensive (n = 26; 2 sessions/week, 8 weeks). Measurement of passive range of motion, Timed up and go test, 10-meter walking test and 6-minute walking test were evaluated pre- and post-training.

RESULTS: A significant increase in passive range of motion in the knees and ankle joints was observed after the gait training ($p<0.001$). Changes in others outcomes were not significantly different between both groups. Gait training reduced the proportion of children with hip and knee contractures, in hip joint significantly in correlation with GMFSC level ($p=0.019$). Walking-related outcomes did not improve differently between two training programs, except for the Timed up and go test, where the outpatient group showed significantly greater improvement ($p=0.021$). Significant within-group improvements were mainly observed in intensive training program.

DISCUSSION AND CONCLUSION: Statistically significant improvement was observed in passive range of motion intragroup, however there was no intergroup difference post-training. Significant improvement in walking tests was observed in group with intensive program. In outpatient group, the significant difference was observed in Timed up and go test alone, which turned out to be a significant difference between the groups.

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Rehabilitation Aspect of Music Therapy in Palliative Care of Children

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BACKGROUND: Palliative care is an interdisciplinary medical approach for people and their families who are facing challenges associated with life-threatening or life-limiting illnesses. Palliative care and rehabilitation share holistic and therapeutic approaches with common goals to improve patient's levels of functioning and quality of life. Music therapy has a great potential to meet the holistic needs of a seriously ill child and their families by relieving symptoms, addressing psychological needs, offering support and comfort, facilitating communication, increasing the ability to cope with stress, and meeting spiritual concerns (1). Current scientific evidence supports the use of music therapy to reduce pain and anxiety and to improve the quality of life of children with serious illnesses (2-6).

AIM: To promote the use of music therapy in seriously ill children and adolescents.

METHOD: A case study with video samples of various music therapy methods applicable with pediatric patients and their families.

RESULTS: A 12-year–old girl with high-grade osteosarcoma was initially treated with neoadjuvant chemotherapy, tumor resection and knee prosthesis implantation. Chemotherapy lasted for a year and caused her difficult neutropenic infections and stomatitis, which prevented her to eat, speak or move.

Despite extensive pain medication the adequate pain control was not reached. A long-term pain management plan was made because of difficult pain and weak performance. Because the child was artistic in nature, a consultation to music therapist was made.

All basic music therapy methods were attempted. Of these, playing songs with figure notes was the most helpful. According to the patient and her family, music therapy sessions made it easier to tolerate the most painful periods of chemotherapy. She needed less pain medication and was able to do her schoolwork, eat and talk again.

DISCUSSION AND CONCLUSION: Music therapy helped the patient and her parents to relax despite the pain and to express different emotions resulting in an improvement of the pain experience and overall functioning. It is important to make a long-term pain management plan for a seriously ill patient, including both pharmacological and non-pharmacological treatments. Music therapy appears to be an asset for the interdisciplinary team working to improve quality of life for seriously ill pediatric patients.

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Sports Medicine – Prevention and Rehabilitation

ACL Reconstruction in Adolescents - Returns to Sports, Functionality and Perception of Quality of Life

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BACKGROUND: Anterior cruciate ligament injury is a serious sport lesion and his prevalence is growing in adolescent athletes. A safe return to exercise and sports is one is one of the main objectives of rehabilitation program.

AIM: This clinical study intends to evaluate the the level of sports activity and the perception of quality of life after reconstruction of the AC after reconstruction of the ACL, in a population of young patients.

METHOD: Cross-sectional observational study that included a sample of young patients who underwent surgical reconstruction of the ACL and rehabilitation program during adolescence Metric tools were the Tegner Activity Scale (TAS), Knee Outcome Survey - Activities of Daily Living Scale (KOS-ADLS) and Short Form (SF)-36. Descriptive and correlation statistics (Pearson's and Spearman's Correlation Coefficients) were used.

RESULTS: This sample included 30 participants, 15 males and 15 females with a mean age of 19.4 ± 2.0 years and a mean postoperative time of 43.0 ± 16.8 months. In 20 patients, meniscus and cartilage injuries were identified. They had a pre-injury TAS of 8.0 ± 1.2 and a current TAS of 4.6 ± 2.2 and currently present KOS-ADLS score of 87.6 ± 11.0. . The SF-36 vitality, mental health, and general health domains respectively 66.3 ± 22.9, 75.9 ± 19.9 and 75.5 ± 20.0. Pearson Correlation Coefficient KOS-ADLS / Mental Health (SF-36) is 0.444 meaning a strong positive correlation.

DISCUSSION AND CONCLUSION: : Before ACL injury, the patients practiced competitive or recreational sports, with males presenting a higher level of activity. The presence of an associated injury also negatively affects the functional performance of the knee. Despite high knee function values found in the KOS-ADLS evaluation, there was a significant reduction in sports activity levels. This can be explained by the possible psychological impact of this major knee injury, which affects motivation levels for returning to sports, especially for competitive sports demand. An increased level of function is correlated with perception of quality of life, particularly in physical pain and mental health domains. The positive and statistically significant correlation between the KOS-ADLS score and the Mental Health dimension of the SF-36 suggests that knee functional status has a relevant impact on the overall perception of emotional well-being.
Adolescents and young adults undergoing ACL reconstruction have a high perception of knee functionality and quality of life. However, after the rehabilitation program, they significantly lower the level of sports activity. Different aspects (concomitant injuries, psychological impact) may contribute to this reduction.

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Eccentric Training of the Hamstring Muscle After ACL Reconstruction

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BACKGROUND: ACL reconstruction with hamstrings results in deficit in hamstring muscle strength and power. Its correction is one of the challenges in rehabilitation.
AIM: This work aims to show the effect of eccentric isokinetic training of hamstrings in patients after ACL reconstruction and determine whether their effect is better compared to concentric exercises.

METHOD: A prospective study followed 240 recreational players after ALC reconstruction with hamstring tendons. The patients were divided into two groups according to the type of applied postoperative rehabilitation protocol after the assessment of the subjects muscle performance by isokinetic testing of the thigh three months after the operation. Group A consisted of 120 male recreational football players who postoperatively performed eccentric training of the hamstrings in a short range of motion, and group B consisted of 120 recreational football players who performed exclusively concentric training of the hamstrings. The therapeutic intervention lasted for 3 months when control isokinetic testing of the lower leg muscles was performed. Statistical analysis was performed using the Student's T-test($p < 0.05$ was taken as the level of statistical significance).

RESULTS: At the isokinetic testing 3 months after ACL reconstruction, a deficit of hamstring strength and power was found in 98% of subjects. This deficit remained after eccentric training in 46% of subjects from Group A and in 67% of subjects from Group B. The average values of Peak torque to body weight in patients from Group A were statistically significantly better compared to patients from Group B ($p < 0.05$).

DISCUSSION AND CONCLUSION: Correction of hamstring strength and power deficit is one of the key tasks of postoperative rehabilitation after ACL reconstruction. Although there is still no consensus about the type of applied therapeutic intervention that is the "gold standard", this research will contribute to the understanding of the effects of eccentric exercise of the hamstrings in recreational athletes. Eccentric training produces large muscle forces that more quickly neutralize the negative effects of surgery and inactivity in these patients compared to those in concentric mode. In this way, the assumption is that patients who undergo this type of exercise will return to sports more quickly and safely. This is especially important for eccentric isokinetic training that is carried out under controlled conditions on isokinetic systems. Eccentric training of hamstrings in a short range of motion applied from the 12th postoperative week after ACL reconstruction achieves faster and safer correction of hamstring strength and power deficit and reduces the risk of re-injury of the same or contralateral knee.

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Cryo Plus Ultrasound Therapy for Acute Lateral Ankle Injury Sprain in Football Players: A Proof-of-Concept Study

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BACKGROUND: Acute lateral ankle sprains are common injuries among football players, but the optimal treatment strategies in elite athletes are still debated [1,2].

AIM: This proof-of-concept study aimed to assess the impact of cryo plus ultrasound therapy on the short term recovery of football players with acute lateral ankle sprains.

METHOD: Semiprofessional football players with grade I or II lateral ankle sprains were randomly as signed to experimental group (receiving cryo plus ultrasound therapy combined with conventional physical therapy) or control group (sham cryo plus ultrasound therapy combined with conventional physical therapy). Pain intensity and physical functioning were assessed by the Numeric Rating Scale (NRS) and Foot and Ankle Disability Index (FADI) at baseline (T0), at the end of treatment (T1), after one month (T2), and two months after treatment (T3)

RESULTS: After the study intervention, significant differences between groups were reported in terms of pain relief (NRS: 4.08 ± 1.29 vs 5.87 ± 1.19; p=0.003) and physical function (FADI: 50.9 ± 10.3 vs 38.3 ± 11.5; p=0.021). However, no significant differences were reported between groups at T2 and T3. No adverse effects were reported.

DISCUSSION AND CONCLUSION: Cryo plus ultrasound therapy combined with conventional physical therapy can accelerate recovery and early return to sport in elite football players with acute lateral ankle sprains [3]. While this study contributes valuable insights into the potential benefits of cryo plus ultrasound therapy, further investigations with longer follow-up are needed to validate and optimize the application of physical agent modalities in the management of ankle injuries.

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Efficacy of Blood Flow Restriction With Low-Load Resistive Exercise in Adults Who Have Risks for Symptomatic Knee Osteoarthritis: Double-Blind Randomized Controlled Trial

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BACKGROUND:
Osteoarthritis (OA) is a degenerative disease with an increasing incidence each year. In 2020, more than 654 million people worldwide suffer from osteoarthritis(1). Strength of the muscles around the knee joint especially the quadriceps muscle can help to reduce the and slow the progression of the disease in people with a history of knee OA. The recommendation is the resistive exercise at a weight level of 70-80% of 1 Repetition Maximum (1RM) will increase muscle size (hypertrophy) and muscle strengthening. However, adverse complications have been reported in adults exercising with resistance at this intensity, such as pain in the knee. So, Blood Flow Restriction Training (BFR) is a type of resistive training performed by controlling blood flow using a tourniquet (cuff or band) wrapped around the proximal part of the muscle. It uses less weight to train and can increase muscle mass and reduce unwanted effects after exercise.

AIM: To assess the efficacy of blood flow restriction (BFR) to improve knee extensor strength in irregular exercise adults with risk factors of symptomatic knee osteoarthritis (OA).

METHOD: Design: Double-blind randomized controlled trial (January 2022 – July 2022)

Participants: Irregular exercise of adults aged ≥ 40 years old and had at least one of risk factors of symptomatic knee OA

Methods: 44 patients were randomly assigned into intervention (BFR) and control groups using stratified and mixed block randomization. The intervention group exercised 2 times/week for 4 weeks in leg extension exercises at 30% of 1 repetition maximum (1RM) (15 reps×4 sets) with cuff pressure according to the protocol of this study, while the control group did not use the cuff protocol. Both groups were given the diary book to record any possible confounding factors. The outcomes of interest included 1RM isotonic knee extension, 1RM isotonic leg press, 30-second chair stand test, and knee pain outcome score (KOOS). Pre-exercise and post-exercise tests were recorded. Compare the differences in results between groups using the linear regression test.

RESULTS: The posttest mean differences of 1RM isotonic knee extensor, 1RM leg press, 30 second chair stand test, and KOOS after 4 weeks of exercise between groups (adjusted mean difference, AMD) were 14.74 kg (95% CI: 4.00, 19.29; p<0.001), 30.83 kg (95% CI: 18.00, 43.66; p<0.001), 7.11 times (95% CI: 4.16, 10.07; p<0.001) and 1.42 points (95% CI: 0.34, 2.50; p=0.01) respectively, which were significantly different in statistics.

DISCUSSION AND CONCLUSION: This research used an exercise protocol using the minimum intensity, number of reps, number of sets, and duration from each study combined(1).
A 4-week, low-load resistive training program with concurrent application of BFR improves knee extensor strength in irregular exercise of adults who have risk factors of symptomatic knee OA when compared and no further worsened knee symptoms.
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Enhancing Concussion Prevention: Findings from an International Survey of French-speaking Athletes on Sport-related Concussion Characteristics

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BACKGROUND: Sport-related concussions (SRCs) pose significant physical, emotional, and economic burdens on athletes and the sports community. With the long-lasting consequences of SRCs, effective prevention strategies are imperative.

AIM: To investigate the relationship between demographic data, history of concussion and sports' characteristics with the number of SRC, symptoms' duration and resting period.

METHOD: Cross-sectional online survey. A three-month online survey was conducted among athletes in five French-speaking countries. The survey was created on an online platform and distributed through institutional networks, professional associations, regional clubs, and research centers. Communication efforts included newsletters and social media platforms. Data on demographic, history of concussion, sport category (high-risk, moderate-risk, low-risk), sport level, symptoms duration and recovery duration were extracted from the database. We investigated if the number of SRC, duration of symptoms and duration of recovery period differ depending to demographics, sport category and sport level.

RESULTS: Out of the 998 participating athletes, 939 complete answers were analysed with balanced gender distribution. The duration of symptoms was longer for women (132.54±21.34 days) compared to men (81.37±19.93 days; $z=-4.674$, $p<0.001$). Athletes from Canada had higher number of repeated SRCs (23 athletes with 4 and 11 athletes with 5 SRCs) than European countries (7 athletes with 4, and one athlete with 5 SRCs) ($X^2=39.718$, $p<0.001$), with symptoms lasting 88 days longer on average ($p<0.001$) in similar population. The number of SRCs was influenced by the sport category. A positive correlation was observed between the number of SRCs and symptom duration. Professional athletes had shorter recovery periods than non-professionals.

DISCUSSION AND CONCLUSION: These findings highlight the need for tailored prevention strategies in high-risk sports and among athletes. Additionally, the prolonged symptom duration exceeding recommended recovery periods raises crucial concerns in SRC management, emphasizing the importance of preventive measures.

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Dry Needling in Overhead Athletes With Myofascial Shoulder Pain: A Systematic Review

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BACKGROUND: Shoulder pain is a common and debilitating musculoskeletal condition among overhead athletes. In these sports, the explosive and repetitive overhead movements can lead to overuse injuries to the shoulders, resulting in long periods of inactivity. The most common shoulder pathologies include scapular dyskinesia, impingement syndrome, superior labrum anterior to posterior tears, glenohumeral internal rotation deficit, rotator cuff tears, and myofascial trigger points (MTrPs). MTrPs are defined as irritable points within a tense band of skeletal muscle, which cause pain during stretching, contraction, or palpation and can lead to postural changes, reduced range of motion, and muscle weakness. The management of myofascial pain in athletes requires a range of fast and effective rehabilitation techniques. In this context, Dry needling (DNY) has shown promising results due to its ability to rapidly reduce pain.

AIM: This study aims to investigate the clinical potential of DNY in the treatment of myofascial shoulder pain in overhead athletes.

METHOD: A comprehensive search was conducted on PubMed, Scopus and Web of Science databases. PICO model (patient/population, intervention, comparison, outcome) was used to identify studies: overhead athletes with shoulder pain (P); DNY (I); no treatment, comparison between DNY application, manual therapy, and other kind rehabilitation (C); pain, disability, range of motion (ROM), Pain Pressure Threshold (PPT) (O). We included studies that met the following inclusion criteria: overhead athletes with shoulder pain, DNY in MTrPs, randomized controlled trial (RCT), case-control study, feasibility study as study design, full-text availability, written in English. Exclusion criteria were studies that did not include athletes, studies that did not focus on the treatment of MTrPs with DNY, other reviews.

RESULTS: Out of 375 articles, 165 were excluded due to duplication, and 210 articles were screened. Only 6 articles met the inclusion criteria, and 1 was subsequently excluded after Newcastle-Ottawa scale to evaluate quality assessment criteria. A total of 5 studies were included in the systematic review. The selected studies used heterogeneous DNY protocols and focused on the assessment of short-term pain. Pain, ROM, Isometric strength, Shoulder function and Disability show significant improvement after treatment, in contrast, PPT increased in the immediate post-treatment period, probably due to soreness after the injection.

DISCUSSION AND CONCLUSION: The present systematic review show that DNY is a valid, quick, and safe method for the treatment of myofascial shoulder pain in overhead athletes. For athletes, the period out of competition represents a critical factor, and it is mandatory for the medical staff to find treatments providing immediate pain relief to reduce or prevent periods of inactivity. In this context DNY represent a valid solution in sports rehabilitation setting. Finally, the rapid analgesic effect of the DNY treatment could have a positive influence on reducing the intake of drugs.

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Rehabilitation of Adults and Children With Disabilities 2

Acute Rehabilitation Guidelines in Pediatric Population

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BACKGROUND: Acute rehabilitation in pediatric population is increasingly implemented in all pathology in recent decades. Benefits are shown to be effective particularly in complications prevention, favorable condition, shortening duration of hospitalization and better treatment and functional outcome.
AIM: to deliver acute rehabilitation guidelines including indications, timing, precautions and plan of treatment for different ages and dysfunctions.

METHOD: In methodology we used GRADE methodology (Grading of Recommendations Assessment, Development and Evaluation), formulated the questions according to PICO format (population, intervention, comparison, outcome) and performed comprehensive research of the available literature in PRM interventions for acute rehabilitation. Selection of databases included PubMed, Cochrane Library, SCOPUS and selection of article types in PubMed included: Randomized Controlled Trials, Meta-analyses and Cochrane reviews. Inclusion criteria included: children age up to 16 years of life, patients in Intensive Care Units, premature children, neonates pediatric patients and patients after surgical interventions. Exclusion criteria included: non-interventional studies, case series and patients outside clinical centers and hospital. Results generated from research questions in PICO format.

RESULTS: The results present interventions that are advised and safe for performance in neonatal period, pediatric patients up to one year of life, preschool and school age and adolescents patients. Furthermore, indicative interventions in Intensive Care Units (ICU) and outside ICU are analyzed and included with the optimal timing for the beginning of rehabilitation with special attention the influence of acute rehabilitation timing on treatment outcome. Comparisons between different methods are critically analyzed including effectiveness of kinesiotherapy versus positioning in acute rehabilitation; respiratory exercises versus acute respiratory rehabilitation; early verticalization than late verticalization and exercises with orthoses versus exercises alone. The position of acute rehabilitation in pediatric patients in terms of effectiveness in prevention and reduction of complications is summarized with differences in acute rehabilitation regarding patients age, present pathology.

DISCUSSION AND CONCLUSION: The results for acute rehabilitation guidelines in pediatric population present the position of SISC for PRM in Children of ESPRM. This guideline will help in standardization and harmonization of acute rehabilitation clinical practice with the evidence-based recommendations in all European centers.

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Application of Non-invasive Neuromodulation in Children With Neurodevelopmental Disorders to Improve Their Sleep Quality and Constipation

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BACKGROUND: Children with neurodevelopmental disorders have a very wide clinical variability. A common prevalent factor is problems with stool and sleep quality. Currently, there are multiple studies related to their evaluation, but not so much related to a specific intervention (1-5).
AIM: The aim was to evaluate the effectiveness and safety of the application of non-invasive neuromodulation as a treatment in children with neurodevelopmental disorders to improve constipation and quality of sleep.

METHOD: A total of 23 minors aged between 2 and 16 were included in this cross-sectional study. All participants were applied the microcurrent device for 60 min, 3 times per week for a total of 4 weeks. The technique was based on non-invasive neuromodulation using a surface-applied microcurrent electrostimulation device that administers an external, imperceptible, pulsed electrical stimulation. It is applied to the extremities, in a coordinated manner, using gloves and anklets connected with electrodes to a control console (6-8). Sleep latency and microarousals were evaluated through a sleep diary (4)(5). To assess the evolution and type of defecation, the adapted and validated version in Spanish of the Bristol Stool Form Scale was used (5).
ClinicalTrials.gov ID: NCT05265702.

RESULTS: No adverse events occurred during the study and no incidences were registered. Clinically relevant improvements were registered in defecation frequency and type as well as in sleep related parameters. An increase in the hours of sleep was registered, from 7,35 (0,83) to 9,09 (1,35), and sleep interruptions decreased from 3,83 (1,95) to 1,17 (1,11), ($p < .001$).

DISCUSSION AND CONCLUSION: Microcurrents can be used as an effective and safe treatment to improve quality of sleep and constipation in children with neurodevelopmental disorders. More studies are needed in order to obtain statistically significant results.

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Botulinum Toxin Injection and Gross Motor Function Classification System: Dosis and Muscle Selection in Children

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BACKGROUND: BoNT-A stands as a favored option for managing focal spasticity in upper / lower extremities. Within pediatric population, cerebral palsy (CP) emerges as primary cause of spasticity. Goals of BoNT-A injection include improving functionality, gait patterns, positioning, facilitate hygiene care, achieving cosmetic improvements, managing pain. To achieve these goals, most commonly targeted muscles include adductors, hamstrings, rectus femoris, gastrocnemius, all of which belong to the lower limb.

AIM: Primary goal of this study was: characterize the use of onabotulinumtoxinA and abobotulinumtoxinA in pediatric population and correlate it with the child's level of motor function (Gross Motor Function Classification System - GMFCS), with an analysis of the major injected muscles. Secondary goal: characterize demographic information, diagnosis, administered doses, adverse reactions to the drug.

METHOD: This is an observational retrospective study that evaluated all children up to 18 years and 364 days of age treated with BoNT-A at a PRM Department. Inclusion criteria: age under 19 years, follow-up in pediatric PRM appointment, treated between October 2022 and October 2023. Patients were evaluated in several follow-up appointments before and after injection.
Active / passive range of motion was assessed for relevant joints. We applied the modified Ashworth scale (MAS) before the injection and 1 month after.

RESULTS: 96 children were evaluated (42 girls (43.8%) and 54 boys (56.2%)), average age of 9.7 years (minimum 1.75 years, maximum 18.83 years). Most prevalent diagnosis was cerebral palsy (87.5%). 74 patients (77.1%) were treated with onabotulinumtoxinA and 22 patients (22.9%) with abobotulinumtoxinA. A significative statistical difference was observed between patients with walking ability (GMFCS ≤ 3) and those without (GMFCS > 3).
GMFCS >3 patients required higher total (p=0.013) and per kilogram (p=0.004) doses and were more frequently injected in adductor (p=<0.001) and hamstring (p=0.001) muscles. In GMFCS ≤ 3 patients, lower doses were needed, and gastrocnemius muscle was injected more frequently. No differences were observed in the upper limb for these two patient groups.
Both BoNT-A laboratories used were also evaluated separately. The average dose of onabotulinumtoxinA was 169 IU (minimum 20, maximum 400 IU), resulting in 8.4 IU/kg. The average dose of abobotulinumtoxinA was 620 IU (minimum 400 IU, maximum 1000 IU), approximately 19.4 IU/kg. Data related to spasticity assessment and functionality was not statistically analyzed.
However, it is clear from clinical records that there was a good therapeutic response in the majority of patients, noticeable by a reduction in spasticity level on MAS.

DISCUSSION AND CONCLUSION: This work reflects the need to adjust injected muscles to patient's functionality/therapeutic goals. Use of BoNT-A in pediatric population is essential in preventing deformities, improving positioning, preventing hip dislocation within the context of a surveillance program.
Predictably, non-ambulatory children exhibited greater spasticity severity, and therapeutic goals were related to deformities / positioning. Therefore, doses/kilogram were higher, and most frequently injected

muscles were adductors and hamstrings. Contrastingly, in ambulatory children, most injected muscles were gastrocnemius to optimize gait pattern.
BoNT-A is effective and safe in treatment of spasticity in children, at all GMFCS levels. Dose and muscle injection planning should patient-tailored basis accordingly to therapeutic goals.

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Real-Life Pilot Study: Dosing and Timing to Start Botulinum Toxin Injection in Spastic Children?

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BACKGROUND: BoNT-A is one of the preferred treatments for controlling focal spasticity in upper / lower limbs. In pediatric populations, most common cause of spasticity is cerebral palsy (CP). Goals of BoNT-A intervention in include improving functionality, gait patterns, positioning, facilitate hygiene care, managing pain. Pursuing these goals, muscles most frequently injected are adductors, hamstrings, rectus femoris, gastrocnemius, all of which in the lower limbs.

AIM: Primary goal: characterize theuse of BoNT-A in a pediatric population aged three years or younger and determine whether on-label indications remain appropriate or if there may be a need for revision. Additionally, characterize this population's demographic information, diagnosis, administered doses, injected muscles, adverse reactions.

METHOD: This is an observational retrospective study that evaluated all children aged 36 months or younger treated with onabotulinumtoxinA at a PRM Department. Inclusion criteria: age equal to or less than 3 years, follow-up in pediatric PRM clinic for spasticity, treated with BoNT-A. All patients were evaluated in several follow-up appointments before and after injection.
Active and passive range of motion was assessed for relevant joints. We applied the modified Ashworth scale (MAS) before injection and 1 month after.

RESULTS: 34 children were evaluated (15 girls (44.1%), 19 boys (55.9%)), with average age of 28 months (minimum 21, maximum 36). 8 children (23.5%) were 24 months or younger, as this represents an off-label use. CP was the most prevalent diagnosis (79.4%). Average injected dose was 94 IU (minimum 20 IU, maximum 200 IU), and the average dose/kilogram of body weight was 8.9 IU/kg (minimum 1.54 IU/kg, maximum 16.67 IU/kg). In 97.1% of patients, injections were administered in lower limbs or in both lower and upper limbs, only one patient received injections in upper limb alone. Regarding lower limb injections, average dose was 9.38 IU/kg (minimum 1.54 IU/kg, maximum 16.67 IU/kg), above recommended value of 8 IU/kg. In upper limb, average was 5.08 IU/kg (minimum 4.0 IU/kg, maximum 6.15 IU/kg), within manufacturer's recommendations (3-6 IU/kg). Data related to spasticity assessment and functionality was not statistically analyzed. However, it is clear from clinical records that there was good therapeutic response in the majority of patients, noticeable by reduction in spasticity level on MAS.

DISCUSSION AND CONCLUSION: BoNT-A laboratories provide maximum doses and reference ranges for BoNT-A application in upper and lower limbs. OnabotulinumtoxinA reference values for upper limb injection range between 3-6 IU/kg (200 IU maximum, divided among muscles); for lower limb, values are higher, ranging between 4-8 IU/kg (300 IU maximum, divided among muscles). Therefore, it was observed in this population that doses above the recommended values were used, particularly in lower limb. Additionally, 23.5% of children were injected before the recommended age (2 years).
Concluding, it appears that the administration of onabotulinumtoxinA in children aged three years or younger is safe and can even be considered in children under 2 years of age, although considered off-label.
Further research is needed to clarify safety of over-the-label dosing. Forthcoming, it may be considered the need of revision of maximum doses to be injected, at least in the lower limb.

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Ultrasound Evaluation of the Hip in Girls With Rett Syndrome: A Pilot Study

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Background: Rett syndrome (RTT) is a severe, progressive neurodevelopmental disorder characterized by an initial period of normal development followed by psychomotor regression, deceleration of head growth and development of distinctive repetitive, purposeless hand movements.

Radiological and clinical screening for hip displacement and scoliosis is recommended [1]. Hip dislocation is a silent progressive disease, with significant morbidity and decreased quality of life, if left untreated. Ultrasound (US) uses the echoes of mechanical waves to locate the structures and can locate, without ionizing radiation, both the cartilaginous FH and acetabulum. There are advantages to developing the conventional 2-D US technologies for hip surveillance because of their cost effectiveness and accessibility [2].

Aim: Primary aim: evaluation of the presence of hip displacement in all patients with Rett syndrome referred to the Physical and Rehabilitation Medicine (PRM) outpatient clinic of Tor Vergata University Hospital using US examination.
Secondary aims: assess if hip dislocations are more present in subjects with impaired gait and if US assessments are feasible, accepted, and repeatable.

Methods: During a general PRM evaluation, from April 2023, an US examination was carried out to appraise if hip dislocation was present by a PRM specialist with a long experience on US hip evaluation.
All US appearances are going to be confirmed by x-ray evaluations.

Results: Results are preliminary. Twelve patients (11 female, 92%) have been assessed [median age (15), mean age (16,3), range (4-36 years)]. All patients agreed to the US examination, no adverse event has been registered and no complaints were reported.
Four patients (33%) were non ambulatory; 3 used aids (25%) to achieve a functional ambulation; 5 (42%) were fully ambulatory.

We are disclosing data of 7 out of 12 (58%) US assessments of which x-ray evaluations are already available. US appearances are all confirmed by x-ray evaluations. One hip (14%) was found completely dislocated (hip luxation) and 1 hip with subluxation (14%). Two hips (29%) showed signs of dysplasia and 3 (43%) didn't show any abnormalities.

Discussion and Conclusion: US Hip examination appears as a feasible, accepted, easily administered, cheap and repeatable test during a general PRM consultation. US has confirmed to be.
Early assessment of hip anomalies will allow setting up an individual rehabilitation project (IRP) aimed at containing the deformity and preventing secondary complications.

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Impact of the War on Children's Rehabilitation in Ukraine

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BACKGROUND: Since its start, the war in Ukraine has taken a devastating toll on the country's children. As of now, 508 children have been killed and 1,135 injured. Besides, 13 children suffered from sexual violence, and 19,546 went missing, were deported and/or forcibly relocated, with 386 eventually returning to Ukraine. The repercussions of these harrowing experiences have had profound effects on the overall well-being and mental health of children, along with their access to medical care and education. Simultaneously, Ukraine has witnessed rapid changes in its rehabilitation system due to the ongoing war.

AIM: to evaluate the impact of war-related factors on children's rehabilitation in Ukraine.

METHOD: Analysis of the existing literature pertaining to the influence of war on children. A survey conducted among children's rehabilitation specialists regarding the challenges they have encountered.

RESULTS: The survey responses from Ukrainian mothers with children aged 3-17 showed that a staggering 60% of children have either witnessed or directly experienced war-related events. The most common traumatic events reported include separation from family and friends (28%), relocation within the country (25%), exposure to shelling and bombings (24%), prolonged exposure to harsh living conditions (17%), relocation abroad (11%), living in occupied territories (8%), witnessing the death of relatives or loved ones (6%), homelessness (5%), and enduring hunger and lack of access to water (5%).
As a result, children aged 10-15 often exhibited irritability, apathy, disinterest in learning, and abandonment of hobbies. Those aged 16-17 showed signs of anxiety, memory problems, and difficulty concentrating. In 3-9-year-olds, the traumatizing factors adversely affected games and creativity. Children of all ages often display outbursts of anger and aggression.
Another study revealed that 18.5% of preschool children and 14.2% of school-age children in Ukraine show PTSD symptoms. The war affected children's access to education and peer interaction. About 42% of children are forced to learn online, 29% follow a mixed online-offline format, and only 26% can attend school and pre-school institutions.
Approximately 14% of children changed schools at least once. Challenges that children with disabilities faced when the war started included the limited access to qualified medical care and medication shortages. Among families of children with epilepsy, 10% reported a worsened condition, seizure frequency increasing in 31% of cases.
The study also revealed stress and work overload experienced by children's rehabilitation specialists, many being compelled to leave their pre-war homes and workplaces.
The positive developments in the rehabilitation system reported by specialists included improved conditions for providing rehabilitation assistance (about 34%), equipment upgrades (54%), and better access to professional training (60%).

DISCUSSION AND CONCLUSION: The war has a lasting negative impact on the physical and psychological well-being of children in Ukraine, the most vulnerable category being those with disabilities. Despite the challenges, there have been positive trends in the development of children's rehabilitation.

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Rehabilitation After Spinal Cord Injury

Change in Bladder Emptying in Spinal Cord Injury Patients

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BACKGROUND: Spinal cord injury (SCI) results in neurogenic bladder dysfunction including difficulty with bladder emptying. Bladder-emptying methods change through patient's evolution. They depend on the type of neurogenic bladder and the level of SCI (1).

AIM: The aim to this study is to describe methods of bladder emptying and their evolution through the follow up.

METHOD: This is a prospective and descriptive study including 82 SCI patients recruited in the department of Physical Medicine and Rehabilitation of university hospital « CHU Ibn Rochd ». The level of SCI is evaluated with AIS classification. The evaluation of bladder emptying was done at T0, at T1 (after 6 months) and at T2 (after 1 year). We used bladder scan for the measurement of post void residual volume.

RESULTS: Mean age was 47 years old with a male predominance. Of 82 patients, 30.5% had cervical, 46.3% thoracic and 23.2% lumbosacral lesions. 57.3% had a neurological lesion corresponding with score B on the AIS classification. Bladder-emptying methods changed from T0 to T2, with a decrease of clean intermittent assisted catheterisation (from 34.1% to 12.2%) and indwelling catheter (from 45.1% to 7.3%) and increase in clean intermittent self-catheterisation (from 14.6% to 61%) and normal voiding (19.5%). Post void residual volume was significant at T0 in 79.2% and remained important in 58.5%.

DISCUSSION AND CONCLUSION: Methods of bladder emptying depends on the type of neurogenic bladder and the level of spinal cord injury. These methods change during the evolution of patients, from spinal shock when the bladder is not contracting until the recovery or not of a normal voiding (2). The gold standard is the use of clean intermittent catheterisation. One of the most important variable to monitor is the post void residual volume responsible for urinary tract infections (3).

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Prediction of Functional Recovery in Spinal Cord Injured Patients During Inpatient Physical Medicine and Rehabilitation: A Retrospective Study of an Acute Care Hospital

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BACKGROUND: The complete recovery of severe spinal cord injuries (SCI) is challenging, (1), which is why rehabilitation is a critical stage in the recovery process for these patients (2). To quantitatively assess the progression of functional recovery before, during, and after the rehabilitation program, the scale that stands out the most in this patient group is the Spinal Cord Independence Measure (SCIM) (3).

AIM: Evaluate the role of rehabilitation and define which variables are predictive of functional recovery in patients with spinal cord injury, through the measure of independence in spinal cord injury.

METHOD: This is an observational, analytical and retrospective study, developed in a peripheral hospital center for acute patients. The files of all patients hospitalized in this hospital, in the Physical Medicine and Rehabilitation Service (PMR), between 2017 and 2022, inclusive, and diagnosed with SCI were gathered. The variables age, gender, etiology and level of SCI, classification of motor injury, duration of hospitalization and SCIM score at admission and discharge were collected and subjected to statistical analysis.

RESULTS: There was a statistically significant variation ($p < 0.05$) in the SCIM score between admission and discharge date. The highest percentage recovery occurred in self-care. There was a positive and moderate correlation between the total SCIM score at discharge, both with the level of injury ($\rho = 0.452$; $p = 0.004$) and with the type of motor injury at admission. Patients with incomplete motor lesions had better scores in all subdomains, when compared to patients with complete motor lesions, however this difference was only statistically significant in the subdomain of respiration and sphincter management ($p = 0.006$). Regarding the relationship between the SCIM score and the level of injury, it was observed that, both in the total SCIM score and in the subdomains of self-care and mobility, the groups that obtained statistically significant differences between them were the high quadriplegia and the of paraplegia.

DISCUSSION AND CONCLUSION: There is a significant improvement in all SCIM subdomains between admission date and discharge date. The level of SCI and the type of motor lesion were the only predictive variables of the total SCIM score at discharge, with patients with less severe conditions presenting better scores.

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InSCI Survey in Romania; What Have We Learned About Our Spinal Cord Injury Population

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BACKGROUND: The Romanian National Spinal Cord Injury Survey (RO-InSCI) represent the local version of the community survey, developed as a tool to collect information about the lived experience of persons with SCI. This is a part of the Learning Health System for Spinal Cord Injury (LHS-SCI), an initiative embedded in the World Health Organization's (WHO's) Global Disability Plan aimed to statistical collection of data on the lived experience of persons with SCI to consequently formulate recommendations and policies.

AIM: To describe the design and methodology of Romanian version of the International Spinal Cord Injury community (RO-InSCI) survey, reporting on participation rates and cohort characteristics and identification of the main barriers and unmet needs for an inclusive life of persons with SCI.

METHOD: Cross-sectional survey.

RESULTS: The total number of participants included in the study was 216, aged between 16 and 75 years The recorded data indicate a number of 60 women (27.8%) and 156 men (72.2%) with SCI. Most of the SCI were traumatic SCI (N=180) patients, and less of them were non-traumatic SCI (N=35). According to the level of injury, 66 tetraplegic and 149 paraplegic patients were registered in the research. Males were more likely than females to have traumatic injuries and younger age-groups were more likely to have traumatic injuries and tetraplegia.
DISCUSSION AND CONCLUSION:
Ro-InSCI was the first survey conducted in Romania aimed to identifies the factors associated with functioning, health, and well-being of persons living with SCI. Results supports systematic cross-sectional and longitudinal research and could be used for policy reforms designed to improve the functioning, health and well-being of persons with SCI in the country

REFERENCES:

Spinal Cord Injury in Metastatic Cancer Patients: An Observational Study

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BACKGROUND: Spinal metastases are frequent in solid cancers and osteolytic lesions are typically present in hematological diseases. The most severe complication of spinal metastases is spinal cord compression with paralysis. In the last decade metastatic patients live longer due to more effective and combined treatments, such as Radiotherapy and Chemio/Immunotherapy, whereas treatment side effects and complications may cause disabilities.

AIM: The aim of this study was to document the main aspects of disability, the types of cancer treatments as well as rehabilitation treatments and setting in metastatic spine cancer referred to the Rehabilitation Medicine Unit of our Comprehensive Cancer Center.

METHOD: Our study is an observational retrospective study to evaluate the characteristics of inpatients with metastatic spine cancer that were referred to the Rehabilitation Medicine Unit from February of 2013 until September of 2023 due to paraparesis. For all patients the physiatrist developed an Individualized Rehabilitation Project including necessary rehabilitation programs and the setting for continuing rehabilitation. All patients freely gave informed consent for the use of their socio-demographic and clinical data for scientific purposes. We collected data on age, sex, cancer types, lesion levels, oncological treatments developed by oncologists, prescription of orthoses, and the setting to continue rehabilitation programs after discharge

RESULTS: The results are : median age 57.51 years; 19 males and 14 females; the spinal injury was located on the dorsal column in 30 patients (90.9 %) and on the lumbar column in 3 patients (9.1%) ; laminectomy was performed in 17 patients (51,5%) and the other 16 patients (48.5%) underwent conservative treatments which included radiation, physical exercise, occupational therapy, psychotherapy, nutrition therapy and orthoses (braces). Braces were prescribed for 23 patients (69.9%) for both post-surgical and conservative treatment. The most represented cancers were breast (11 patients, 33.3 %), hematological malignancies (5 patients, 15.15%), lung (4 patients, 12.12%), prostate (3 patients, 9.09%), melanoma (2 patients, 6.06%), sarcoma (2 patients, 6.06%), colon-rectum (1 patient, 3.03%) and unknown (3 patients, 9.09%). The rehabilitation setting was home-based in 30 patients, inpatient spine center in 2 patients and intensive inpatient rehabilitation in 3 patients.

DISCUSSION AND CONCLUSION: Our study population is balanced by age and sex ; the most represented cancers are breast , lung and haematological malignancies but there are also patients with unknown diagnosis. The most frequent compression site is in the dorsal column and in particular the D2-D5 and D11-D12 tracts. These compression sites are characteristic of metastases. After a spine injury the majority of our patients received home-based rehabilitation treatments: this is a critical issue related to a poor prognosis due to the advanced cancer stage although it could also be true the opposite because prognosis may worsen due to worsening physical health . Future research and more effective rehabilitation strategies are needed for these patients as well as Public Health campaigns.

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Evaluation of the Rehabilitation Process in Spinal Cord Injury Following Attempted Suicide

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BACKGROUND: Spinal cord injury (SCI) refers to a partial or complete interruption of the ascending or descending tracts of the spinal cord leading to limitation of voluntary movement, alteration of the sensitivity under injury, lack of sphincter control, sexual disorders, and changes of the neurovegetative system. Globally, there is an incidence of 0.9x 10^6 new cases/year (1). SCI may have a traumatic (TSCI) or a non-traumatic (NTSCI) aetiology. Historically 90% were TSCIs, while more recent studies indicate a trend towards an increase in the percentage of NTSCIs (2); the percentage of TSCI varies widely among countries and populations and to date, it remains the primary cause of SCI (3). Interestingly, it has been recently demonstrated that precipitation in attempted suicide accounts for causes 2% of TSCIs (4).

AIM: The aim of this study was to determine whether the self-injurious aetiology of the spinal cord injury could modify the effectiveness of rehabilitation treatment in term of improvement in Spinal Cord Injury-Ability Realization Measurement Index (ΔSCI-ARMI) and the adherence to clinical follow-up.

METHOD: In this retrospective observational study collected data were analysed according to descriptive and inferential statistical methods: the descriptive values, expressed as mean, SD (standard deviation), median and range, were provided for all continuous variable clinical data, while for categorical data frequencies and percentages were reported.
Regression analyses were performed to study the relationship between self-injurious aetiology and the extent to which rehabilitation potential is realized (Δ SCI-ARMI) and to assess the correlation of this aetiology with the adherence to outpatient clinical follow-up.

RESULTS: The study sample consisted of 234 subjects with SCI, among which 22 were found to have self-injurious aetiology and 212 another one.
There is no significant effect of the self-injurious aetiology on the realization of the rehabilitation potential: p-value < 0.05, C.I. 95%; a low significant difference was also found in the correlation between the aetiology and the adherence to outpatient clinical follow-up with a p-value = 0.1821, C.I. 95%.

DISCUSSION AND CONCLUSION: The self-injurious aetiology does not affect the realization of rehabilitation potential, nor the adherence to outpatient clinical follow-up. Further studies are necessary to determine the possible causes of the lack of achievement of the rehabilitation potential and the not optimal adherence to the post discharge clinical follow-up the entire population with spinal cord injury.

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Cardiac Rehabilitation and Rehabilitation of Patients With Respiratory Dysfunction

Prone Positioning as a Last Resort in Pulmonary Rehabilitation Management of Patients With COVID-19: A Real Practice Restrospective Study During the First Wave Pandemia in Lesser Poland Orthopaedic and Rehabilitation Prof. B. Franczuk Hospital

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BACKGROUND: during the first wave of the COVID-19 pandemia, in October 2020, by the decision of the Lesser Poland Governor, a COVID-19 department was created at the Lesser Poland Orthopaedic and Rehabilitation Prof. B. Frańczuk Hospital [1,5,6].

AIM: the aim of our study was to review admitted patients and rehabilitation treatment used [2,3,4].

METHOD: real time RT-PCR Sars-Cov-2 test [1], exercises: tapping, active breathing exercises, prone position [2].

RESULTS: 54 patients were admitted: 36 women and 18 men. The mean age of the patients was 72 years (from 50 to 97 years), the mean hospital duration stay was 12 days, the shortest stay was 3 days, the longest 26 days. 32 patients (59.2%) were admitted from rehabilitation departments, 1 patient from the orthopedic department (1.8%), 21 patients (38.8%) from Lesser Poland Acute Medical Units. 50 patients (92.5%) had concomitant diseases. At admission, all patients had a positive real time RT-PCR Sars-Cov-2 test [1]. 13 patients (24%) had oxygen saturation spO2 below
94%, the lowest spO2 was 87%. During the hospital stay, in all patients were applied breathing exercises: tapping, active breathing exercises in 50 patients (92.5%), passive exercises in 4 patients (7.4%), general improvement exercises in 50 patients (92.5%). Breathing and general improvement exercises, each one was applied for 30 minutes, 6 days a week. In one person (1.8%) a prone positioning was used as a last resort for rehabilitation due a sudden drop in oxygen saturation [2,3,4]. Only one person died (1.8%), at admission without logical contact, a patient with numerous internal and rheumatological diseases (RA, Sjőgren syndrome, with exacerbation during hospitalization), in past rib fracture. 15 patients (27.7%) were transferred to another Hospital/ICU, 3 patients (5.5%) to isolation wards, 35 patients (64.8%) returned home.

DISCUSSION AND CONCLUSION: despite many difficulties, the Lesser Poland Orthopedic and Rehabilitation Prof. B. Frańczuk Hospital faced COVID pandemia during the first wave in 2020 year. All possible rehabilitation techniques have been applied in this restrospective study [5,6]. Great acknowledgements for all doctors, resident doctors, physiotherapists and nurses, for all who created the COVID team at the Lesser Poland Orthopedic and Rehabilitation Hospital.

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Expanding Access to Cardiac Rehabilitation: A Remote Service Model for Heart Disease Patients

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BACKGROUND: The project "Remote Rehabilitation Service Model for Cardiac Patients" aimed to tackle the issue of limited cardiac rehabilitation (CR) accessibility for heart disease patients. CR, despite reducing mortality and healthcare costs, is underutilized in Europe, with an average participation rate of 37% and below 10% in Estonia.

AIM: Expanding access to cardiac rehabilitation

METHOD: A pilot study was conducted between 01.08.2021 and 31.12.2022, involving coronary artery disease (CAD) patients from Tartu University Hospital, Estonia. The multidisciplinary project included organizational and technological adaptations, rehabilitation material development, and nurse case manager recruitment. Using a carepath management platform, the remote service model was pilot-tested with 71 patients (56 males and 15 females).

RESULTS: The project successfully implemented the remote service model, incorporating it into existing workflows and training healthcare professionals. Continuous improvements were made based on feedback. The number of rehabilitation program participants doubled compared to 2019. CAD patients experienced a mean increase in peak aerobic capacity (VO2 peak) of 3.7 ml/kg/min during 12 weeks of CR. The completion rate for remote service model patients reached 99%. Moreover, 57.8% of patients resided outside the city center, suggesting improved inclusion of remotely located patients.

DISCUSSION AND CONCLUSION: The innovative remote CR model proved viable, holding the potential to enhance rehabilitation service accessibility. The CR program positively influenced aerobic functional capacity. The subsequent stage will assess the remote service model's impact and explore implementation possibilities with other healthcare providers and the national health insurance agency.

After the successful pilot study, the Department of Sports Medicine and Rehabilitation at Tartu University Hospital, in cooperation with the Estonian Health Insurance Fund, launched a consecutive project, "Remote rehabilitation service for cardiac patients“ along with the longitudinal cohort study. All patients with an acute coronary event (ICD-10 diagnoses I21, I22 or I25) hospitalized in the Tartu University Hospital Cardiac Unit are referred to rehabilitation and included in the study. The rehabilitation program is ongoing for 2–3 months in both the control and intervention groups of patients. The study is conducted from 01.01.2023 until 31.12.2023 (study measurments at the begginig and end of program CPET VO2max, load bearing capaticy, EEK-2 questionary, SUS questionary, EQ5D questionary, and others) preliminary research results should be available in march/april 2024

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Study of the Prevalence and Progression of Cognitive Impairments in Patients Enrolled in a Cardiac Rehabilitation Program

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BACKGROUND:Cognitive deficits frequently follow cardiovascular events, with mild impairments posing challenges for detection compared to severe ones. Timely recognition of these cognitive issues is pivotal for early cardiac and cognitive rehab, while acknowledging exercise's transformative role in enhancing cognition emphasizes its integration into rehab programs. This dual approach minimizes family impact and fosters holistic recovery. The Montreal Cognitive Assessment (MoCA) offers a straightforward, rapid, and non-invasive avenue to identify mild cognitive impairment, encompassing attention, executive function, memory, language, conceptual thinking, and orientation

AIM:This study seeks to comprehend the cognitive status at the baseline of our cardiac rehabilitation (CR) patients, as well as the impact of the CR program on patients' cognitive function by using the MoCA test for assessment. In addition, it aims to understand how clinical variables like gender, body composition and diagnosis of cardiac pathology may influence cognitive function

METHOD:The MoCA test was administered to participants in the CR program at HGUGM Hospital in April, May, and June 2023, both at the program's initiation and upon completion. Data such as age, gender, cardiac conditions, and cardiovascular risk factors were gathered. MoCA test scores were analyzed in relation to these variables, and pre- and post-rehabilitation scores were compared. The study was approved by the Gregorio Maranon Institutional Review Board.

RESULTS:75 patients participated in the study. 78% (n= 59) were men and the average age was 60 ±11 years. Ischemic heart disease was the most common cardiac condition (81.33%, n=61). Dilated cardiomyopathy was observed in 6.67% (n=5), valvular heart disease represented 5.33% (n=4) while stable angina, amyloidosis, pericardial disease, heart transplantation, and chronic heart failure each accounted for 1.33% (n=1) of the cases. 28% (n=21) of patients scored below 28 on the MoCA assessment in the baseline, including 10.17% (n=6) of male patients and 93.75% (n=15) of female patients. 12 patients (16%) received a score of 0 in the delayed recall section. In contrast, in the 'naming' section, 98.67% (n=74) patients achieved the maximum score, which is 3 out of 3. 28% (n=21) were classified as individuals with obesity, with a BMI over 30. This included 8% (n=6) of male patients and 20% (n=15) of female patients identified as individuals with obesity. After the CR program, we observed that 40% (n=30) patients improved their scores by 2 points. 49% (n=37) successfully reduced their weight. Among these 37 individuals, 92% (n=34) experienced an improvement in their MoCA Test scores.

DISCUSSION AND CONCLUSION:Cognitive deficits might be present after a cardiac event. CR might enhance cognitive well-being among individuals with cardiovascular conditions. Future research should focus on larger, controlled studies with long-term follow-up

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Sexuality and Disability

Gender Analysis of Sexual Health Problems and Mental Health in Persons With Spinal Cord Injury: Data From the Greek InSCI Survey

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BACKGROUND: While there is a paucity of data on the lived experience of people with spinal cord injury, the International spinal cord injury (InSCI) survey launched in 2017 and being relaunched in 2023 is still offering valuable insights in line with World Health Organization's Global Disability Action Plan 2014-2021, "Better Health for All People With Disability".

AIM: In this study we aim to describe differences between mental health across the referred sexual health problems and gender among individuals with spinal cord injury in Greece.

METHOD: The Greek version of InSCI survey questionnaire was used for data collection, which includes the Mental Health Index-5 (MIH-5), the SF-36 Vitality subscale (VS) and the Spinal Cord Injury- Secondary Health Conditions Scale (SCI-SCS) among others. ANOVA statistical analysis was used to calculate mental health condition by sexual health problem (SXP) and gender.

RESULTS: The 200 participants had a mean age of 45,2 y (±12,1), the majority being men (73%). The mean time since injury was 14,2 y (±10,7), 36,5% were married or in a relationship, 32,5% with tetraplegia and 46,5% with complete injury. Over half of the participants (57,0%) indicated sexual health problems of medium or worse severity, with 84,0% of them being men ($p<0,00$). At the same time treatment was sought by only 25% of men and 2% of women. As regards severe mental health problems (MHI-5<60, VS<45), 83% of men/ 57% of women had reported significant SXPs in MHI-5 and 84% of men/ 53% of women in VS. Quite interestingly the mean MHI-5 of men with/ without SXPs was 56,5 vs 73,4 ($p<0,00$) and 50,2 vs 66,7% for women ($p<0,00$).

DISCUSSION AND CONCLUSION: While waiting further international comparisons within InSCI 2017 results, unmet needs in sexual health rehabilitation have been depicted. The detrimental effect of sexual health on mental health underlines the importance of dealing with the elephant in the room when managing post SCI complications, especially taking in account under-reporting and not seeking help in women. Attention should also be raised in the complex interactions that need to be addressed to prioritize and effectively improve quality of life after SCI.

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AT and Rehabilitation in Emergencies

High-Tech Augmentative and Alternative Communication Systems Assessment Tool: A Comprehensive Tool for Evaluation of Individuals With Complex Communication Needs

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BACKGROUND: Augmentative and Alternative Communication (AAC) encompasses strategies designed to assist a heterogeneous population with complex communication needs (CCN). AAC systems serve as substitutes and/or supplements to spoken language, enhancing effective communication, participation and quality-of-life.
To promote engagement and achieve favourable outcomes, it is imperative that AAC systems are tailored and customized to the patient's needs. To do so, expert-led assessments are crucial (1). In this matter, literature advocates the need to examine various aspects, including individuals' needs and expectations, communication partners and contexts, communication competencies, as well as domains like access, preferred representation, comprehension, linguistic expression, among others (2).

AIM: To develop a comprehensive assessment tool for evaluating adults with CCN in a multicentric framework. This tool aims to establish a reproducible and applicable systematic evaluation process fitting of the daily routine of a specialized rehabilitation centre.

METHOD: Literature data combined with knowledge and expertise of a multiprofessional and multicentric team specialized in high-tech AAC. The tool was derived from the existing assessment instruments employed at the rehabilitation centres involved, combining different digital resources (GRID3, Gaze-Viewer, and Look-to-Learn software), accessible through various devices such as eye tracking, head movement, switches, joysticks, and touch-screens, based on patient requirements.

RESULTS: The developed tool is described in detail, considering factors such as performance using technology, communicative competencies, communication partners, needs, motivations, and context. The tool also assesses access, preferred representation and patient's participation.
The assessment process includes an initial PMR consultation to gather relevant information and define goals for the evaluation, followed by our team's flowchart-driven assessment tool. This tool generates a multiprofessional and detailed report for the user and referring physician, that includes high technology AAC system suggestion for the patient and intervention recommendations. Afterward, customization of the device, training and ongoing follow-up/technical support is given as necessary.

DISCUSSION AND CONCLUSION: Despite widespread recognition, implementing AAC systems for individuals with CCN faces limitations. Thus, promoting AAC awareness among healthcare professionals and developing comprehensive and systematic evaluation methods that assess patients' deficits, needs, and contextual factors is crucial (3).
Currently, there are no published detailed assessment tools to aid in high-tech AAC systems selection and adaptation for adults with CCN. Our assessment tool provides a systematic and reproducible evaluation that can be easily implemented and adapted. It serves as a guideline, and each of the developed contents shall be used according to its relevance.

The selection of an appropriate AAC system is pivotal to enhance user's compliance, autonomy and active participation in communication (3). While striving for replicability and comparability, our tool intends to serve as a flexible guide that allows systematic evaluation and, simultaneously, respects users' individuality.
We encourage its use and adaptation. Also, we aim to employ this tool in order to identify gaps and areas requiring further development in the AAC field.

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The Extent of Musculoskeletal System Injuries After the Earthquake: Demographic and Clinical Characteristics of Earthquake Victims and Their Functioning Status 8 Months Later

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BACKGROUND: Earthquakes are natural disasters that disrupt the normal order of life in the society and result in long-term disability for the survivors. On February 6th, 2023, two earthquakes with 7.7 and 7.6 magnitude occurred in Southeast Anatolia, Turkey affecting 10 provinces and 13 million people.

AIM: The aim of this cross-sectional study was to describe the demographic and clinical characteristics of earthquake victims who were admitted to Ankara University Hospitals and were consulted/referred to the Department of Physical Medicine and Rehabilitation. A second aim was to determine their functioning status at 8 months after the earthquake.

METHOD: Eighty earthquake survivors were included. Patients' demographic data, time under debris, and type, location and number of injuries were recorded. Patients were contacted by phone 8 months after the earthquake to assess their functioning in terms of activities of daily living (Modified Barthel Index: MBI) and working/educational status. 12 patients could not be reached, 2 patients had died. Therefore, information was obtained from 66 patients. All patients were questioned by MBI except 2 children at preschool age (< 6 years old).

RESULTS: Of the 80 patients assessed for rehabilitation needs; 47 (58.8%) were female, 33 (41.2%) male with a mean age of 29.4 years (min-max: 1-75). 26 patients (33%) were younger than 18 years old. Mean time getting out of the rubble was 34 (min-max: 0-183) hours. 48 (60%) patients had axial skeletal and extremity fractures, 33 (41.2%) had fasciotomy, 31 (38.8%) had crush syndrome, 23 (28.8%) had amputation, 15 (18.8%) had nerve damage, 6 (7.5%) had traumatic brain injury and 1 (1.3%) had spinal cord injury. 34 patients had multiple fractures, mostly located on the foot and ankle, lumbar vertebrae, ribs and pelvis-sacrum regions. Amputation levels were mostly transfemoral and transtibial. Of the 23 amputations, 7 had bilateral limb amputations. All patients were enrolled in a rehabilitation program. At the 8 month, of the 66 patients who were contacted, 14 (21.2%) were still continuing outpatient/inpatient rehabilitation. 22 (88%) out of 25 patients who were previously working could not return to work, and 7 (29.2%) out of 24 patients in education had to interrupt their education. Of the 64 patients assessed by MBI; only 34 were independent, whereas 14 were slightly, 11 were moderately, 4 were severely, and 1 patient was totally dependent.

DISCUSSION AND CONCLUSION: Our earthquake survivors were mostly young and women. Mostly encountered musculoskeletal injuries were fractures, fasciotomies, crush syndrome, amputations and peripheral nerve injuries. Most of the patients had more than one type and one site of injury. After 8 months, one fifth of the patients still needed rehabilitation. 88% of the working group could not return to work and almost one third had to interrupt their education. Just over half of the group was independent in activities of daily living whereas 25% were moderately/severely/totally dependent. Our results revealed the early and long-term devastating effects of the earthquake on survivors. In spite of the commencement of early rehabilitation programs, almost half of the patients had some level of disability 8 months after the earthquake.

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The Relationship Between Severity of Traumatic Amputation and Psychological Deviations in Patients With War Injuries

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BACKGROUND: The war in Ukraine has been continuing for almost 20 months. According to the announcement of the Ukrainian Minister of Health in August 2023, more than 54 thousand amputations among different groups of people were registered. Some of them are currently patients of Superhumans Center who undergo rehabilitation after getting prosthetic extremities. During the rehabilitation process, they are faced with a lot of complications, such as psychological disorders that should not be ignored.

AIM: This study aimed to evaluate the psychological condition of patients with traumatic limb amputations and determine the association between the severity of amputation and levels of anxiety, depression, and PTSD of patients suffering from combat actions.

METHOD: The study participants were obtained from Superhumans Center (Vynnyky, Lviv, Ukraine) - an orthopedic specialist clinic for the treatment and rehabilitation of war victims.
In the current study were observed male patients, who had amputations due to combat actions. Before any intervention participants signed the informed consent. Participants were randomly split into two groups: 100 and 191 patients distributed evenly by age (Group 1 - 37.71±10.7 years, Group 2 - 35.79±9.57 years, U-test p-value > 0.05) and severity of the amputation (Group 1 - 5.39±3.08 points, Group 2 - 5.46±3.12 points, U-test p-value > 0.05). PTSD Checklist for DSM-5 [1] was performed on both groups. The first group was tested using General Anxiety Disorder-7 [2] and Patient Health Questionnaire-9 [3], while the second group used the Hospital Anxiety and Depression Scale [4]. All tests were administered in the Ukrainian language and were filled out by the patient themselves in paper form.

RESULTS: Patients of the Group 1 had the following results of the psychological tests:
GAD-7 - 2.47±3.10, PHQ-9 - 4.18±3.90, PCL-5 - 14±11.79.
For the patients of Group 2, it was: HADS (anxiety) - 3.91±3.32, HADS (depression) - 3.19±3.04, PCL-5 - 12.18±9.93.
The Spearman correlation test showed no correlation between amputation severity level and any psychological test score. Nevertheless, in both groups was a statistically valid correlation between the ranges of the psychological tests: Group 1 had a strong correlation between GAD-7 and PHQ-9 (R=0.73), GAD-7 and PCL-5 (R=0.63), PHQ-9 and PCL-5 (R=0.61); Group 2 had a high correlation between HADS-Anxiety and HADS-Depression (R=0.49), HADS-Anxiety and PCL-5 (R=0.65), HADS-Depression and PCL-5 (R=0.53).

DISCUSSION AND CONCLUSION: Different psychological tests (HADS, PSL-5, etc.) formed a cluster of highly correlated values. Nevertheless, we have not found a correlation between the severity of amputation and psychological deviation.
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Prosthesis Application and Challenges in Amputee Children After the 2023 Kahramanmaraş Earthquakes in Türkiye

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BACKGROUND: The 2023 Kahramanmaraş earthquake sequence in Türkiye is the most devastating natural disaster in our history. It has been reported that more than 50,000 people died, and over 106,000 people sustained injures, and it is estimated that the total number of people with disabilities will increase with the injured survivors. The earthquake caused various traumatic injuries in children, who constitute the most vulnerable age group. Given their permanent and long-term effects, amputations are of great importance among them. However, data on amputee children and prosthesis application is quite limited in the literature.

AIM: In this study, we aimed to evaluate the injury-related data, prosthesis application processes, stump problems and difficulties experienced with prosthesis in children who suffered limb loss due to earthquake.

METHOD: Amputee children, including late adolescence (<21 years old), who admitted to Cukurova University Child Wellness Center for prosthesis application were included in the study. The Child Wellness Center Project is an initiative, founded immediately after the earthquake, to provide comprehensive, long term rehabilitation and care for children suffering limb loss in the Kahramanmaraş 2023 earthquakes. Sociodemographic and injury-related data, interventions preceding amputation, prosthesis application, current prosthetic problems and revision surgeries were recorded.

RESULTS: The median age of 102 amputee children at the time of admission was 13.0 (min-max=1-21) years. 67.6% of patients (n=69) had one or more concomitant injuries, the most common among them were soft tissue defects, peripheral nerve injuries, crush injuries, compartment syndrome and fractures. The median number of amputations was 1.0 (1-4). Thirteen patients had two, one patient had 3 and one patient had 4 amputations. Of the total 120 amputations 67.5% (n=81) were in the lower extremity. The most common amputation levels were transtibial amputation 29.1% (n=35), transfemoral amputation 22.5% (n=27) and transhumeral amputations 15.8% (n=19). The median amputation time after earthquake was 4.0 (0-57) days. Most of the amputees (56.8%) underwent revision surgeries after the initial amputation, among them main reasons were related with soft tissue defects, failure of graft tissue, infections, bone spurs, and severe contracture. The median time from amputation to prosthesis application was 184 (28-314) days. A total of 25 prosthesis (21 lower extremity, 4 upper extremity) were needed socket revisions/change. Six patients required surgical revision of the stumps to allow prosthetic fit and mobility (two for bone overgrowth, two for lack of soft tissue cover, one for fibular remnant removal, one for heterotopic ossification).

DISCUSSION AND CONCLUSION: Earthquake-related amputations and prosthetic applications have different characteristics. Limited healthcare facilities, surgeries performed under emergency conditions, accompanying multiple traumas, inadequate follow-up conditions, and additional difficulties arising from the pediatric patient group (i.e. stump bone overgrowth) lead to difficulties in the care of pediatric amputee patients. In order to mitigate these effects, it is of great importance that amputee children be evaluated by a multidisciplinary team at the earliest possible time. Our results will guide the care of this vulnerable patient population in the event of a similar unfortunate disaster.

Rehabilitation Aspects in Palliative Medicine and in Some Other Conditions

Strategic Growth of Care Integration Within an Academic Prm Division

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BACKGROUND: Enhanced care integration within and across the care continuum is essential to the functioning of high-quality health systems (1,2) and can promote scholarly activity within academic PRM divisions (3).

AIM: The Division of Physical Medicine & Rehabilitation at the University of Toronto set out to promote care integration as a key pillar of its academic strategic plan of 2019.

METHOD: A committee was struck to define and categorize approaches to promote care integration. Proposed approaches included the identification of new opportunities, empowering medical leadership to achieve care integration goals, strengthening existing physician workflows, addressing local barriers impeding care integration, and advocating at the health system level to facilitate care integration activity. The committee opted to explore and promote new integration opportunities after conducting a prioritization survey. An inventory of existing integrated care activity was compiled at a divisional retreat. Thereafter, the committee met regularly to ensure an expansion of integrated care activity.

RESULTS: Several strategies were implemented to promote integrated care across academic sites. They included: (1) showcasing integrated care models at divisional grand rounds, (2) discussing integrated care models at all divisional retreats, (3) liaising with health leaders and health disciplines/specialists to explore care integration with PRM, (4) the development of a "one-pager" on the physiatrist's scope of practice and expertise, and (5) co-presenting with collaborating specialists from integrated clinics at national and international meetings. Since 2019, integrated care activity within the university academic physiatry division has been initiated or grown within burn rehabilitation, cancer rehabilitation, complex brain disease, geriatric medicine, motor neuron disease, demyelinating disease, peripheral nerve injury, pregnancy and women's health, sickle cell disease, sports medicine, trauma rehabilitation, and peripheral vascular disease.

DISCUSSION AND CONCLUSION: Some success has been achieved within our academic PRM division in building a culture of care integration. Future approaches may include building integration concepts within clinical practice guidelines, aligning integration with evidence, leveraging collaborative practice to elevate scholarly activity, and advocating to health leaders and funders to support integrated care activity financially and otherwise.

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Rehabilitees' Experiences of the Benefits of Adaptation Training Courses Organized by Specialized Healthcare After Six Months

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BACKGROUND: Adaptation training intervention is a Finnish version of psychosocial group rehabilitation interventions after diagnosis. It is a multi-professional intervention including professionals from different medical fields and social care. The objective is to provide the rehabilitees with knowledge, psychosocial and peer support with various working methods such as lectures and functional methods. The ultimate goal is to motivate rehabilitees to maintain and improve their functional ability and find new ways to cope in everyday life. (1.) This study is part of a larger research project regarding adaptation training interventions in specialized healthcare promoting functional ability and quality of life. Adaptation training interventions have not been studied much before nationally nor internationally.

AIM: To describe the experiences of rehabilitees of the benefits of adaptation training courses organized by specialized nursing care after six months.

METHOD: Data was collected between 3/2021-12/2022 through individual thematic interviews on home visit or over telephone after six (6) months of a group-based adaptation training intervention. Rehabilitees (N=13) had Parkinson´s disease (n=5), memory disorder (n=2), fibromyalgia (n=3) and breast cancer (n=3). Data was analyzed by using inductive content analysis.

RESULTS: Rehabilitees´ experiences of the benefits were identified in the five main categories: 1) Empowerment, 2) Promoting healthy lifestyles, 3) Increasing social activity, 4) Strengthening of the relationship with the spouse and 5) Modifying the home environment. Empowerment was promoted by dealing with issues with peers, strengthening resources, increased understanding of illness and increases in self-compassion. Rehabilitees promoted their healthy lifestyles by increased physical activity, improved sleep, regular rhythm of life, healthier diet, relaxation and promoting brain health. Rehabilitees increased participation in third sector organization activities and social events. Becoming closer and increased communication, as well as spouse's increased understanding of the illness, strengthened the relationship of the rehabilitees. Modifying the home environment referred to starting home renovations.

DISCUSSION AND CONCLUSION: According to the results, adaptation training intervention supports the process of adaptation. The rehabilitees have made concrete changes in their lives that support functional ability, healthy lifestyle and active participation and agency in society. These changes and benefits could still be seen after six months. The multi-professional adaptation training intervention promotes not only adaptation to illness, but also empowers resources to self-care and arouses self-efficacy. The spouse has an important role in supporting the adaptation process. Adaptation training intervention can also encourage concrete renovation of the living environment, which is important to independent survival. Multi-professional and wide-ranging adaptation training intervention is important in promoting rehabilitees' functional ability. In the future, it is important to support rehabilitees for the maintenance of the achieved positive benefits. Rehabilitees should also be encouraged to have agency of their rehabilitation and adaptation process as well as be active members of society despite illness. All this is crucial from the perspective of individuals but also from the society and public health.

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Does the Diagnosis of Schizophrenia Worsens Parameters of In-Patient Rehabilitation?

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BACKGROUND: Schizophrenia is a common, severe mental illness with a complex presentation and a multifactorial cause. Studies show that those patients suffer from reduced life expectancy and increased morbidity. Elevated rate of chronic diseases, accidents and suicides among those patients guide to raise in need for medical rehabilitation. However, some health practitioners believe, that these patients' ability to rehabilitate is much lower, than in patients without mental illness.

AIM: The aim of this study was to find out, whether the parameters of in-patient rehabilitation were different in patients with and without schizophrenia.

METHOD: We conducted a matched retrospective cohort study of patients hospitalized in the rehabilitation unit of Soroka University Medical Center, admitted due to various conditions that required in-patient rehabilitation. Schizophrenia patients were identified through the presence of a documented schizophrenia diagnosis. They were matched with mentally healthy patients in a ratio of 1:5 as a control group. The criteria for admission and discharge were similar in both groups. Except that patients with schizophrenia need more attention from psychological and psychiatric staff, the rehabilitation program was similar in the same categories of the patients. The level of cooperation was defined at the admission by the physiotherapy staff as full, partial, or no cooperation. Duration of hospitalization (length of stay; LOS), was measured in days hospitalized in the rehabilitation unit.

RESULTS: 31 patients with Schizophrenia were hospitalized at the rehabilitation unit throughout the study period and included in this study. They were matched with 155 hospitalized patients without Schizophrenia. No differences between patients with and without schizophrenia in terms of age, gender, major cause for rehabilitation, and admission functional status were detected. During the hospitalization, schizophrenia patients showed significantly lower rates of complete physical therapy cooperation (71% vs. 91%, p=0.007, respectively). There was no statistically significant difference in hospitalization duration between the two groups (median 27 days for schizophrenia patients vs. 31 days for mentally healthy patients, RR [95% CI]: 1.2 [0.9, 1.6]).

DISCUSSION AND CONCLUSION: It is important to note that all patients with schizophrenia had the supervision and guidance of a psychologist from the rehabilitation staff and a psychiatrist from the psychiatry staff of the hospital. Our study found that despite the pre-rehabilitation screening, a statistically significant difference in the degree of cooperation at admission to the rehabilitation unit was found. The psychological and psychiatric management led to improved cooperation and good functional outcomes at discharge. Our study proves that despite the difficulties these patients express at the beginning of the process, they still manage to achieve impressive results and their LOS is almost the same, as in the non-schizophrenic patients' group. This finding disputes the widespread stigma in the healthcare system regarding mentally diagnosed patients.

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EuroMediterranean Rehabilitation Summer School – Past, Present and Future

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BACKGROUND: In many Countries in Europe, mainly in Mediterranean area, Rehabilitation services and education for doctors and professional in this field, is not so well organized as today medical research can offer to Disabled People.

AIM: The goal o f the EMRSS is to organize, once a year, a highly specialized course for young PRM doctors , to share experiences and documents in rehabilitation research and mainly in clinical daily activities

METHOD: every year a different topic is chosen for the program, developed by the Scientific Committee of the EMRSS involving experts from EuroMediterranean Region.

RESULTS: great excitement from the participants as they trained and shared their experiences and emotions.

DISCUSSION AND CONCLUSION:
excitement from the participants as they trained and shared their experiences and emotions. Still many more editions of this wonderful course will be held in Syracuse
REFERENCES: EMRSS report

Rehabilitation after Acquired Brain Injury 1

Cog-First: A New Tablet-Based Cognitive Assessment Tool for Brain Injured Patients. A Pilot Study on Canadian Population

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BACKGROUND: Acquired brain injuries (ABI) frequently lead to cognitive impairments, necessitating accurate cognitive assessment tools for relevant clinical management. Although the Montreal Cognitive Assessment (MoCA) is widely used, Cog-First, an innovative tablet-based assessment, designed by a French academic collaboration, evaluating executive functions, episodic memory, and attention, provides a promising alternative.

AIM: This pilot study compares Cog-First and MoCA in assessing cognitive functions in chronic-phase brain injury patients.

METHOD: ABI patients were prospectively and sequentially recruited in an outpatient setting at the Gf Strong Rehabilitation Centre, Vancouver, Canada. Participants underwent cognitive assessments using both Cog-First and MoCA version 8.3 in a randomized order and Spearman's correlation coefficient was used to assess score and sub-score correlations.

RESULTS: Twenty-one brain injured patients (52% male, median age 61 years) were recruited, with a median time of 3.9 years post-injury. Injury types included 8 stroke patients, 6 traumatic brain injuries, 4 multiple sclerosis cases, 2 cerebral tumor surgery patients, and 1 with cerebral tuberculosis. All participants completed assessments and Cog-First median time was 25 minutes. Statistical analysis revealed a significant correlation between Cog-First and MoCA scores. Preliminary findings from this pilot study suggest that Cog-First and MoCA exhibit differences in performance and potential utility.

DISCUSSION AND CONCLUSION: This pilot study highlights the potential of Cog-First as a promising alternative cognitive assessment tool for ABI patients in the chronic phase. Further research is warranted to validate these initial findings and determine the clinical implications of choosing between Cog-First and MoCA in acquired brain injury management. This study represents a significant step toward optimizing cognitive assessment strategies for acquired brain injury individuals.

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Long Term Evaluation of Patients after Brain Damage in CIMT Day Program

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BACKGROUND: The Department of Rehabilitation Medicine, General Teaching Hospital and the First Faculty of Medicine Charles University in Prague.runs day program with CIMT (Constraint Induced Movement Therapy) concept for patients after brain damage. CIMT as was described first by Taub (1994, 1999) and Millner 1999 is based on two basic principles, forced used of the affected arm by restraining the unaffected arm e.g. by hand splint or glove during dedicated exercise sections or ADL (activities of daily living) and massed practice of the affected arm through so called shaping activities. Shaping is a method in which an objective is approached in small steps of progressively increasing difficulty of movement.(1)

AIM: We wanted to reveal if there are long term results (more than one year after intensive program) in activities which were trained during the Day Program

METHOD: 24 -chronic patients with hemiparesis due to acquired brain damage (stroke or traumatic brain injury) age 18 and older were involved. They had good cognitive functions to understand and follow the tasks. Cognition was proved by neuropsychological assessment. All patients signed written consent. All of them had paresis of upper limb and were able to extend wrist at least 20 degrees and fingers in metacarpophalangeal joints extend at least 10 degrees. Patients had four weeks of intensive day programme (five hours of special CIMT training a day, two hours individual – shaping, repetitive movements, ADL on the department, 1,5 hours group therapies and 1,5 hours individual therapies at home) from Monday till Friday. The evaluation of the effect on patients functions was done by using standardised functional tests (e.g. Jamar dynamometer for grip strength, Frenchay arm test and other) as well as measuring time of shaping activities and spasticity scales (MAS – modified Ashwort scale and Tardieu scale). They were controlled at the beginning of the intensive program, at the end, after one month, three, six and twelve months after finishing the program.
Key hypothesis: the effect of CIMT therapy persists more than one year after finishing intensive treatment. The effect is present even in chronic patients who are more than one year after brain damage.

RESULTS: The results are promising. All patients were much better after the intensive programme, 20 patients were better in Jamar as well as in FAT, 4 patients only in FAT, 80 % were better even after three and six months after the therapy and 68% even after one year.

DISCUSSION AND CONCLUSION: CIMT method can be used even for chronic patients more than one year after brain injury and the results persist long time, in 68% of patients even one year after finishing the program. Most important is the motivation and cognitive status of the patient.

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Rehabilitation of Persons With Parkinson's Disease and Other Movement Disorders

RAPIDO (teleRehabilitation for pAtient With ParkInson's Disease at Any mOment): An Interim Analysis of Acceptability and Clinical Usefulness Data

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BACKGROUND: Parkinson's disease(PD) is the second most frequent neurodegenerative disorder after Alzheimer's disease, with a prevalence of roughly 3/1000 in the whole population, increasing with age up to 1/100 in the over-80s. More than 6 million people worldwide suffer from PD, and both the incidence and prevalence of the disease are increasing faster than other neurological disorders. PD is a heterogeneous and complex pathology, with the concomitant presence of both motor and non-motor disorders and different kinds of disability progression. A multimodal and intensive rehabilitation treatment has the potential to help people with PD achieve long-lasting benefits in any disease phase and subtype. However, involving patients in cycles of intensive rehabilitation, at regular intervals, is a challenge given the number of individuals with rehabilitation needs in the face of the poor availability of rehabilitation professional resources. In the RAPIDO project, a remote monitoring system for physical exercises is proposed to enhance patients' rehabilitation, while wearable devices are utilized to collect health parameters throughout the day. These parameters are then stored on a remote server, facilitating subsequent analysis[1].

AIM: We aim to assess the acceptability and feasibility of an integrated telerehabilitation and telemonitoring system in MP patients at any stage. We also further investigate the impact of the telerehabilitation and telemonitoring system on motor and non-motor function as well as on the quality of life and caregivers' burden.

METHOD: This plan involves performing exercises through a dedicated web-based telerehabilitation platform for three months(3 sessions/week). The web-based platform allows participants to access a library of video-recorded exercises, used by clinicians to build individual rehabilitation protocols tailored to the patient's abilities. Participants are called to wear a smartwatch to measure behavioural parameters during the day. Data are anonymously stored on a remote server and then analysed. The preliminary clinical analyses presented in this work have been computed on 31 patients who completed the monitoring period. The percentage of adherence to the telerehabilitation plan and smartwatch usage is computed as a proxy of system acceptability.

RESULTS: Participants in the advanced disease stage(H&Y stage 3-4) showed less daily physical activity and complained of a significantly poorer quality of life than people in the early stages(H&Y stage 1-2). Only 3 out of 31(10%) participants showed difficulties in accepting the proposed system.
After 3 months, no side effects or adverse events emerged from the training experience.
From the analyses of motor behavior, participants in the early stage increased the number of steps and distance covered each day after the first week. They reached a maximum in the second week and remained stable up to the 10th week to slightly decrease afterward. In contrast, people in the advanced stages of the disease did not show any recognizable trend

DISCUSSION AND CONCLUSION: Our preliminary results support the acceptability of the proposed intervention and hint at its usefulness in specific disease stages. However, the interpretation of findings warrants further analysis once data from a larger sample is available

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Reality DTx® Augmented Reality Rehabilitation for People Living With Parkinson's Disease: A Feasibility Study

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BACKGROUND: Parkinson's disease is a progressive neurodegenerative disorder that causes severe motor impairments, particularly in relation to gait and balance, and is a frequent cause of falls [1]. It is the most rapidly growing neurological condition, and it is expected that the number of people living with Parkinson's disease globally will double in the next two decades, driving an ever-increasing need for health and social care services.

People living with Parkinson's are encouraged to engage in a daily exercise programme to maintain their mobility, independence, and quality of life. However, as gait and balance deteriorate, and fear of falls increases, maintaining engagement in an exercise programme becomes more difficult, leading to reduced function and declining quality of life.

In addition, people may experience 'freezing of gait' (FoG), which can be frustrating and lead to falls. One of the most effective treatments for FoG is sensory cueing [2]. However, for this treatment to be effective it needs to be delivered in sufficient doses, which can be challenging, particularly in people's homes.

AIM: To demonstrate that the augmented reality rehabilitation can be deployed at home to people living with Parkinson's.

METHOD: We aim to recruit 30 adult participants with Parkinson's (Hoehn and Yahr stages 2-4) into this feasibility study, which will commence recruitment on the 1st of October 2023 and run for 6 months. Participants will receive 6 weeks of daily home-based rehabilitation via an augmented reality headset individually prescribed by a physiotherapist with weekly telephone follow-up [3]. The primary outcome measure is the timed-up-and-go. Secondary outcome measures include the Parkinson's Disease Questionnaire-39, EQ-5D-5L, and the Lindop Parkinson's Assessment Scale. Statistical analysis comprises parametric and non-parametric methods appropriate to the data. This study has institutional review board approval (IRAS Project Identification Number: 321744) and is registered on ClinicalTrials.gov (NCT05794542).

RESULTS: We will present the results during the Late Breaking News sessions of ESPRM 2024. This will be the first presentation of the results of a trial of home-based augmented reality rehabilitation in Parkinson's.

DISCUSSION AND CONCLUSION: Novel exercises, implemented through augmented reality glasses, will be used to deliver home-based gait and balance rehabilitation for people living with Parkinson's. Our project's vision is to utilise integrated sensory cueing to provide modern and creative therapies in an enriched gamified environment for rehabilitation in Parkinson's as well as broadening horizons and opportunities in rehabilitation science and healthcare technologies more widely.

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Application of Biometrical Holistic of Human Body (BHOHB) for Postural Assessment of Patients With Parkinson's Disease

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BACKGROUND: Patients with Parkinson's disease frequently develop postural changes as the disease proceed. Progressive spinal stiffness, camptocormic posture, small steps march, freezing of gait are common findings in these patients. Sometimes they accelerate during walking (festiantio) or present retropulsion.
To evaluate postural dysfunction and the effects of rehabilitation we need validated instruments. To date, spine X-ray has been the gold standard method used for spinal assessment, although is associated damaging rays exposure, limited ability to measure spinal rotation and increased costs.

AIM: The purpose of the study was to compare BHOHB SPINAL METER®, a new non-ionizing methodology for the evaluation of body posture and spine assessment, to standard spine X-ray in a group of patients with Parkinson's disease.

METHOD: A total of 45 adult patients affected by Parkinson's disease (MMSE>23) with various paramorphism and dysmorphism of the spine were enrolled in the study. Patients were excluded if unable to maintain an upright position without the support of aids or orthoses. Each candidate underwent a whole-spine X-ray in the coronal and sagittal plane which was then compared to a postural assessment performed with BHOHB®. In particular, the Cobb's angle and the degree of Kyphosis were assessed.
Validity and effectiveness of BHOHB® technology was estimated using the Bland-Altman method and Pearson's correlation coefficient. The results of the study were expressed in mean and standard deviation. The values obtained with the two different methods (X-ray and BHOHB®) were compared using Student's t Test for paired data.

RESULTS: Cobb's angle obtained with BHOHB® and Radiography showed an excellent correlation (r = 0.984). In addition, examination of the corresponding Bland and Altman chart showed excellent agreement between the two measurements.

DISCUSSION AND CONCLUSION: Our results demonstrated, that BHOHB SPINAL METER® is a reliable method, as already seen for scoliosis in growth (1), for postural assessment in spinal paramorphism/dysmorphism in Parkinson's patients compared to standard X-ray. A larger sample of patients is needed to confirm the validity of this preliminary results.

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Angelo G. Aulisa, Diletta Bandinelli, Martina Marsiolo, Francesco Falciglia, Marco Giordano and Renato M. Toniolo

Pharyngeal Structure and Dysphagia in Patients With Parkinson's Disease and Related Disorders

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BACKGROUND: More than 80% of patients with Parkinson's disease and related disorders (PRD) have swallowing disorders (Kalf, 2012). Easy and early screening of swallowing disorders is crucial for rehabilitation of patients with dysphagia and prevention of pneumonia.

AIM: Pharyngeal muscle changes occur in patients with PRD (Mu, 2012); however, the association between the structural alterations in the pharynx and the symptoms of dysphagia remains unclear. We assessed structural changes and contractile forces by measuring pharyngeal wall thickness and width. We aimed to define the pharyngeal measurements and determine their value as diagnostic tools for dysphagia.

METHOD: All 46 patients and 46 age-matched control group underwent a lateral neck roentgenogram, with measurements of pharyngeal wall thickness (PWT) and the width of the pharynx at rest (PWR). All patients took a Videofluoroscopic Swallowing Study (VFSS), and the shortest width of the pharynx during swallowing (PWS) was measured. After the VFSS, physicians rated the patient on the penetration-aspiration scale (PAS) and dysphagia outcome and severity scale (DOSS). The severity of PRD was assessed with Hoehn and Yahr scale (HY scale). We compared PWR and PWT between the PRD group and the control group using the independent t-test. Kendall correlation test was done among the radiological data of the pharynx (PWT, PWR, and PWS), the dysphagia scale (PAS, DOSS), and the HY scale. To determine the optimal cutoff points for predicting aspiration, receiver operating characteristic curve analysis was performed for PWT and PWR. All statistical significances were defined as CI > 95% and p-value < 0.05.

RESULTS: The PWT was thinner, and the PWR was wider in the PRD group ($p<0.05$). The dysphagia scale (PAS and DOSS) showed significant correlations with the radiological data (PWT and PWS) and the HY scale ($p<0.05$). Specifically, the absolute magnitude of the correlation coefficients was organized as follows: DOSS correlated with PWS with a coefficient of 0.348, DOSS with PWT of 0.305, PAS with PWT of 0.323, and PAS with PWS of 0.234. Additionally, the HY scale showed a correlation of 0.225 with the PWT ($p<0.05$). The optimal cutoff points of the PWT and the PWR for predicting aspiration were determined to be 4.05 mm and 16.05 mm in the PRD group, respectively.

DISCUSSION AND CONCLUSION: The PWT and the PWR representing muscle wall atrophy of the oropharynx, and the PWS representing the contractile strength of the pharynx are valuable indicators that can reflect structural and functional changes of the pharynx. With the correlations among the radiological indicators, the dysphagia scale, and the HY scale, we can identify the factors that influence dysphagia in patients with PRD in terms of their swallowing function. The combination of PWT and PWR can be an easy and simple indicator to predict swallowing disorders at the bedside.

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Physical Activity and Sport for Persons With Disabilities

Physician's Advice on Adapted Physical Activity – Are We Good in That?

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BACKGROUND: Physician counselling on the physical activity (PA) is known to be an effective tool to rise the PA level in the general population. Adapted physical activity (APA) is a part of rehabilitation medicine (European Standards on Adapted Physical Activity, EUSAPA); where physicians are presumably being the leaders of the multidisciplinary teams. So, do we play the role?

AIM: aim of this presentation is to pinpoint the physician's role in exercise counselling.

METHOD: Where it was appropriate, the question about the previous and future physical activity/APA was risen under the formal inn office consultation. Contingent consisted from the adult patients (18 years and older) referred to and eligible to the in/outpatient rehabilitation programs; 800 – 1000 new patients per year. Diagnoses/conditions: 1) orthopaedic (OA, long-term musculoskeletal pain conditions, recovery after the orthopaedic operations inclusive knee/hip surgery, inborn conditions, bone fractures); 2) neurologic (stroke, MS, radiculo/polynevropathy, polio/postpolio, neuromyopathy, SCI); 3) others (RA, AS, other rheumatic inflammatory diseases, chronical pain syndromes, chronical fatigue); 4) common mental health disorders. Most of the patients were not formally recognised as a person with a disability.

RESULTS: There was no formal possibility for the follow up, it is unknown on the following PA of the patients.

DISCUSSION AND CONCLUSION: Physician's related obstacles for PA counselling are generally known to be a lack of time, lack of financial incentives, lack of information, lack of interest. Sports physician is not a recognised medical (sub)specialty in Norway (Helsedirektoratet). Prophylactical sports medicine is not a formal topic in the physician's education/continuous education in Norway. Neither topic on the physician counselling about exercise in the general population, neither this one is broadly actualised. APA/Paralympic topics are being rarely reflected on the PRM agenda. There is research available on APA structure in Norway (OsloEconomics/BeitostolenHelsesportsenter, 2020). Some diseases/conditions are included in the general PA guidelines (Aktivitetshåndboken, 2015), though APA is not being explicit mentioned there.
Patient related obstacles are the suboptimal motivation, physical and mental hinders. Facilitators in the field are accessible sports facilities, assistants, assistive devices including the PA devices, transport, various training groups on the community level, Paralympic sports incorporated into Olympic sports federations, regional Paralympic coordinators, broad information is available. National data shows the lover levels of participation in APA/Paralympics than in the regular sport (11 000 versus 1 900 000 formally registered participants).
The wider awareness on the topic in academia and in the medical/rehabilitation settings could further promote the inclusion of the persons with a disability into the regular APA. Broader clinical implementation of the worldwide academically highlighted sports medical topics is necessary.

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Self-Medication and Parasport: A Study on Adult Amateur Athletes With Motor Disabilities

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BACKGROUND: Limited research has been conducted on self-medication (SM) practices in sports, particularly among amateur athletes with motor disabilities. While SM is prevalent among able-bodied athletes, there is a lack of data on its use among amateur disabled athletes.

AIM: This study aimed to determine the prevalence of self-medication among amateur sportsmen and women with physical disabilities, identify factors influencing self-medication behaviors, and address misconceptions associated with these practices.

METHOD: A quantitative cross-sectional study was conducted using an anonymous online self-administered questionnaire. The study included amateur disabled sportsmen and women from Belgium and France. Self-medication behaviors were assessed for dietary supplements (DS), over-the-counter drugs (OTC), and formerly prescribed drugs (FPD) through self-reported procedures. Data on participant characteristics, sports practice, consumed products, and knowledge were collected. Descriptive statistical analyses, group comparisons, and logistic regressions were performed to assess factors influencing self-medication.

RESULTS: Among the 164 disabled sportsmen and women who participated, 38.7% acknowledged engaging in self-medication practices in the context of sports. Among them, 23.2% used DS, and 25.6% used MEDS (OTC and FPD combined). Self-medication with DS was positively associated with age, consumption of caffeinated and energy drinks, and self-medication with MEDS. Self-medication with MEDS was positively associated with the number of hours of sports practice, consumption of caffeinated drinks, and self-medication with DS. Paracetamol was the most commonly consumed pharmaceutical molecule, while proteins were the most commonly used DS. 36.4% of participants using MEDS and 42.1% using DS believed that self-medication posed no health risks.

DISCUSSION AND CONCLUSION: This study reveals a high prevalence of self-medication among amateur sportsmen and women with physical disabilities. Fortunately, paracetamol, which is one of the most commonly used medications, is generally associated with a low risk of side effects. However, even with this seemingly innocuous medication, recent research has raised concerns about potential safety issues, emphasizing the need for a more cautious approach to usage of any medications. The associated risks, reliance on unreliable sources of advice and information (e.g., the internet), and lack of awareness regarding the dangers of self-medication highlight the need for educational strategies targeting amateur disabled athletes. Further research is required to gain a deeper understanding of self-medication behavior in this population.

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Levels of Physical Activity Measured by Accelerometer and Associated Factors in Children with Cystic Fibrosis: A Cross-Sectional Study

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BACKGROUND: Cystic Fibrosis (CF) is an autosomal recessive, progressive respiratory disease caused by Cystic Fibrosis Transmembrane Regulator (CFTR) gene variants. Chloride and bicarbonate secretion in the respiratory tract epithelium is impaired causing mucus retention and plugs and leading to persistent bacterial infection and structural damage to the lung parenchyma. Regular respiratory physiotherapy and exercises contribute to long-term respiratory and general health (1).
Physical activity levels play an important role in the prognosis of children with cystic fibrosis, besides pulmonary function. Respiratory dysfunction limits a child's daily physical activity. On the other hand, increased mobility and physical activity helps to improve pulmonary function (2).

AIM: It was aimed to define levels of physical activity and associated factors in children with CF.

METHOD: Fourteen children diagnosed with CF and aged between 13 and 17 years, who were assessed in the pediatric pulmonology and in the physical medicine and rehabilitation outpatient clinics between July 2023 and November 2023 were included in the study.
The exclusion criteria were inability to ambulate, severe cardiological, musculoskeletal, neurological, or cognitive diseases, or being a candidate for lung transplantation.
Physical activity levels were evaluated objectively with wrist-worn accelerometer (3) and subjectively with the physical activity questionnaire for children and adolescents (PAQ-C and PAQ-A). Spirometric pulmonary function test, body composition parameters, 6-minute walk test, hand grip strength measured via dynamometer, Cystic Fibrosis Questionnaire-Revised (CFQ-R) were administered.

RESULTS: Median age of 14 children (8 boys, 6 girls) was 14 years (interquartile range (IQR):13 and 16 years). Median body mass index z-score was -0.55 (IQR: -0.84 and 0.53). Median counts per minute (cpm) measured via accelerometer was 379 cpm. Based on cpm values, level of physical activity of children were identified as sedentary (<256 cpm) in one child, high (>720 cpm) in one child, and low to moderate in the rest. Measured level of physical activity was correlated with 6-minute walk distance ($r=0.664$, $p=0.018$), PAQ ($r=0.797$, $p=0.002$), FEV1 ($r=0.895$, $p<0.001$) and CFQ-R physical ($r=0.854$, $p<0.001$). Physical activity level was not correlated with age, gender, body composition parameters or hand grip strength.

DISCUSSION AND CONCLUSION: The majority of our participants had low level of physical activity in our study similar to the previous studies. Since physical activity intensity is associated with functional capacity, respiratory capacity and quality of life in children with CF, we would like to emphasize the importance of exercise training and/or physical activity in these patients.

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Rehabilitation Interventions

Understanding Temporomandibular Joint Dysfunction: The Role of Parafunctional Habits and Mechanosensitivity in a Cross-Sectional Analysis

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BACKGROUND: Temporomandibular joint dysfunction (TMJD) is a term that encompasses structural and functional abnormalities related to the jaw muscles and/or the temporomandibular joint, with or without clinical signs and symptoms. Early diagnosis of TMJD is crucial to prevent advanced problems that may arise in the later stages. Late diagnosis can complicate the treatment process, leading to irreversible issues[1]. Therefore, identifying predisposing parameters associated with TMJD is of great importance in terms of preventive treatment approaches.
One of the possible parameters that may be related to TMJD is oral parafunctional habits such as nocturnal and diurnal teeth clenching, teeth grinding, nail/lip/cheek/pencil biting, and gum chewing[2,].They may play a significant role in the pathogenesis of TMJD.
Another factor is potential changes in mechanosensitivity which can serve as a precursor marker, especially when dealing with painless TMJD[3].
Identifying factors that can affect TMJD can serve as a guide for developing preventive approaches and potentially slowing down the progression of the disease before it becomes more severe.

AIM: The current prospective cross-sectional study aimed to investigate the relationship between the presence of TMJD and parafunctional disorders, and mechanosensitivity.
METHOD: In this study involving 27 participants, TMJD statuses were assessed using 'Fonseca's Anamnestic Index'[4], while parafunctional disorders were examined using the 'Oral Habits Questionnaire'[5]. Mechanosensitivity was bilaterally measured using an algometer device (at the temporomandibular joint, C2, and C7 spinal processes' 2 cm laterals)[6].

RESULTS: The findings indicated significant relationships between TMJD and both parafunctional disorders (p: 0,000/r: 0,656) and mechanosensitivity (p: 0,012/r: 0,507; p: 0,01/r: 0,495; p: 0,050/r: 0,392).

DISCUSSION AND CONCLUSION: Our study revealed significant associations between TMJD, parafunctional habits, and mechanosensitivity. Particularly, we found a strong correlation between parafunctional habits and TMJD, underscoring their role in its development. Additionally, we proposed the utilization of pressure pain threshold measurements as potential early indicators for TMJD diagnosis. Our study enhances the understanding of TMJD complexity, emphasizing the necessity for focused interventions to modify parafunctional habits and the exploration of pressure pain thresholds for early diagnosis.

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Towards a European directive to apply participation in clinical practice

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BACKGROUND: Rehabilitation services are increasingly targeting involvement in daily life. In the International Classification of Functioning, Disability and Health this is referred to as "participation". However, questions have arisen regarding the conceptualization of participation, and consensus is lacking. There is an need to create a solid ground to create a European directive to apply participation in rehabilitation practice.

METHOD: To develop this European directive, a multi method study was rolled out. The first phase of this study was a critical review of the literature to detect recurring conceptual problems in the application of participation and how researchers deal with these. The second phase was a systematic review to identify how participation measures are operationalized. The third phase is ongoing and is a Delphi study to find a European consensus on a definition of participation and a solid framework to measure participation in all relevant settings.

RESULTS: The critical review. We found possible solutions to 4 recurring key limitations:
(1) In dealing with the ambiguity and vagueness regarding the term "participation" three different solutions are present in the current literature. A first way to overcome the ambiguity is by adding an adverb explaining the geographical or social context of the life situation (e.g. school participation or labour participation explaining the context). A second way is to clarify the aspect of involvement by referring to the level of power that individuals possess. Some people experience the feeling to participate when they heave been notified about certain decision in life, others want to have more decisional power relating the concept of participation to the concept of autonomy. A third way is by thinking of life situations as life roles, thereby linking participation to the roles that people fulfil in society (e.g. mother, engineer, dancer, etc.)
(2) In dealing with the difference between activity and participation. In the ICF, 4 different options are proposed to differentiate between activities and participation. However, there is empirical evidence that every activity can be the trigger to experience participation. The difference depends on the individual's subjective appraisal of the activity.
(3) And what about the empirical knowledge of the subjective aspects of partici-pation. Participation cannot be defined purely as objective aspects, such as the amount of activities that individuals perform or the capacity individuals have to perform activities, but rather as a cluster of subjective variables and experiences, such as being able to choose activities, experiencing challenges, experiencing control by performing activities, experiencing engagement, having responsibilities, experiencing autonomy, experiencing meaningfulness, sense of belonging, etc.
(4) There is no consensus on how to measure participation. This issue has been tackled with a systematic review.

The systematic review
We found 18 instruments operationalizing participation in different ways: (i) unidimensional: frequency of performing activities (e.g. the KAP, Keel Assessment of Participation); (ii) unidimensional: limitations in experiencing participation when performing activities; (e.g. the P-scale, Participation Scale), (iii) multidimensional: multiple subjective dimensions when performing activities (e.g. the IPA, the impact on participation and autonomy); and (iv) multidimensional: objective and subjective dimensions (e.g. the GPS, Ghent Participation Scale

The Delphi Study.
This study in ongoing and aims to clarify the concept leading to one overarching definition based on the above described body of knowledge. As a second aim this study will provide us a solid framework to measure participation in all relevant settings.

DISCUSSION AND CONCLUSION: Notwithstanding an increasing body of knowledge, some issues remain unclear and how participation is measured is subject to debate. This results in difficulties in the use of participation in clinical practice. Insight into the current body of knowledge and awareness of shortcomings helps clinicians who aim to apply participation in practice.
The results of this study, including preliminary results of the Delphi study will be presented at the conference.

Lower Limb Disorders

Comparison of Early Outpatient Rehabilitation and Standard Inpatient Rehabilitation After Knee or Hip Arthroplasty

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BACKGROUND:
Total knee and hip replacements improve the health of people with joint problems. The recovery process usually takes three months before people fully reintegrate into their social and occupational roles. Routine data from inpatient rehabilitation in Austria demonstrate the potential benefits of taking part in an early-onset rehabilitation programme (Grote et al., 2020).
The "Outpatient Remobilisation after Knee and Hip Arthroplasty" (AMB-REMOB) programme was developed to accelerate professional and social reintegration (Löfler et al., 2022). Unlike conventional programmes, this approach can allow participants to return to work within six weeks of surgery.

AIM: This study compares the effects of early outpatient rehabilitation with standard inpatient rehabilitation after knee or hip replacement.

METHOD: We enrolled 46 patients who had undergone total knee or hip arthroplasty for chronic cartilage damage and started early rehabilitation two weeks after surgery. Complete data sets (pre, post, and follow-up) were available for 23 participants (53.5%). A comparable control group of 305 individuals, matching for gender, age, BMI, and diagnosis, were selected from standard inpatient rehabilitation data (WHO Phase II).
The four-week rehabilitation programme included medical check-up, physiotherapy, underwater therapy, and electrotherapy, totalling approximately 1200 minutes. Follow-up measurements were undertaken at the four-week mark, coinciding with the start of the regular inpatient rehabilitation programme.
The primary outcomes were the Timed Up and Go Test (TUG) and the Health-Related Quality of Life Questionnaire (EQ-5D-5L). A repeated measures multivariate analysis of variance (rMANOVA) was performed to assess the effect of the rehabilitation programme (early vs. standard) on the outcomes.

RESULTS: The early rehabilitation group (age: 66.4 ± 7.6 years; 73.9% female) began treatment 2.0 ± 1.1 weeks post-surgery, while the matched standard rehabilitation group started at 9.6 ± 3.8 weeks. No adverse events were observed during the outpatient sessions. Both groups showed significant rehabilitation effects ($p < 0.001$) from admission to discharge [early rehab: $\eta^2_{multivariate} = 0.769$, changes (Δ) EQ5D index: 0.10 ± 0.01, Δ TUG: 7.8 ± 3.1; standard rehab: $\eta^2_{multivariate} = 0.640$, Δ EQ5D index: 0.04 ± 0.01, Δ TUG: 2.8 ± 1.1]. Follow-up results showed even better primary outcomes for the early group ($p = 0.077$, $\eta^2_{multivariate} = 0.016$), achieving positive results approximately two months earlier than the standard group.

DISCUSSION AND CONCLUSION: These study findings highlight the potential benefits of early outpatient rehabilitation for knee and hip arthroplasty patients to improve quality of life and mobility. Early rehabilitation resulted in positive outcomes approximately two months earlier than standard rehabilitation, suggesting faster remobilisation and reintegration. These findings underline the importance of early rehabilitation in accelerating recovery and improving outcomes after joint replacement surgery.

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Percutaneous Needle Tenotomies: Indications, Procedures, Efficacy and Safety. A Systematic Review of the Literature

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BACKGROUND: Percutaneous needle tenotomies (PNT) constitute a promising approach by direct access to tendons through mini-invasive interventions [1,2]. They can be performed in a short time without large incisions nor general anaesthesia [3]. However, reported procedures are heterogeneous and currently conducted without guidelines.

AIM: We aimed at collecting the indications of PNT, described in the current literature. As secondary outcomes, our objectives were to identify the different procedures reported, with their efficacy and their safety.

METHOD: A systematic review was conducted (CRD42022350571, non-funded), including original articles mentioning PNT in humans, reporting its application or description, effectiveness or adverse events. Non-percutaneous tendinous surgical procedures and non-eligible designs were excluded. Downs and Black checklist was used to assess the risk of bias.

RESULTS: A total of 540 studies were identified between May and August 2022 (Medline, EMBASE, Cochrane, PEDRo databases). Fourteen clinical studies met the inclusion criteria and quality assessment (674 patients, 1664 tenotomies). We found that PNT were performed in 14 indications (e.g diabetes, cerebral palsy, congenital talipes equino varus, stroke), with 22 tendinous targets reported in upper and lower limbs. PNT were performed indifferently with 16/18 Ga needles, could last from 1 to 30 minutes, performed through various anaesthetic modes and procedures. Efficacy could be assessed through clinical outcomes (i.e gain in range of motion, pain allevation, functional or non-functional improvements) or para-clinical ones. The complication rate was estimated at 5% of procedures, with a mean follow-up of 16.2 months.

DISCUSSION AND CONCLUSION: Current evidence suggests that PNT appear to be effective procedures, safe and applicable for various neurological and non-neurological pathologies [2-7]. We emphasize that this technique must be performed by trained professionals in a specific environment, with gradations depending on the site. Further studies are needed, involving rigorous analysis of pain and longer follow ups, to validate their efficacy.

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Effectiveness of Manual Therapy and Sacroiliac Joint Injection in the Treatment of Patients With Sacroiliac Joint Dysfunction

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BACKGROUND: Sacroiliac joint dysfunction (SIJD) is a disease that affects a significant portion of patients with low back pain (1). It seriously affects the quality of life and its impact on the quality of life is greater than many chronic diseases (2). There is no specific algorithm for treatment, also there are lack of evidence in the literature regarding studies comparing treatment options.

AIM: Our aim is to examine and compare the effects of manual therapy (MT) and corticosteroid injection treatments on patients' pain, disability levels and physical examination findings in the treatment of SIJD.

METHOD: Thirty patients were included in the study according to inclusion and exclusion criteria. Randomization was performed as 15 patients in the MT group and 15 patients in the injection group. Patients in the MT group received total 5 sessions of MT, once a week. In the injection group, a single session of corticosteroid and local anesthetic injection was applied to the sacroiliac joint under fluoroscopy. Patients were evaluated with Numeric Rating Scale (NRS), Oswestry Disability Index (ODI) before treatment and at 1 month, 3 months, and 6 months after treatment. Sacroiliac provocation tests (SIPT) and sacroiliac mobility tests (SIMT) results were evaluated before treatment and at the 1 month and 3 months after the treatment.

RESULTS: In both groups NRS, ODI, positive SIPT and positive SIMT values were significantly decreased compared to baseline in all months ($p<0.05$). There was no significant difference between the MT and injection groups in NRS, ODI and positive SIMT changes from baseline in all months. In the MT group the decrease from baseline in the number of positive SIPT values at 1 month was significantly greater than in the injection group ($p<0.05$). In other months there was no significant difference in the changes of positive SIPT values from baseline between the two groups.

DISCUSSION AND CONCLUSION: In the literature there is only one study that comparing MT and corticosteroid injection in the treatment of SIJD. In this study, patients with radicular pain were evaluated. However, in our study, patients with below-knee radicular pain were excluded to rule out disc pathologies. Also, our follow up period was longer than this study. In both studies, there were no difference between two treatments in terms of their effects on pain and disability levels (3).
In conclusion, MT and corticosteroid injection are effective in reducing the severity of pain and disability in patients with SIJD. This effect lasts until the 6 months after both treatments. There was no difference in reducing pain and disability between two treatments.

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Popliteal Artery Compression Due to a Baker's Cyst: A Case Highlighting Diagnostic and Therapeutic Significance of Interventional Ultrasound in Physical Medicine and Rehabilitation

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BACKGROUND: Knee osteoarthritis (KOA) is a common global disorder, often associated with the development of Baker's cysts (BC), which are synovial cysts found within the popliteal fossa. The clinical presentations of BC vary and may be related to the size of the cyst. Importantly, BCs can exert pressure on the popliteal neurovascular bundle, resulting in symptoms like leg pain, paresthesia, edema, and, in cases of compression of the popliteal artery, intermittent claudication. (1)

AIM: This study seeks to underscore the wide-ranging spectrum of BC presentations and emphasize the importance of an accurate diagnosis in guiding effective patient management.

METHOD: A comprehensive evaluation was conducted on an active 75-year-old female patient with a BC within the Physical Medicine and Rehabilitation (PMR) consultation setting.

RESULTS: The patient, who had been receiving treatment for left-sided KOA, requested an assessment at our outpatient facility for a comprehensive clinical evaluation. She reported calf pain persisting for three months, particularly during ambulation (numeric rating scale (NRS): 6/10) that subsided at rest (NRS: 0/10), impairing work performance. Additionally, she experienced paresthesia in the second, third, and fourth toes of her left foot. Ultrasound imaging of the left popliteal fossa revealed a BC measuring 5 x 4 cm, compressing the popliteal vein and artery during plantar flexion of the left ankle, interrupting blood flow. An ultrasound-guided aspiration procedure successfully extracted 16cc of unremarkable synovial fluid from the BC, followed by a BC infiltration with lidocaine and methylprednisolone. The patient experienced immediate relief, with no pain during walking. A one-week follow-up demonstrated substantial improvement (NRS: 1/10, absence of paresthesia), her claudication improved progressively, and she returned to her premorbid work participation. Two months post-intervention, the patient remained asymptomatic and was able to work all day.

DISCUSSION AND CONCLUSION: This case illustrates that BC can manifest as a symptomatic condition, significantly impacting patients' daily functioning and overall quality of life. A thorough clinical history and clinical examination are essential for accurate diagnosis and effective management of such cases, highlighting the importance of a dynamic evaluation and underscores the in-situ role of interventional ultrasound within the context of Physical Medicine and Rehabilitation consultations. Furthermore, this study contributes to the recognition of BC's diverse presentations and the significance of early diagnosis and intervention.

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Radiofrequency of the Superior Gluteal Nerve for Greater Trochanter Pain Syndrome Management

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BACKGROUND: The Greater Trochanteric Pain Syndrome (GTPS) is a common consultatio reason in Rehabilitation units and can be refractory to conservative treatment, becoming chronic. The most frequent cause is the degenerative tendinopathy of the gluteus medius and gluteus minimus tendons at their insertion on the trochanter. The superior gluteal nerve innervates the gluteus medius and minimus muscles, as well as the tensor fasciae latae. Pulsed radiofrequency has been successfully used in pain treatment, but there is a lack of evidence for its use in GTPS

AIM: The purpose of the study is to describe pulsed radiofrequency as a possible alternative treatment for trochanter pain. A descriptive study is carried out on patients with chronic GTPS refractory to conservatives terapies.

METHOD: For the procedure, patients are in a prone position. The nerve is next the superior gluteal artery (our reference) and are located using ultrasound, following the technique described by Ferreira-Dos-Santos et al (1). Sensory and motor stimulation is performed, and if the response is appropriate, pulsed radiofrequency (4 minutes at 45°C) is applied Before the procedure, a pain and functional assessment is conducted using the Visual Analog Scale (VAS), Harris Hip Scores (HHS), and Lattinen Test (LT). Patients are reviewed at one month, evauating the presence of side effects or complications at this time. At three months, a follow-up consultation is performed to reevaluate functional capacity and pain using the same scales as before the procedure. Lastly, at six months, a telephone assessment is conducted to inquire if the improvement has been maintained.

RESULTS: Ten procedures were performed on three males (30%) and seven females (70%) with an average age of 54.70 years. None of the patients experienced side effects or complications attributable to the procedure, except for two cases of increased pain that resolved with local ice and analgesics. The initial VAS score was 8.8, and at three months, it was 2.58. In the HHS, the initial score was 56, and the final score w as 65, while in the LT, an initial value of 12.16 was recorded, which improved to 8.75. All patients maintained their improvement at six months and were satisfied with the results.

DISCUSSION AND CONCLUSION: GTPS is a common condition, sometimes very challenging to treat, and it can have a significantly negative impact on the quality of life. Nerve blocks and radiofrequency have gained popularity in the conservative management of chronic musculoskeletal pathology. In cases involving nerves with a motor component, pulsed radiofrequency is used, which is a neuromodulatory technique that does not damage axons. Conclusions In our study, ultrasound-guided pulsed radiofrequency is a well-tolerated procedure that significantly improves pain and functional capacity. Better-designed studies with larger sample sizes are needed.

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The Conservative Treatment of Lipedema

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BACKGROUND: Lipedema is a chronic, progressive condition, affecting almost exclusively women. It is characterized by: symmetrical accumulation of fat in the subcutaneous tissue of the lower limbs (and in some cases of the arms, too), orthostatic edema, pain, bruising. It has been estimated that lipedema affects from 0.06 to 10% of the female population.
AIM: Examination of published guidelines for lipedema, in order to find concordance and differences in the approach to diagnosis and treatment of lipedema

METHOD: PubMed, Google Scholar, Cinhal, and PeDro were searched for guidelines and consensus documents on lipedema.

RESULTS: Seven documents were identified, published between 2014 and 2021: 5 guidelines (German, Dutch, British, Spanish) and 2 consensus documents (European and US).

DISCUSSION AND CONCLUSION: Most of the documents confirm the paradigm shift that a few years ago concerned the conservative therapy of lipedema: its pillars are the use of elastic garments, an antinflammatory dietary treatment and regular motor activity; lymphatic drainage and pressotherapy have ancillary role. Complex Decongestive Therapy (skin care, manual lymphatic drainage, elastocompressive bandage, kinesitherapy, with subsequent adoption of made-to-measure, flat knitted compression garments) is solely reserved to lipolymphedema (due to lymphatic mechanical insufficiency, subsequent to chronic lymphatic overload typical of lipedema).
Not to be forgotten is the possibility of a surgical treatment, consisting in liposuction. Unfortunately this therapy is expensive and must normally paid by the patient.
The overview of the guidelines and consensus documents on lipedema identified in the literature allows the choice of the most appropriate interventions in favor of this pathology.

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Combined Diabetes and Arthritis are Associated with Increased Sleep Efficiency Variability

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BACKGROUND: Sleep is a biological process in which the reaction of sleep changes play role in body function [1]. Diabetes Mellitus (DM) and Rheumatoid Arthritis (RA) are common chronic health issues, in which causing sleep disturbance [2]. Inconsistent sleep schedule or night to night sleep variability are arising concerning harmful health consequences [3].

AIM: This research conducted to observe and analyze the data on the sleep efficiency variability of patients suffering from DM and RA.

METHOD: This research used the Midlife in the United States Second Wave Research (MIDUS-2). The design was a cross-sectional research comprising 434 participants. Data was collected from all the participants after taking informed consent. Participants were divided into four groups based on the presence of one of the above-mentioned systemic disorders, including DM group, RA group, DM and RA group, and healthy group. Age, gender, Body mass index (BMI), symptoms of depression, and prescribed medicines were included as control variables. Data has been analyzed on Statistical Package for social sciences (SPSS), for Macintosh Version-25 (SPSS Inc., Chicago, IL), using Chi-Squared and the Kruskal-Wallis tests to assess differences between groups, and linear regression to assess the relationships between groups and sleep variability.

RESULTS: Of 434 participants, 61.05% were female, 39.63% only had RA, 0.06% had DM alone, and 44.23% were healthy. The sleep efficiency of the healthy group was 81.55%; of patients having only RA was 78.37%; of patients having only DM was 75.35%; and the group having both disorders was 74%. the analysis of multiple linear regression indicates that combined RA and DM were remarkably associated with increased variability of sleep efficiency (B = 5.14, 95% confidence interval (CI) [1.62 to 8.66], p = 0.004). RA was markedly accompanied by increased variability of sleep efficiency (B = 3.66, 95% CI [.20 to 7.12], p = .038).

DISCUSSION AND CONCLUSION: DM is a chronic condition that develops due to a lack of capability to produce energy. RA is an autoimmune disorder in which the joints become so painful. The research's results showed a significant difference between the sleep efficiency of healthy people and those of other groups. Results show that patients experience trouble maintaining normal sleep efficiency due to systemic disorders and the negative effects of medications affecting their endocrine systems. There is a close relevance between variations in the sleep cycle and systemic conditions. Clinicians may recommend following enough sleep hygiene for patients with DM or RA.

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Rehabilitation After Acquired Brain Injury 2

Craniectomy and Rehabilitation: Exploring Patients Views of Their Decompressive Craniectomy – A Preliminary Qualitative Study at a National Rehabilitation Hospital

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BACKGROUND: Following significant injury to the brain raised intracranial pressure can occur leading to increased risk of disability and death. Decompressive craniectomy is a neurosurgical procedure that entails removing part of the skull to allow decompression of intracranial swelling (1). There is much written on neurosurgical process and outcomes in this topic but little in relation to the lived experience of this procedure and its potential relevance to rehabilitation.

AIM: to explore the lived experience of having a craniectomy and how this may impact rehabilitation.

METHOD:
1) Research Ethics Committee approval was secured.
2) The study was carried out a national rehabilitation hospital.
3) Six patients (5 women, one man) were recruited and informed consent taken.
4) interviews were conducted, recorded, transcribed and then analysed using thematic analysis.
5) The researchers engaged with reflective practice including supervision during the analysis.

RESULTS: principal themes from the analysis included:
1) a limited understanding of craniectomy amongst participants.
2) feelings of vulnerability which could impact rehabilitation for example patients could be anxious about washing and participation in physiotherapy.
4) head appearance was difficult for some
5) cranioplasty was seen as part of recovery and some felt it would restore their brain to normal.
6) patients reported that the craniectomy could cause family members to worry about their vulnerability.

DISCUSSION AND CONCLUSION: The literature relating to the lived experience of a craniectomy is underdeveloped. There is wider relevant literature but not specifically on craniectomy for example Agarwal et el (2013) highlight the importance of readability of neurosurgical patient education materials and Hiromitsu et al. (2018) explore concepts of embodied sense of self in the context of brain damage (3). As such though this is a small study it it adds to the wider body of knowledge given the underdeveloped literature.

In terms of implications for rehabilitation practice the following points are relevant:
1) it is important to explicitly explore with a patient their understanding of their craniectomy. Patients will tend not to remember conversations that occurred at the acute stage. Provision of accessible written information and autobiographic timeline work may help people understand what has happened to them.
2) it is important to explore concerns a patient may have in terms of their felt vulnerability and how they feel the craniectomy affects their appearance.
3) adapting rehabilitation practice to take account of these concerns for example when a professional is touching their hand (for example during washing or vestibular physiotherapy) is warranted and offering acceptable protective headware is important.

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The Experience of an Italian Neuro-Intensive Step-Down Unit Specialized in Early Neurorehabilitation

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BACKGROUND: Neuro-Intensive Step-Down Unit (NISU) is a rather unique organisation in Italy. Physically located in a tertiary referral specialized rehabilitation hospital, NISU is an intermediate hospital station balancing activities of life-saving intensive care treatment and life-making neurorehabilitation for Severe Acquired Brain Injured (SABI) and Spinal Cord Injured (SCI) persons. The professional team at NISU consists of physician, specialist in anaesthesia and intensive care, intensive care nurse and healthcare assistant, physiotherapist, and speech-therapist. Ancillary specialists in neurology, medicine, radiology, and laboratory services work alongside to help support the function of the patient's vital organs, management of nutrition, and to fend off infections and other secondary consequences of the SABI and SCI persons. Furthermore, a social worker, psychologist, professional educator, and occupational therapist collaborate as part of the interdisciplinary team.

AIM: to discuss the NISU project designed to provide early rehabilitation in a semi-intensive unit for SABI and SCI patients.

METHOD: during the meeting of the multi-professional team, professionals are invited to follow the monitoring lines in an observation project that collects data from clinical practice, to identify the objectives, measures, tools and timeline for each element. We gathered data on clinical stability, device management, weaning from devices, prognostic judgment, observation and treatment, and family communication. The patient who has not been weaned by the ventilator and whose clinical conditions and comorbidities do not allow the rehabilitation process are discharged from NISU.

RESULTS: we examined the data of patients who were admitted to NISU in 2022. Acute wards received 108 individuals, with 70 of them having SCI, Guillain-Barré syndrome, or post-Covid, while 38 had SABI of different aetiology. Despite this, 20 people remained or returned to NISU, and 4 of them perished. The patients who were discharged directly from NISU were 3 SABI and 13 SCI. Of these, 2 were discharged with a domestic ventilator, while the others were discharged due to the absence of a rehabilitation plan after clinical worsening.

DISCUSSION AND CONCLUSION: the timely completion of the multi-professional briefing, assessment scale compilation, and rehabilitation program planning has been ensured by the organizational and logistical changes. Within 7 days of joining the NISU, short-term rehabilitation goals could be defined through the weekly meeting of the multi-professional team. Additionally, a dedicated speech therapist at NISU ensured an early assessment of cognitive, communication, and swallowing problems, and provided subsequent intervention during the first days of admission. The daily activities were ensured by a greater number of health assistants in this context, as long as the clinical conditions allowed it. Neuromotor physiotherapy with verticalization and early mobilization, combined with the already present respiratory physiotherapy, has led to a progressive reduction of intensive care activities. Finally, the early involvement of the caregiver in the care and the improvement of the professional's empathy skills could guarantee a better ability of the family to cope with the new situation. The management of SABI and SCI in the NISU has allowed an early decrease in clinical and care intensity and a simultaneous increase in rehabilitation activity.
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The Effect of Multi-Component Balance Exercise and Sensory-Motor Mobilization of the Feet on Balance in Patients After Brain Surgery in the Acute Phase of Neuro-Rehabilitation

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BACKGROUND: Many patients experience disturbances in their perception of body posture and movement after undergoing brain surgery. Problems with the proprioceptive system often accompany balance disorders. Establishing balance simultaneously enhances the functioning of patients' proprioceptive systems (1). Patients who have undergone brain surgery may experience decreased foot sensitivity and an increased risk of falls due to poor postural control caused by disturbances in their sensory and motor systems. The sensory mechanisms significantly influence an individual's ability to maintain balance in their feet. The feet are a direct and unique interface between our body and the ground, enabling us to perceive and interact with our environment. Our feet have receptors crucial in transmitting critical pressure and skin stretch information. This sensory feedback triggers corrective postural responses from the muscles responsible for maintaining posture, allowing us to maintain an upright posture by resisting the force of gravity and the ground.

AIM: We aimed to determine whether combining functional somatosensory foot mobilization with multicomponent balance training could improve static postural control.

METHOD: The study was prospective. Following brain tumor surgery, we enrolled 20 patients. All patients scored above 25 on the Mini-Mental State Exam, 30 on the Berg Balance Scale, and 48 on the Morton Mobility Index. During hospitalization, patients were divided into two groups: a control group that received multicomponent balance training with an emphasis on eye, head, and trunk movements in various body positions and activities (vestibular exercises) and a test group that received manual sensorimotor mobilization of mechanoreceptors with an active foot arch strengthening exercises for intrinsic foot muscles in addition to multicomponent balance training. The patient's static postural control was evaluated on the third day post-operation and before discharge to their home environment using the Balance Error Scoring System (BESS).

RESULTS: The study included 20 patients, 10 in each group, with six women and four men in each group. The control group had an average age of 30 years, while the test group had an average age of 34.5 years. In the control group, eight patients exceeded the minimum clinically significant change of 11 points between the two BESS scores. In the test group, nine patients surpassed the clinically substantial improvement threshold of 18 points. The statistical analysis showed a significant difference between the groups ($p<0.05$).

DISCUSSION AND CONCLUSION: Both patient groups showed significant progress in maintaining posture and balance while standing still with eyes closed on different surfaces upon discharge. The test group, which underwent foot-strengthening exercises, had fewer errors in maintaining a still position after the BESS test than the control group, who followed a multicomponent exercise program. The improvement was both clinically and statistically significant. Our study suggests that enhancing sensory feedback of the plantar arch can be a promising approach for managing patients following brain tumor surgery. To obtain more accurate results, it is crucial to include a larger sample size in our study, given the limitations of our current sample.

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Goal-Setting in Long Term Rehabilitation After an Acquired Brain Injury: Taxonomy, Analysis and the Importance of Setting Personal Goals

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BACKGROUND: At Center Naprej we provide long-term rehabilitation for persons with ABI. In rehabilitation, goal setting is crucial, however the goals must be meaningful and important for the user. Research also shows the importance of the hierarchical classification of goals into general and specific goals [1]. At Center Naprej we formed a taxonomy that we linked to the internal instrument Wheel of Life, with which users evaluate ten important life areas: knowledge, finances, family, partnership, health, friendship, fun, independence, self-image, and emotions. The taxonomy enables us to classify general goals, from which then arise hierarchically subordinate specific goals. By setting goals we can maintain a user-centred approach during rehabilitation and increase the user's positive commitment [2].

AIM: To compare users' goals over a period of five years, according to region and gender, to examine the long-term significance of goals, to provide interpretations and perspectives in the goal-setting process, and to examine the potential of the taxonomy.

METHOD: With the help of targeted interviews, users rated 10 important life areas on a scale from 1 to 10 on the Wheel of Life assessment instrument and formulated general life goals. They then set specific goals in 6 rehabilitation areas. With the help of taxonomy we classified general and specific goals and compared them over time, by region and by gender. Post hoc analysis was used to compare the statistical significance of differences in the frequency of set goals between different groups in repeated measurements of participants.

RESULTS: In the five-year period from 2019 to 2023, users set a total of 3856 goals in both units. Using the taxonomy, we classified 735 general goals in 10 areas for 58 users. They currently have 224 general goals set in the following areas: 33% Knowledge, 31% Health, 7% Fun and Emotions, 5% Partnership and Independence, 4% Friendship, 3% Finance and Family, and 2% Self-Esteem. On the basis of these general goals, 3121 specific goals were formulated in 6 rehabilitation areas. The importance of individual life areas, a smaller number of general goals compared to specific goals (18% of general goals out of all goals), and a permanent long-term commitment to goals were shown. The results show a trend of emphasizing goals that are focused on the individual and his personal abilities (motor and cognitive) and not so much on goals related to the environment and family and to self-evaluation.

DISCUSSION AND CONCLUSION: The general goals appear to be fairly stable over time and are maintained despite achieving maximum abilities. They indicate a positive commitment to rehabilitation, a positive attitude towards one's own independence and the need for long-term rehabilitation. The taxonomy provides a useful means of classifying goals, is a useful tool for exploring the influences on goal setting and is directly applicable to rehabilitation practice both in the rehabilitation planning phase and in the verification and evaluation phase.

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From Mascara to the Mystery of the Feminine Soul – Experiencing Femininity After Brain Injury

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BACKGROUND: Half (47%) of the patients treated at the Brain Injury Rehabilitation Unit of the Hungarian National Institute for Medical Rehabilitation between 01/2022 and 04/2022 were women. Their age was widely distributed (mean: 46, range: 17-74 years).

AIM: To help the young women with acquired brain injury to regain their femininity during the rehabilitation. Two specific goals were set: to regain femininity in an autonomous way (e.g.: use of feminine hygiene products, beauty care, women's clothing) and to reconstruct the traumatized self-image, i.e. to regain the sense of femininity in different roles (partner, mother, grandmother).

METHOD: The traditional rehabilitation treatment was complemented by an interdisciplinary teamwork involving exclusively female colleagues (nurse, occupational therapist, physiotherapist, speech therapist, neuropsychologist, physician). The one-hour sessions were held in the ward, once a week. Topics were adapted to the participants' requests, and necessitated a cycle of 8 or 10 sessions to be fully covered. Two such cycles have thus far been completed since its introduction (01/2022).

RESULTS: A total of 26 inpatient participants were willing to participate, including all patients below the age of 50 years. No dropout occurred.
The regain of autonomy was helped by the occupational therapist, physiotherapist and nurses. Patients with aphasia could participate with the help of speech therapist.
The confidential and intimate atmosphere successfully encouraged the patients to share their questions and thoughts on their traumas and to work in a guided emotional way. Sensitive questions could be discussed individually with a psychologist. To regain the sense of femininity was thus encouraged by the whole group.
Based on the feedback of participants, the sessions provided an occasion for the patients to ask for help without inconvenience. They shared their successful and joyful experiences and were able to reflect on their own feelings and experiences. The group leaders also faced new challenges and the group sessions provided an opportunity for in-depth discussions between therapists and patients.

DISCUSSION AND CONCLUSION: As reflected by the high interest of young female patients, the women's group facilitated the rehabilitation of the patients, both physically, mentally and emotionally.

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Rehabilitation of Persons With Sequelae of COVID-19

Feasibility Study of a Randomized Controlled Trial Comparing Multidisciplinary Versus Standard Physical Therapy for Long COVID: Recruitment Challenges

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BACKGROUND: Long COVID is present in up to 43% of COVID 19-survivors. Literature on this new condition states a need for a multidisciplinary approach. We performed a pilot study, funded by the Belgian Health Care Knowledge Center, to investigate the feasibility of a pragmatic randomized controlled clinical trial, comparing a personalized multimodal treatment to standard physiotherapy.

AIM: This work discusses the recruitment strategies and consequent difficulties experienced during the pilot study.

METHOD: We aimed to include 66 participants in an expected period of 12 months. The recruitment strategy consisted of collaborations with general practitioners (GP) and paramedical professionals (PP), leaflets at the study site, social media posts, and through patient associations. Additionally, the principal investigator mentioned the trial during multiple media appearances addressing current findings in long COVID research. Information about the trial was posted on multiple websites.

RESULTS: From May 2022 till September 2023 we succeeded including 66 of 146 potential participants that contacted the study team. The most successful recruitment route was through referral by medical doctors within the study site (38 applications). Mentions of the trial in traditional media led to 29 applications, while websites led to 17 applications. Of the planned strategies, the most successful strategy was through social media followed by GP referral, then flyers and finally PP referral, with respectively 13, 10, 8 and 7 applications. Additionally, 2 volunteers were referred by participants of the trial and 2 were referred by another research team. For 20 volunteers, the recruitment route was not specified.
Referrals by medical doctors within the study site remained constant throughout the entire recruitment period. When the recruitment rate stagnated, mentions in the media were most successful, compared to the other strategies, leading to rise in applications.

DISCUSSION AND CONCLUSION: Despite a great amount of long COVID patients and a variety of recruitment strategies, recruitment was slower than expected for the small projected group. We experienced that there is need for further awareness of this condition. It would also be interesting to find out if other trials experienced the same recruitment problems. Generalized low recruitment patterns could possibly imply that long COVID patients either have very high or very low disease burden, rendering study participation impossible respectively not interesting.

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The Dynamic Landscape of Long COVID: A Focus on Musculoskeletal Symptoms and Related Rehabilitative Needs

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BACKGROUND: Long COVID, characterized by persistent symptoms following SARS-CoV-2 infection, has been associated with several musculoskeletal symptoms, significantly affecting patients' well-being. The dynamic rehabilitation needs of Long COVID patients have not been adequately explored over time (1).

AIM: This study presents a comprehensive literature review spanning three years of the pandemic to delineate the evolving landscape of Long COVID, with a particular focus on musculoskeletal symptoms and rehabilitation needs.

METHOD: We conducted a literature review to identify and analyze articles related to Long COVID syndrome, focusing on musculoskeletal symptoms and the related rehabilitation needs. Lexical analysis was employed to track changes in the language used to describe these symptoms and their evolution over time.

RESULTS: Our analysis revealed a growing involvement of the musculoskeletal system in Long COVID symptomatology over time. Specifically, there was a progressive increase in the prevalence of fatigue and weakness symptoms over time. Additionally, arthralgia consistently appeared as a prominent symptom associated with Long COVID.

DISCUSSION AND CONCLUSION: The lexical analysis we conducted highlights the interconnected nature of the symptoms reported in Long COVID. This underscores the need for interdisciplinary rehabilitative management to address the various aspects of this syndrome. Moreover, our approach underscores that Long COVID is a dynamic condition that requires current interventions. In conclusion, our study provides valuable insights into the evolving nature of musculoskeletal symptoms in Long COVID over the course of the pandemic. The findings emphasize the importance of a multidisciplinary approach to managing this syndrome and the necessity for up-to-date interventions. Healthcare systems worldwide should prioritize multidisciplinary teams to ensure early and comprehensive rehabilitation, ultimately reducing the social and healthcare burden associated with Long COVID.

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Long COVID Rehabilitation Program in Two Different Setting: Effectiveness and Implications

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BACKGROUND: Long COVID, characterized by the persistence of a wide range of symptoms beyond the acute phase of COVID-19 infection, represents a multifaceted rehabilitative challenge. These symptoms, which can encompass respiratory, neurological, cardiovascular, and musculoskeletal issues, manifest in various combinations and intensities, making the rehabilitation process multi-systemic and individualized.

AIM: This study investigates the efficacy of a multi-systemic rehabilitation program for Long COVID patients in two settings: health resort and home-based.

METHOD: We conducted a randomized controlled trial involving sixty-six patients who had experienced medium-to-long-term outcomes following SARS-CoV-2 infection. Patients were randomly assigned to either the health resort group (Group A, n=33) or the home-based exercise group (Group B, n=33). Both groups underwent a 5-week program that included exercises for motor, respiratory, and cognitive rehabilitation.
At the initiation and completion of the treatment, as well as during two subsequent follow-up assessments at 3 months and 6 months after the conclusion of the treatment, patients in both groups underwent evaluations based on the following parameters: Numerical Rating Scale (NRS), Short Physical Performance Battery (SPPB), hand grip strength, Barthel Dyspnea Scale, Modified British Medical Research Council Questionnaire (mMRC), 12-Item Short Form Health Survey (SF-12) Physical Component Summary (PCS) and Mental Component Summary (MCS), Beck's Depression Inventory (BDI), Beck Anxiety Inventory (BAI), Fatigue Assessment Scale (FAS), and Montreal Cognitive Assessment (MoCA).

RESULTS: Both groups exhibited positive effects, with sustained benefits at the 6-month follow-up. Notably, the health resort group showed greater improvements in Barthel scores and hand grip strength at all evaluation time points ($p < 0.01$). Moreover, group A patients reported a statistically significant variation in the PCS related to quality of life at all three-time points compared to baseline values ($p < 0.01$), whereas in the health resort group, this change was not significant. Regarding pain, group A demonstrated a continuous reduction in NRS values in all follow-up times ($p < 0.01$), while the home-based group showed significant improvements only in T2 and T3 compared to T0 ($p < 0.01$). Additionally, the health resort group had significantly better early improvements in BDI and BAI scores.

DISCUSSION AND CONCLUSION: Our findings suggest that a multi-systemic rehabilitation program, especially in a health resort setting, can effectively address Long COVID complexities, benefiting patients across various domains. Nevertheless, further research is required to assess the cost-effectiveness and long-term sustainability of these interventions.

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Physical Recovery up to 2 Years After Hospitalization for COVID-19; Results From the Multicenter Prospective CO-FLOW Study

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BACKGROUND: Patients hospitalized for COVID-19 may experience physical impairments. Several studies reported physical recovery up to one year after hospitalization for COVID-19, but trajectories up to 2 years of follow-up and risk factors for poor outcomes are scarce.

AIM: To assess trajectories of physical function in patients with COVID-19 up to 2 years after hospitalization. Additionally, we explored risk factors for the most impaired physical outcome at 2 years.

METHOD: This multicenter prospective cohort study included adults hospitalized for COVID-19 in the mid-west of the Netherlands. Physical function was objectively assessed at 3, 6, 12, and 24 months after hospital discharge and included assessment of cardiorespiratory fitness with the 6-minute walking test (6MWT) and 1-minute sit-to-stand test (1MSTST) and muscle strength with maximum handgrip strength (HGS) testing. Generalized estimating equations were used to assess the trajectories of outcomes and to identify risk factors (demographics and clinical characteristics at admission) for the most impaired physical outcome at 2 years.

RESULTS: The CO-FLOW study included 650 patients hospitalized for COVID-19, the mean age was 59.7 (SD 11.4) years, 449 (69%) were male, and 273 (42%) patients were admitted to an intensive care unit (ICU). At 3 months, the estimated mean distance walked in 6MWT was 473.5 (SE 5.3) meters, 24.7 (0.4) sit-to-stand repetitions in 1MSTST, and 35.6 kg (0.5) in HGS. Outcomes on the 6MWT (mean difference +32.6 [95% CI 24.5 to 40.9], p<0.001), 1MSTST (+7.1 [5.5 to 8.7], p<0.001), and HGS (+5.4 [4.7 to 6.2], p<0.001) improved significantly up to 2 years follow-up. At 2 years, patients reached 93.9% of normative values in 6MWT, 81.5% in 1MSTST, and 106.9% in HGS. Apart from follow-up time (p<0.001), female sex (-7.4 [-11.8 to -3.1], p<0.001), younger age (-0.4 [-0.6 to -0.2], p=0.001), obesity (-4.7 [-8.8 to -0.6], p=0.03), diabetes (-7.9 [-12.7 to -3.2], p=0.001), pulmonary disease (-10.2 [-14.5 to -5.9], p<0.001), low education level (vs high education -6.9 [-12.0 to -1.7], p=0.009; vs middle education -6.2 [-10.8 to -1.6], p=0.009), no ICU admission (-6.6 [-12.3 to -0.9], p=0.02) and a longer stay in the hospital (-0.2 [-0.3 to -0.07], p=0.003) were identified as risk factors for a lower percentage of normative value in 1MSTST.

DISCUSSION AND CONCLUSION: Overall, physical function improved after hospitalization for COVID-19. Patients generally showed good recovery in 6MWT and HGS, but levels reached in 1MSTST were relatively low at 2 years. The outcome of the 1MSTST is also related to functional lower limb muscle strength; our findings may indicate that there is still some impairment in functional lower limb muscle strength rather than in cardiorespiratory fitness. Female sex, pre-existing comorbidities, low education level, and no ICU treatment were prominent risk factors for a reduced 1MSTST outcome. Patients at risk for poor physical recovery may require additional therapy.

REFERENCES: none

Long Term Consequences in Patients After COVID-19 and Respiratory Failure

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BACKGROUND: During the pandemic, more than 200 patients after COVID-19 pneumonia and respiratory failure with consequent Critical Illness Neuropathy (CIN) and Critical Illness Myopathy (CIM) were admitted for comprehensive rehabilitation at our department. In the period of 2nd and 3rd epidemic wave, a prospective study on rehabilitation outcomes including 50 consecutive patients with CIN or CIM as a consequence of COVID-19 and respiratory failure was conducted. The results showed beneficial effects of our rehabilitation programme (1). However, long-term consequences may persist in a high percentage of patients after COVID-19 (2, 3).

AIM: The aim of the current study was to assess long-term functional problems in these patients more than 2 years after discharge from our department.

METHOD: Fifty patients (14 women, 36 men) from our previous study were invited to participate in a telephone interview. A positive response was obtained from 46 patients. Interviews were taken in September and October 2023. A survey included questions regarding their functional status, as well as symptoms typical for Long COVID, more than 2 years after discharge from our department.

RESULTS: Fatigue was reported by 37 patients (80%). Neurological symptoms were present in 42 (91%), about half of them (20) complaining of a “brain fog”. Psychological problems were recognized by 17 patients (37%), mostly in the form of symptoms that can be regarded as depression (16, 35%) and/or anxiety (11, 24%). Cardiac and pulmonary problems (shortness of breath, cough, chest pain, palpitations) were reported 36 patients (78%) and gastrointestinal symptoms in 20 (43%). Muscle and/or joint pain was present in 29 patients (63%).

DISCUSSION AND CONCLUSION: Our results show that, from more than a 2-year period after discharge, patients after severe COVID-19 with respiratory failure improved (or at least preserved) their functional performance regarding ADL and walking. However, a vast majority of them suffer from symptoms typical for Long COVID. A high percentage of these long-term sequels, especially in comparison with current literature data (2, 3), could be attributed to a severe acute course of disease with several complications, requiring prolonged ICU treatment followed by comprehensive rehabilitation (1).
Conclusion: It seems that more than two years after completing comprehensive rehabilitation, patients after severe COVID-19 with respiratory failure improved their functional performance. However, a vast majority of them suffer from symptoms typical for Long COVID.

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Therapeutic Physical Agents

How Many Laser Therapy Sessions is Necessary to Reduce Plantar Fasciitis Pain?

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BACKGROUND: In the literature different number of laser therapy sessions is applied to the patient to treat plantar fasciitis (1-5).

AIM: To assess the minimal number of laser therapy sessions required to achieve clinically significant pain relief and to evaluate possible side effects and complications of low-level and high-intensity laser therapy.

METHOD: The study was a single-centered single (participant) blinded randomized controlled trial with parallel group design. Recruitment period was January 2017 to April 2019. Participants were randomized to HILT or LLLT groups. Subjects with unilateral plantar fasciitis received a course of 8 treatments over 3 weeks. HILT group received high-intensity laser therapy (BTL-6000 High Intensity Laser 12W: 1064nm, 7W, Continuous, 120J/cm2, 3000J) and LLLT group received low-level laser therapy (LAS-Expert: 785nm, Pulsed (50%), 50-60Hz, 4,0J/cm², 140J). The possible harms were evaluated during the treatment: subjects were asked about side effects. Numerical pain rating scale (NPRS) from 0 to 10 ("0"=no pain, "10"=the most intense pain) was used to evaluate pain before every laser therapy session in different times: pain in the first step in the morning, pain 1min. after first step and in the evening. A reduction of one point in the NPRS represented a minimal clinically important difference for the patient (6). All statistical analyses were performed using SPSS for Windows. A two-sided p value <0.05 was considered to be statistically significant. Data presented as mean ± standard deviation.

RESULTS: 102 participants included and analyzed (51 in HILT group and 51 in LLLT group).
According to the NPRS, a clinically and statistically significant reduction of pain in the first step in the morning was achieved after 4 laser sessions when assessed before 5th laser session in both groups (HILT 2.28±3.13, p=0.001; LLLT 3.18±3.74, p=0.001) without a statistically significant difference between the groups (p=0.194). A clinically and statistically significant reduction of pain 1min. after first step was achieved after 4 laser sessions when assessed before 5th laser session in both groups (HILT 1.77±2.97, p=0.005; LLLT 1.65±2.12, p=0.000). There was statistically significantly more pain reduction in HILT group (p=0.016). A clinically and statistically significant reduction of pain in the evening was achieved after 2 laser sessions when assessed before 3rd laser session in HILT group (1.74±2.23, p=0.008) and after 3 laser sessions when assessed before 4th laser session in LLLT group (2.34±3.25, p=0.021) without a statistically significant difference between the groups (p=0.097).
The treatment that was applied in this study had neither adverse events nor complications. However, 15 % of people noticed the temporary increase of pain for short period of time in the middle of the treatment (HILT group 10 (19.6 %); LLLT group 5 (9.8 %); between the group p=0.263).

DISCUSSION AND CONCLUSION: According to the NPRS the clinically and statistically significant pain reduction was achieved after 4 sessions of laser therapy and documented on arrival to 5th session.
There were no complications during the treatment with high-intensity and low-level lasers.

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Application of High-Intensity Laser Compared to Low-Intensity Laser in Pain Treatment of Patients With Knee Osteoarthritis

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BACKGROUND: Osteoarthritis is a rheumatic disease characterized by degeneration and decay of cartilage in the joints. In addition to pharmacological therapy, low-intensity laser treatment (LILT), high-intensity treatment (HILT) and exercise are used to treat osteoarthritis of the knee (OAK). HILT is a new modality in our country and the experience from its application is small, especially in the treatment of OA of the knee.

AIM: Compare the effect of HILT with LILT in the treatment of OAK.

METHOD: Compare the effect of HILT with LILT in the treatment of OAK.

RESULTS: We found a significant difference between the two groups in terms of VAS score after 10 therapies in favor to a significantly lower score, that is, less pain in the HILT group (p = 0.0035). The comparison of the VAS score between the two times in the two groups separately showed that in both, the HILT and the LILT groups, the VAS score after 10 days of therapy was significantly lower compared to thatat 0 time, for consequently p = 0.00001vsp = 0.00001.

DISCUSSION AND CONCLUSION: There is more research with LLLT and HILT where the results showed significant improvement in the treatment of osteoarthritis of the knee. Our comparative research has shown that treatment with HILT and LILT significantly reduces pain in patients with OAK. HILT was more effective than LILT.

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The Therapy Gardens

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BACKGROUND: Plant therapy is a discipline that uses plants and gardening as a professional program in the neurorehabilitation of people with neurological deficits. The first steps of plant therapy in neurorehabilitation in Croatia were presented at the 1st Neurorehabilitation Congress in Osijek in 2004 (1). Then new applications were developed and in this endeavor flower beds - raised beds - were introduced as a therapy in neurorehabilitation (2,3).
The starting position can be sitting (chair or wheelchair) or standing, assessing the posture of the whole body (4). The patient acquires many new skills by learning horticultural techniques and methods, such as growing plants, gardening and arranging flowers. They improve speech disorders and communication skills while developing psychomotor activities (5).

AIM: The aim is to point to floriculture, plant therapy, in a narrower sense with flowers, as part of horticultural therapy and a therapeutic modality in the neurorehabilitation of patients, primarily for the rehabilitation of people with impaired function of the gross and fine grip of the fingers and hand.
Methods: We conducted a literature search in the databases: Medline (Pubmed), Scopus, Web of Science, Embase, Cochrane Library in the period from 2018 to 2024. The databases were searched for the keywords The Therapy Gardens, neurological deficits, in English. The inclusion factors were studies that show the effects of therapy garden for various neurological conditions, while studies that contain other conditions and diseases with therapy garden, COVID-19 and were older than 2018 were not included in the review.

RESULTS: The search identified 87 references; however, only 11 of the total number of articles were included in this review. Of the relevant papers (reviews, meta-analyzes and randomized controlled clinical trials), most showed that these procedures and patient activities provide many therapeutic benefits. One interpretation is that by working with plants and following their life cycle, because plants stimulate a direct, specific and positive response for which the human sensory system is specifically designed. The stimulation of sensory perception: sight, hearing, touch, taste and smell play an important role in achieving the full effectiveness of a horticultural therapy program (6).

DISCUSSION AND CONCLUSIONS: These procedures and activities of the patient bring many therapeutic benefits. Gardening and caring for plants together contributes to the socialization of sick and neglected people, and if floriculture is available to the local population, it becomes an interactive host for the clients of a specialized hospital, a health resort, creates additional positive transfers and arouses the desire to return to the health resort.

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Effects of Mechanical-Sound Vibration Therapy on Muscle Strength, Pain, and Joint Function in Elderly Patients Undergoing Knee and Hip Arthroplasty

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BACKGROUND: The process of prosthetization poses a challenging endeavor for every patient, especially among the elderly. Rehabilitation plays a crucial role in the treatment following the surgical intervention. To achieve the best possible outcome, new methods are continually being implemented to quickly enhance the patient's quality of life through a patient-centered approach (1). One such technique may involve vibration therapy, a treatment method based on vibrational stimulation applied to a specific muscle or muscle group using a mechanical device equipped with a specific blower.

AIM: The aim of this study is to assess the effectiveness of vibrational therapy in pain management and its effects on muscle strength, tone, and endurance during the early post-operative rehabilitation of patients with total knee arthroplasty and total hip arthroplasty. The study considers differences in terms of muscle strength, pain, endurance, and function between patients undergoing physiotherapy combined with vibrational therapy and those treated with physiotherapy alone.

METHOD: We enrolled 38 patients (19 with total knee prostheses, 19 with hip prostheses) over a period of 3 months. These patients underwent vibrational therapy sessions lasting 30 minutes each day, with administered frequencies of 200 Hz and 300 Hz, along with a standard physiotherapy protocol lasting 90 minutes per day. Additionally, we included 22 patients (11 with hip prostheses, 11 with knee prostheses) as a control group, following a rehabilitation protocol that included only the standard 90-minute daily physiotherapy.
All groups were treated for 5 days. Patients were recruited within a period of 3 days (+/- 1) from the surgical intervention when tissue swelling was significantly reduced, following inclusion/exclusion criteria. Assessments were conducted pre-treatment (T0), on the fifth day at the end of the treatment (T1), and three days after its completion (T2).
For the evaluation of different parameters, we used NRS and McGill scales for pain, the 10-second sit-to-stand test for muscle endurance, the MRC scale for strength assessment, and centimeter measurements for muscle tone.

RESULTS: Our study has shown that in patients treated with mechano-sonore vibrational therapy compared to those undergoing only standard physiotherapy, there is a significant reduction in pain, an increase in muscle tone, and endurance. Furthermore, it has been observed that none of the enrolled patients experienced side effects related to the use of mechano-sonore vibrational physical therapy.

DISCUSSION AND CONCLUSION: Applying vibrations to the major muscle groups in the lower limbs of patients with knee or hip prostheses, has demonstrated beneficial effects that enhance the rehabilitation process. This promotes a quicker pain management, improved performance recovery, and better outcomes during the immediate postoperative rehabilitation period for patients.

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Treatment of the Persons With Chronic Pain Conditions and Return to Work

Comparability of Video Conference and In-Person Chronic Pain Treatment on Pain Intensity and Interference With Daily Functioning

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BACKGROUND: At University Rehabilitation Institute, Republic of Slovenia, chronic pain patients participate in interdisciplinary rehabilitation programs. During the covid-19 era, we transformed our standard in-person programs into a hybrid form, combining in-person rehabilitation with video conference rehabilitation delivery. A meta-analysis of 14 randomized controlled studies indicated that telerehabilitation can improve pain intensity and quality of life compared to waiting list, pharmacological and nonpharmacological therapies (1) and can be successfully implemented in chronic pain management in conjunction with, or in lieu of, in-person interaction (2).

AIM: The aim of our research was to establish whether the change in the delivery of interdisciplinary rehabilitation chronic pain treatment affected reduction of pain intensity and interference with daily functioning due to pain.

METHOD: In this retrospective study we reviewed data from 389 chronic pain patients. 183 patients were treated in-person, and 206 patients were treated in a hybrid fashion: in-person, as well as through a video conferencing platform. Due to their functional capabilities, patients took part in rehabilitation programs of varying intensities. All patients filled in a short form of the Brief Pain Inventory (BPI) at baseline and end of treatment.

RESULTS: No statistical significance was found in pain intensity and pain interference measures between groups of patients at baseline, making further data comparison possible. We used an ANCOVA model to evaluate means of pain intensity and interference with daily functioning due to pain, while controlling for effects of varying rehabilitation deliveries (completely in-person or combined with videoconferencing) and rehabilitation programs of different intensities. There were no statistically significant differences in influence of pain on various aspects of daily life means between in-person and hybrid groups. There were however statistically significant differences in means of pain intensity between groups. The difference was largely driven by the rehabilitation intensity factor, with patients from low intensity IRP achieving lower pain intensity reduction when receiving treatment in a hybrid format.

DISCUSSION AND CONCLUSION: A hybrid format of interdisciplinary rehabilitation for chronic pain patients, combining in-person and video conference treatment, can be comparable to completely in-person treatment, when it comes to interference of pain on various aspects of daily life. However, the reduction of pain intensity is only comparable between treatment formats in chronic pain patients with better functional abilities. The results could imply functionally more impaired patients need more in-person therapeutic contact to achieve comparable reduction in pain intensity.

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Cutaneous Electroanalgesia for Relief of Chronic Neuropathic Pain in Patients With Spinal Cord Injury

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BACKGROUND: To help validate the use of Scrambler therapy (ST) a cutaneous electroanalgesia for relief of chronic neuropathic pain in patients with spinal cord injury (SCI)

AIM: Relief of chronic severe neuropathic pain in patients with spinal chord injury.

METHOD: This prospective study enrolled 35 patients (M and F) of 29-68 years- old who were experiencing chronic severe neuropathic pain after SCI (NRS>7) despite chronic pharmacological therapy and physical treatments. ST was performed using the NC5-A Calmare for ten times, 30 min sessions. Pain score (NRS), patient's activities of daily living (ADL), Beck Depression Inventory (BDI) score were collected before treatment and at 2 and 4 months post-treatment. Statistical analyses were performed using Wilcoxon's test.

RESULTS: A striking reduction in pain was observed during and immediately following treatment ($p = 0.03$). Clinically a treatment session is judged to be successful if neuropathic pain or numbness is relieved and the therapeutic goal is to replace nociceptive signals in the affected field with the ST therapy signal. The duration of relief usually increases with each day of treatment and how reported to last for several weeks after treatment.
The primary analyses showed a significant reduction in NRS scores over 2 weeks. At one month, the NRS was reduced from 8.1 to 2 ($p< 0.0001$). Greater effectiveness were seen in polyradicular pain. Twenty-nine patients responded with an improvement of 70-100% in 14, 50-70% in 11 and < 50% in 4 patients. There was no relation between scores and following background variables: age, education level, pain duration and NRS. At the 4-month follow-up, 82,8% of patients had a pain reduction of more than 50%.

DISCUSSION AND CONCLUSION: Pain relief obtained with ST often facilitates the patient's rehabilitation program. This is a prototype for treatment patients who need a multimodal approach. ST seems to relieves chronic neuropathic pain more effectively than medication management as per the suggested guidelines. A limitation in the neuromodulation is the lack of definite knowledge regarding both mechanism and pain conditions or factor that may predict the success of ST.
We need to understand better the relationship between cutaneous electroanalgesic stimulation and established markers of neuroinflammation like changes in dorsal-horn activation.

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The Role of Botulinum Toxin a Injections in the Treatment of Chronic Pelvic Pain: An Outpatient Rehabilitation Clinic Experience

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BACKGROUND: Chronic pelvic pain is an extremely distressing condition which leads to major effects in women's everyday life. In addition to visceral sources of pain, pelvic floor dysfunction including myofascial pain, vulvodynia, vaginismus or hypertonicity are causes often overlooked. Injecting botulinum toxin type A (BoNT-A) into pelvic floor muscles may be an effective option for women refractory to first-line treatments such as physiotherapy.

AIM: To study the effect of botulinum toxin injection in chronic pelvic pain.

METHOD: We conducted a narrative review to clarify the international published experience. Also, a longitudinal cohort study was performed to evaluate the effects of BoNT-A at 1 month and 3 months post-injection, applying pain and quality of life scales.

RESULTS: The muscles that are injected in chronic pelvic pain treatment include the bulbospongiosus, obturator internus, levator ani (pubococcygeus, iliococcygeus, and puborectalis), and coccygeus. Generally, injections can be performed tolerably with local anesthesia. Doses range from 20 to 100 international units (IU). Most practitioners perform BoNT-A injection of pelvic floor muscles using anatomical landmarks identified by manual palpation.
Regarding the longitudinal cohort results, it is noteworthy that there was a decrease in pain intensity in all patients, starting from the first month after the injection. Pain relief was maintained at 3-month follow-up and this was statistically significant (compared to baseline). Regarding quality of life, a difference was found between the patients, with vaginismus having the greatest impact on quality of life at baseline.

DISCUSSION AND CONCLUSION: Increasing proof points out that BoNT-A is a promising treatment option for pelvic chronic pain in women. Side effects of BoNT-A injection are rare and self-limiting, which makes it safe. Because of the reversible nature of BoNT-A, reinjection appears to be necessary.

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Work Disability in Tertiary Care Chronic Pain Patients

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BACKGROUND AND AIM: To examine patient characteristics associated with disability claims in chronic pain patients who are still working in a cross-sectional study and compare them with chronic pain patients who are already retired due to disability. Data were collected at first presentation at a tertiary care facility.

METHOD: Data routinely collected in clinical practice (gender, age, body mass index, widespread pain index - WPI, painDETECT, 6-minute walk test, NPRS after 6-minute walk test, Timed Up and Go, grip strength, education, employment status, sick leave in the last 12 months) from 389 consecutive patients presenting to the interdisciplinary pain team were analyzed with regard to their current inability to work.

RESULTS: Patients with the highest level of disability (requiring full compensation) had higher symptom burden compared to those not claiming disability (WPI mean 13 vs. 9.2; painDETECT 24 vs. 17.9; NPRS after 6 minute walk test 8.7 vs. 5.6), worse physical performance tests (mean 20.9s vs. 7.2s; 6-minute walk test 175m vs. 310m), higher sickness absence in the last year (12 months vs. 4.3), higher unemployment (67% vs. 21%) and lower education (primary school only 50% vs. 13%). Compared to those who had already retired due to disability, patients who applied for disability were younger (53.4 vs. 59.7), had a higher painDETECT score (23.5 vs. 18, 9), a worse hand grip (left - 69% vs. 40% of normal) and no significant difference in the widespread pain index, NPRS pain after 6min walk test, timed up and go and 6min walk test.

DISCUSSION AND CONCLUSION: Chronic pain patients with higher work disability have a higher symptom burden (1), poorer physical performance and a more difficult social background (2). Patients who are already retired due to inability to work have fewer symptoms and better function (hand grip) than patients who are still working, despite their older age (3).

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TESC

Efficacy of Visual Feedback Training for Motor Recovery in Post-Operative Subjects with Knee Replacement: A Randomized Controlled Trial

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For patients with severe knee osteoarthritis, the total knee replacement (TKR) surgery represents an effective treatment. However, 14 to 46 % of patients still present functional and biomechanical impairments at 1 year after surgery, particularly when walking. Aim of this study is to evaluate the effects of visual feedback training (VFB) on motor recovery in patients after TKR. The performance of 40 first-ever TKR patients (27 females; mean age:
70.5 (67.2–74.0) years) was evaluated in a single center, single-blind, randomized controlled study. The patients were randomly and equally distributed into two demographically/clinically matched groups undergoing experimental or traditional treatments. All patients have been treated in a 1 h session, 2/day for 5 days a week, for six consecutive weeks. The experimental group received advanced knee training with visual feedback using the TecnoBody® devices (Walker View 3.0 and ProKin 252, BG, Italy) whereas the control grunderwent conventional physical therapy. The clinical scales and the instrumental gait analysis (G-sensor, BTS-bioengineering, MI, Italy) were utilized to evaluate knee function and kinematic parameters. Both groups improved significantly and similarly, as measured by NRS for Pain and Barthel index. A significant boosting of the motor performance was detected in the experimental group compared to the control group in the terms of symmetry index 84 (80.8–85.4) vs. 87.15 (84–92.8) p=0.001*; single stance support 34.9 (34.1–36.5) vs. 37.8 (36.6–38.9); p<0.001; and obliquity parameters 58.65 (51.3–70.3) vs. 73 (62.3–82.1); p<0.001. In conclusion, our study supports the need for a structured rehabilitation plan in the early stage after TKR surgery, to avoid the risk of not fully restored gait biomechanics. VFB in addition to traditional rehabilitation improves the knee function and motor control in postoperative TKR patients with a reduction of the risk of fall.

Nervous excitability studies in patients with Charcot-Marie-Tooth disease

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INTRODUCTION: Excitability studies in peripheral neuropathies provide insight into the properties of the axonal membrane at the site of stimulation (ion channels function and axonal membrane potential). In this work, we studied with electroneuromyography (ENMG), in healthy volunteers and in patients with Charcot-Marie-Tooth (CMT) disease type 1A, two excitability parameters: the excitability recovery cycle (ERC) and the iMAX. ERC studies enabled to measure axonal excitability changes following a propagated action potential [1]. The sequence of these changes includes four periods. First, the axon is inexcitable, it is the absolute refractory period (ARP). After, excitability recover progressively but the axon is hypoexcitable, it is the relative refractory period (RRP). These refractory periods are followed by a supernormal period where axonal excitability is increased and finally by a late subnormal period where axonal excitability is decreased. IMAX is a parameter derived from the stimulus response curve. It is the minimal current intensity required to evoke a maximal compound muscle action potential (CMAP) response [2].

MATERIAL AND METHOD: We conducted axonal excitability studies in 40 healthy volunteers and 10 patients with CMT1A disease. Two techniques were performed in the median motor nerve with a simple ENMG device: iMAX which consists to find the minimal intensity require to evoke a maximal CMAP and double shocks technique which consists to apply paired pulse with varying interstimulus interval to study ERC.
RESULTS: IMAX was significantly increased in CMT1A compared to healthy volunteers ($p<0.0001$). ERC was impaired in CMT1A patients; ARP, superexcitability and late subexcitability were significantly decreased ($p=0.0001$, $p=0.0002$ and $p=0.036$ respectively).
Discussion and conclusion
CMT1A disease is a demyelinating peripheral neuropathy associated with major axonal excitability impairment. Change in passive membrane properties and modification of the distribution of ion channel due to demyelination could explain these changes in excitability.

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Cognitive Assessment During Inpatient Rehabilitation After Spinal Cord Injury

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OBJECTIVES: 1) to evaluate cognitive functioning of rehabilitation inpatients with recently acquired spinal cord injury (SCI) with the Montreal Cognitive Assessment (MoCA); 2) to compare the MoCA with the cognitive domain of the Utrecht scale for Evaluation of Rehabilitation (USER)

SETTING: First inpatient rehabilitation in a specialized rehabilitation centre in the Netherlands.

METHODS: Rehabilitation inpatients with recently acquired SCI were included between November 2020 and December 2021. The MoCA and the USER were administered within 2 weeks after admission. Descriptive statistics were used for all variables. The correlation coefficient between the MoCA and USER scores was determined and regression analysis was performed to analyse the associations between the MoCa and demographic and injury-related variables.

RESULTS: Included were 99 adults aged (median) 59.1 years (range 19.5-84.4), 67% male, 26% traumatic SCI, 64% paraplegic. MoCA and USER scores were available for 83 and 92 individuals, respectively. In 44.6 % of the participants, the MoCA score was below the cut-off. Age ($r = 0.31$, $p = 0.005$) and educational level ($r = 0.54$ $P < 0.00$) were significantly correlated to the MoCA score. The MoCA and the cognitive domain of the USER were moderately correlated ($r = 0.25$, $p = 0.03$).

CONCLUSIONS: Almost half of the inpatients scored below the cut-off score on the MoCA. Since the MoCA is a validated cognitive screening tool, the moderate correlation of the MoCA and the cognitive domain of the USER suggests that the USER alone is not sufficient in detecting cognitive deficits. We recommend to screen for cognitive deficits in all people with new SCI.

Tele-rehabilitation Strategies and Applications for Stroke Survivors in Clinical Practice

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Since the COVID-19 outbreak the approach towards patients and follow-up regimens has changed and tele-rehabilitation (TR) became a pillar for patients with ongoing recovery processes and rehabilitation strategies, notably for stroke survivors with spasticity. Rehabilitation services were delivered both in-person (conventional physical therapy program and radial extracorporeal shock wave therapy) as well as with the aid of a TR program for a stroke survivor suffering from right spastic hemiplegia and patellar clonus. The assessments were conducted remotely via a self-adapted treadmill and stabilometric equipment, both connected to the Internet. At discharge and at 20 weeks follow-up, the stroke survivor showed decreased spasticity grade, improvement in sensorimotor function, balance, functional mobility, clonus score, ambulation distance, and decreased pain intensity. The case highlights the utility of tele-rehabilitation strategies in complementing and enhancing the effects of conventional physical therapy (CPT) and radial extracorporeal shock wave therapy (rESWT) in post-stroke spasticity.
An additional software interface was designed to display parameters such as range of motion, spatiotemporal and kinematic variables of stroke survivors affected by lower limb spasticity undergoing a CPT program, rESWT intervention delivery, and real-time visual feedback balance training. The software platform can detect various movement and stance anomalies specific to the patient's condition and also calculate certain statistics of interest. The input data are the files acquired through medical devices for gait and balance assessment, namely Prokin stabilometric system and Walker View gait analysis system. The data can be displayed comparatively, at admission, discharge, and follow-up evaluations respectively, providing the users with easy access to track patients' progress landmarks and gives remote access to ensure continuity of tele-rehabilitation and tele-assessment for these patients. Additionally, for more advanced stages, the platform could be developed to target other conditions.

Eating Patterns Among Individuals With Fibromyalgia

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BACKGROUND: Fibromyalgia is a chronic disease characterized by chronic widespread pain, fatigue and other functional symptoms. Increasing attention is being paid to dietary and nutritional factors in relation to fibromyalgia symptoms.

AIM: The study aimed to investigate the energy and nutrient intake of individuals with fibromyalgia and assess whether alternative eating patterns are more commonly observed among them compared to the general population.

METHOD: Sixty fibromyalgia patients who were participating in an interdisciplinary rehabilitation programme were included into our study. They filled out the Questionnaire on the frequency of food consumption. We collected basic descriptive statistics.

RESULTS: We enrolled 60 patients (3 males and 57 females), average age was 50 years (SD 6 years, range 34-62 years) and an average body mass index (BMI) of 26.6 kg/m² (SD 3.9, range 18.5-37.5 kg/m²). None of the participants adhered to a vegan diet, 5 (8%) were lacto- (and/ or) ovo vegetarians, additionally four (together 15%) included lean beef or poultry in their diet only once a month. As for other protein-rich foods, 12 (20%) individuals abstained from consuming seafood (lower omega-3 fatty acid intake), two individuals avoided milk and dairy products altogether, and an additional six (13%) consumed a small portion of cheese only 1-2 times a month. Sweets were entirely avoided by six (10%) individuals.

DISCUSSION: Based on our sample, we could conclude that the population with fibromyalgia is diverse in terms of nutritional status (with an average BMI ranging between normal and overweight). Compared to the general population, individuals with fibromyalgia more commonly adopt alternative dietary approaches, eliminate nutrients they consider harmful, and pay increased attention to dietary planning.

CONCLUSION: Based on the research outcomes, we aim to enhance the planning of future nutritional interventions and refine the delivery of nutritional education within the existing program for more targeted impact.

Clinical Examination of Patients Underwent Total Arthroplasty Due to Osteoarthritis of the Knee or Hip

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BACKGROUND: Osteoarthritis (OA) is a progressive, degenerative joint disease accompanied by the qualitative and quantitative destruction of joint cartilage [1]. The risk of having three or more comorbidities in individuals with OA is two times higher compared to OA-free control groups [2].

AIM: We aimed to measure the determining factors regarding the success of rehabilitation with added emphasis on obesity, Type-2 Diabetes Mellitus (T2DM) and cognitive impairment (CI).

METHOD: 39 women and 21 male patients with OA (average age: 72,1±7,9 years) and 50 healthy, age- and gender adjusted individuals without hip/knee complaints and without prior history of arthroplasty (average age: 70,5±5,1 years) were taken into the research. During the assessment the following tests were executed: Mini Mental State Examination (MMSE), Mini Mental Clock Drawing Test (CDT), WHO-Quality of Life-BREF Intellectual Disabilities (WHOQOL-BREF), WHO-5 Well-being [6], Zung Depression Scale , Hamilton Anxiety Scale [8] and the Functional Independent Measure (FIM) test.

RESULTS: Out of 60 patients underwent knee or hip TEP 16 patients suffered from T2DM, 30 individuals were obese [Body Mass Index (BMI)>30kg/m2], 21 patients showed CI in the MMSE (MMSE<27 points) and 27 patients displayed signs of deteriorating cognitive skills in the CDT (CDT<8 points). More than half of the post-operative population (31 patients) demonstrated depression (Zung>39 points) [7]. 16 patients tested positive in the Hamilton Anxiety Scale (18 points or above) [8]. The FIM values assessed at discharge showed positive correlation ($p<0.002$) only with the MMSE results. T2DM patients have performed much worse in the MMSE ($p<0.004$), than patients without T2DM. Obese patients have not performed significantly worse in the MMSE ($p<0,248$). Furthermore, the Zung Scale and the Hamilton Anxiety Scale showed significant correlation with the MMSE ($p<0.018$; $p<0.046$). The control group performed significantly better compared to the subgroups underwent TEP in the CDT ($p<0.05$), however their performance was not significantly better in the MMSE. Furthermore, the results of the healthy control group were significantly better ($p<0.001$), in the following tests: Hamilton, Zung, WHO-5 and WHO-BREF compared to the patients underwent arthroplasty.

DISCUSSION AND CONCLUSION: CI might be the reason for limited rehabilitation in patients underwent total endoprosthesis due to advanced osteoarthritis. Neither obesity nor diabetes mellitus proved to be risk factors for limited rehabilitation, although our T2DM patients decreased cognitive performance may have a negative impact on the success of their rehabilitation. Deterioration of our TEP implanted patients' quality of life could be explained by the high occurrence of depression and anxiety compared with the control groups, which emphasizes the need of psychological consultation at rehabilitation wards.

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Randomised Evaluation of Early v Late cranioplasty: A Pilot Study

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BACKGROUND: Patients with significant brain swelling and/or raised intracranial pressure after TBI or stroke can undergo a decompressive craniectomy (DC) to help in management. Those who survive often require a second operation, known as cranioplasty. This aims to restore the integrity of the skull, giving a degree of mechanical protection with the timing of the procedure possibly having an impact on improved neurological outcomes.

OBJECTIVE: To undertake a single centre, pilot randomised study comparing two distinct time intervals for cranioplasty: early (within 3 months after DC) vs standard of care (more than 6 months after DC) collecting functional outcomes at 6- and 12-months following DC.

POPULATION: Adult patients (>16) who have undergone a DC for either TBI or stroke and who were clinically assessed for cranioplasty.

DATA: Functional outcome measured using GOSE (dichotomised: unfavourable (1-3) or favourable (4-8)) and functional independence measured by functional independence measure (FIM).

RESULTS: 14 patients randomised, 7 to each arm. At 6 months the number of patients with a favourable GOSE outcome in the early arm was 5/7 compared to 4/7 in the late group. Mean FIM total change increased by 27.7 (SD 26.94) (FIM motor 21.9, FIM cognitive 5.8) in early arm compared to 33.92 (SD 33.54) (FIM motor 26.42, FIM cognitive 7.5) in late arm. FIM efficiency was greatest in period with cranioplasty - 0.21 in early group compared to 0.13 in late group.

CONCLUSIONS: Although no definitive findings can be drawn, there is increase in the rate of functional independence following cranioplasty independent of timing. A further substantial study is required to evaluate any potential effect of timing on functional outcomes.

From Surgery to Recovery: The Impact of Kinesiophobia on Quality of Life and Pain-Related Measures After Total Hip Arthroplasty

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BACKGROUND: The outcomes of pain management and quality of life are important after undergoing total hip arthroscopy (THA) (1). Kinesiophobia or fear of movement is a psychological factor that can affect pain perceptions and physical activity responses (2).

AIM: This study aimed to investigate the relationship between kinesiophobia, pain-related measures, and quality of life in patients within the early stages following THA.

METHOD: The study included 96 patients divided into two groups of patients based on their kinesiophobia level on POD5 after surgery. Patient-reported outcome scores (PRO) were created by combining the pain scores and their impact on daily activities. To assess PROs, the validated International Pain Outcomes Questionnaire (IPO-Q) was utilized. Functional status was measured using the motor Barthel index and a 6-minute walking test (6 MWT). Kinesiophobia was measured with the Tampa Scale for Kinesiophobia (TSK). Health-related quality of life was rated with the EuroQol-5D (EQ5D) index score.

RESULTS: Patients with kinesiophobia had significantly worse pain outcomes on the IPO-Q composite score, lower quality of life and worse funcional outcomes compared to patients without kinesiophobia on POD5. Kinesiophobia was independently related to PRO2, 6MWT, Barthel score, and Eq5D in multiple regression analysis.

DISCUSSION AND CONCLUSION: The main finding of the present study was a verified relationship between kinesiophobia and PRO on POD5. Previously published works showed a significant statistical correlation between TSK score and pain rated on unidimensional scales (3,4). Best to our knowledge this is the first study that evaluates the influence of kinesiophobia on different domains of pain after THA. Futhermore our study higligts that kinesiophobia is associated with quality of life, independence level, and walking distance after THA which is in line with previous published work (5).
In conclusion, kinesiophobia significantly predicts pain after THA, and utilizing composite pain scores provides a more comprehensive understanding of the pain-kinesiophobia relationship. Kinesiophobia also has a significant impact on quality of life and functional performance in the early postoperative period after THA.

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Effectiveness of Digital Rehabilitation (SIMPLI.REHAB) in Hand Arthritis: A Randomized Clinical Trial

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INTRODUCTION: Rheumatoid Arthritis (RA) and Psoriatic Arthritis (PsA) are inflammatory osteoarticular diseases predominantly affecting the hand, a critical segment for the functionality of the upper limb. These conditions can lead to significant morphofunctional impairments, requiring physiatrist-led rehabilitation programs for the management and improvement of functional limitations. Recently, emerging technologies have enabled the innovative implementation of rehabilitation programs. This study assesses the efficacy of a rehabilitation program using the digital tool SIMPLI.REHAB, compared to a conventional rehabilitation program, in patients with RA and PsA.

METHODS: A experimental, prospective, single-blinded, superiority, and randomized study includes 35 patients divided into two intervention groups. One group will use the SIMPLI.REHAB digital tool on a smartphone for rehabilitation, while the other follows a conventional program. Each group consists of 6 patients, with the program duration set at 7 weeks.
Coordinated by a physiatrist, the rehabilitation program will include flexibility exercises, muscle strengthening, manual dexterity and motor coordination training, thermotherapy, joint protection principles, and, depending on the intervention group, home-based strategies provided by SIMPLI.REHAB. The primary outcome is functionality, assessed by the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire. Other metrics include pain, disease activity, joint ranges, grip strength, and manual dexterity evaluation. Results will be determined before and after the interventions.

DISCUSSION: The study will focus on the efficacy of integrating a digital tool with dynamic content into a rehabilitation program compared to a conventional approach for RA and PsA patients. Limitations may include follow-up losses and difficulties in accurately assessing adherence to the digital tool. However, the digital tool is expected to facilitate access to home-based strategies, potentially enhancing the functional benefits of rehabilitation programs.

Rehabilitation of Persons With Sequelae of COVID-19 and Peripheral Neuropathy

An Economic Evaluation of an Inpatient Multidisciplinary Rehabilitation Program for Hospitalized COVID-19 Patients: An Observational Case-Control Study

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BACKGROUND: During the Covid-19 outbreak, growing rehabilitation needs for hospitalized Covid-19 patients were highlighted. Indeed, respiratory, motor, cognitive, and psychological impairments were reported, directly impacting activities and participation [1]. Even if defined rehabilitation pathways were unavailable, the inpatient multidisciplinary rehabilitation program was proposed for hospitalized Covid-19 patients [2]. However, no economic evaluation is available so far to determine the cost-effectiveness of this intervention compared with other rehabilitation cohorts.

AIM: This observational, case-controlled study analyzed the inpatient multidisciplinary rehabilitation program's costs, income and cost-effectiveness in hospitalized, severe Covid-19 patients.

METHOD: We included patients admitted to the inpatient multidisciplinary rehabilitation program for Covid-19 sequelae at Ferrara University Hospital between April 2020 and September 2022. The CE-AVEC approved the study, and it was prospectively registered on Clinicaltrial.gov (NCT04615390). The CHEERS guidelines for economic evaluation reporting have been followed. An economic evaluation has been conducted. Specifically, a cost, income, and cost-effectiveness analysis were done. The management control office gave the costs. The income was based on the Emilia-Romagna region rates. Finally, cost-effectiveness was the ratio between costs and functional gains, measured with the changes in the Functional independence measures (FIM) during the inpatient stay and the Incremental Cost-Effectivness Ratio (ICER). All variables were compared with a historical control group. Moreover, the complexity of the rehabilitation needs was measured with the Rehabilitation Complexity Scale - Extended (RCS-E).

RESULTS: We included 53 Covid-19 patients (62 years, 77% males, 64 points FIM at admission and 10-11 points RCS-E) and 41 historical controls (62 years, 65% male). A multidisciplinary rehabilitation program costs about 15631,33 (10430,91) € for Covid-19 patients, whereas the historical group costs 18543,80 (8858,29) € ($p<0.05$). The 88% were direct costs (61% medical and health professionals salaries). The cost-effectiveness was superior for the Covid-19 group (375,75 € instead of 493,18 € /1 FIM point gained), and the ICER was 728 €. The patients' dependency and rehabilitation complexity level at admission significantly influenced the costs of the Covid-19 multidisciplinary rehabilitation program.

DISCUSSION AND CONCLUSION: The Covid-19 outbreak significantly influenced healthcare systems, including rehabilitation services, with the urgent need for new care models [2]. At Ferrara University Hospital, hospitalized Covid-19 patients with respiratory, motor and psychological sequelae and a low level of functioning received an inpatient multidisciplinary rehabilitation program. The economic evaluation revealed that the rehabilitation costs were significantly lower than a historical cohort and that medical and health professionals' salaries were the most prominent. Moreover, the level of dependency and complexity of rehabilitation needs significantly influenced the costs. Specifically, more severe patients with higher complexity had higher costs than others. Unfortunately, the ongoing reimbursement system would not consider these relevant differences. An increased cost-effectiveness has been found for Covid-

19 patients, and the main reason was that this population, with a similar level of complexity and disability at admission, recovered faster than the historical cohort.
In conclusion, an inpatient multidisciplinary rehabilitation program was appropriate and cost-effective. Furthermore, its crucial role in the rehabilitation pathways of hospitalized Covid-19 patients has been confirmed.

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Long Haulers, How Are Your Muscles? Ultrasound Assessment of Muscle Morphology Three Months After SARS-COV2 Infection in a Prospective Controlled Study

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BACKGROUND: Long Haulers; the Anglo-Saxon way to define individuals suffering from Post-Covid syndrome:
positive history of previous CoV-2 SARS infection associated, symptoms that last for at least 2 months and cannot be explained by an alternative diagnosis. Among these, myalgia is one of the main complaints [1]. Ultrasound examinations play a pivotal role in diagnosing neuromuscular problems due to their high predictive value: [2].

AIM: Quantify muscle echogenicity in post-Covid subjects using ultrasound images and measuring muscle echogenicity numerically comparing them with a healthy control group. Additionally, we monitored the evolution in echo intensity over time.

METHOD: A controlled, prospective study included hospitalized and non-hospitalized individuals with previous Sars-CoV-2 infections, along with healthy subjects. Ultrasound assessments were conducted at 3 months post-infection (T0) and 1 year (T1) after the first evaluation, scanning deltoid, rectus femoris, and tibialis anterior muscles bilaterally in transverse plane. We chose the areas of interest and measured muscle echogenicity numerically on a grey scale. Clinical and functional data about the acute phase were collected retrospectively: pre-Covid19 functional status (mod. ranking score), number and type of comorbidities, number and type of Covid19 complications, severity of pneumonia, recurrence of ARDS, neurological complications, need for pronation and oro-tracheal intubation, blood albumin, D-dimer, PCR, CPK, drug therapy, hospital stay (days). Prospectively post-Covid19 conditions were collected: vocational and occupational activity, cognitive, cardiopulmonary, hepatic and renal functions, central and peripheral nervous system functions, motor function and sensitivity, walking independence, dietary and swallowing disorders, pain, psychological function, weakness and fatigue, nictemeral rhythm. We carried out a comparative analysis between the two groups (Mann-Whitney test) and to assess the evolution over time in post Covid-19 subjects (Wilcoxon Signed Rank test). We then investigated correlation between each demographic, clinical and functional factor and the muscle echogenicity by simple regression analysis.

RESULTS: Fourteen subjects with prior Covid19 and 12 age, sex, comorbidity, weight-matched controls were enrolled. Comparative analysis revealed significantly increased echogenicity in post-Covid subjects at the deltoid ($Z=-2.5$; $p=0.01$) and tibialis anterior ($Z=-2.4$; $p=0.015$) muscles, which remained stable over time. In the group of post-Covid subjects, the univariate analysis showed direct correlation between echogenicity and age

($p=0.03$), pneumonia severity ($p=0.002$), D-dimer levels ($p=0.07$), hospital stay duration ($p=0.04$), post-Covid weight loss ($p=0.007$), inverse correlation with albumin levels ($p=0.04$). Moreover, an increase in muscle echogenicity resulted related with post-Covid emerging higher fatigue ($p=0.02$), worse recovery in ambulation independence (FAC scale score; $p=0.1$), higher score in BDI Scale

(p=0.006), worse SF-36 General Health domain score (p=0.02), lower level of social participation (p=0.01) and 6 Minute Walking Test distance (p=0.04). A trend towards increased echogenicity was noted in ICU-admitted subjects without reaching the statistical significance.

DISCUSSION AND CONCLUSION: These findings indicate that Sars-CoV-2 infection leads to altered muscle structure, primarily
associated with pneumonia severity, weight loss, leading to fatigue, reduced 6MWT distance and participation recovery. Preliminary data advocate for further, larger-scale investigations.

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A Multidisciplinary Rehabilitation Program Including Whole-Body Cryostimulation in Patients With Obesity and Post-COVID Condition

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BACKGROUND: Post-Covid condition (PCC) can reduce activity and quality of life, resulting in a significant socioeco-nomic and health burden. Understanding its impact on patients' health is important for the development of personalized rehabilitation interventions. An independent association between obesity and PCC was found because of complications and comorbidities.

AIM: The purpose of this study was to investigate the safety, acceptability and feasibility of a multidisciplinary personalized rehabilitation program including whole-body cryostimulation (WBC) in patients with obesity and PCC, admitted to a rehabilitation unit, and to provide additional data on WBC as an adjuvant treatment for functional recovery in PCC patients (1, 2).

METHODS: 16 patients with obesity and PCC symptoms (i.e., dyspnea, pain, poor sleep quality, muscle fatigue) admitted to the Istituto Auxologico Italiano, Piancavallo (VB), Italy, were recruited for a 4-weeks rehabilitation program including conventional exercise therapy, nutritional intervention, psychological support and WBC. Anthropometric data, cardiovascular parameters, blood tests and functional test scores were collected at baseline (T0) and within 4 weeks at the end of the rehabilitation protocol (T10).

RESULTS: Anthropometric data showed statistically significant changes in weight, waist circumference, and BMI, which were lower at discharge. Biochemical analyses showed a significant decrease in CRP, HDL, LDL, total cholesterol and glucose . Among the other parameters analyzed, no significant difference was found for triglycerides at discharge while a significant reduction in systolic blood pressure and heart rate but not in diastolic blood pressure was observed. There was a significant improvement in performance capacity as measured by Time-Up&Go test and distance walked on the 6-minutes walking test, a significant reduction in pain as shown by VAS pain, and an improvement in psychological well-being as measured by the PGWBI scale. The patients hospitalized at the Pneumology unit showed significant improvements of SpO2 basal evaluation.

DISCUSSION AND CONCLUSION The present study demonstrates the safety and the feasibility of a multidisciplinary rehabilitation program combined with WBC and provides some preliminary evidence in patients with obesity and PCC. Given the existing evidence of clinical and functional benefits following WBC in musculoskeletal, neurological, and psychological conditions (1,2), the addition of such treatment aims to improve the patient's overall physical performance and perceived quality of life.
In the absence of a control group, our results do not fully clarify the extent to which WBC, the multidisciplinary rehabilitation program, or a combination of the two may account for the observed improvements.
A multidisciplinary rehabilitation protocol including WBC designed for patients with obesity and post-covid condition is safe and feasible. The overall improvements demonstrate that multi-disciplinary

rehabilitation was effective on post-COVID patients and suggest that the use of WBC is safe and could play a role as a booster in rehabilitation programs.

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Efficacy of Ozontherapy in Patients with Post-COVID Syndrome

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BACKGROUND: It has been suggested that ozonetherapy may be used in patients who develop post-covid syndrome but, there is limited evidence regarding its usage (1).

AIM: The aim of the study is to investigate efficacy of ozone major autohemotherapy in fatigue, anxiety, depression, quality of life and quality of sleep in patients diagnosed with post-COVID syndrome.

METHOD: The study was designed a medical records review study. It was conducted at Başkent University Alanya Hospital in patients suffering from musculoskeletal system symptoms such as fatigue, joint pain, weakness, arthritis, who had previously been diagnosed with Covid-19 + (confirmed by PCR test) and lasted for 3 months. Patients who applied to the outpatient clinic and accepted 10 sessions of ozone major autohemotherapy with post-covid syndrome were included. Patients who did not accept the process, come to the therapy regularly or have contraindications for ozonetherapy were excluded from the study. Demographic data, Covid test results, previous diagnoses, medications, ozone therapy session-dose information, outpatient clinic control data and anamnesis information of the patients were obtained from the hospital database. The scores of FACIT Fatigue Scale, Beck Depression Scale, Beck Anxiety Scale, Pitsburg Sleep Quality Index, and Short Form-36 scores that were recorded before and after 10 sessions of ozone major autohemotherapy from the hospital system were compared statistically. $P<0.05$ was revealed as stattistically significant.

RESULTS: Totally 40 patients were analyzed. 32 of them were female and 8 of them were mail. 90% (n=36) of them suffered from fatigue, 30% (n=12) of them had arthritis, 10% of them described fibrofog, 5% (n=2) of them had muscle weakness after COVID infection as a complication. It was determined that both Beck Anxiety Scores and Beck Depression Scores were decrased after ozon application ($p<0.05$). Statistically significant decrease in FACIT scores were obtained after 10 sessions ozone major autohemotherapy ($p<0.05$). Additionally improvement in all subscores of Short Form-36 were determined after the ozone therapy ($p<0.05$).

DISCUSSION AND CONCLUSION: Post-COVID syndrome includes symptoms such as fatigue, shortness of breath, and cognitive dysfunction, but also others and generally have an impact on everyday functioning (2,3). It has been suggested that ozonetherapy may be used for the treatment of post-COVID symtoms (4). Tirelli et al. performed ozone major autohemotherapy in 100 patients diagnosed with Post-acute sequelae of SARS-CoV2 infection. They determined statistically significant improvement in Fatigue Severity Scale in 67% of the patients (1). The current study supports these findings as improvement was detected in fatique, anxiety, depression and quality of life parameters in post-COVID patients.

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Effect of Technological Rehabilitation Compared to Traditional Rehabilitation on Function and Quality of Life of Outpatients With Peripheral Neuropathies From Various Causes

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BACKGROUND: Peripheral neuropathies are an extremely common group of diseases worldwide, and they are often difficult to treat. The symptoms can be very debilitating, and often lead to polypharmacy, increase the risk of falls and decrease autonomy in activities of daily living, and thus often impair quality of life [1,2]. Management of this heterogenous group of pathologies definitely benefits from rehabilitation, physical therapy and exercise [3]. Technological tools have provided promising evidence so far, although further investigation in this clinical population is required.

AIM: The purpose of this study is to evaluate the effectiveness of technological rehabilitation with Riablo™ [4] compared to traditional rehabilitation in function in everyday life and in perceived quality of life in outpatients affected by peripheral neuropathies.

METHODS: The study design is a non-randomized controlled clinical trial, a study design with growing evidence of being better able to evaluate the effectiveness of interventions in a real-life setting compared to RCTs [5]. We selected participants affected by peripheral neuropathy from any cause that were able to be participate in physiotherapy in an outpatient setting. Both groups participated in daily 90-minutes rehabilitation sessions for five days a week for four weeks. While the first 60 minutes of therapy were the same for both groups (sensorimotor training, strength training and endurance training, personalized according to each patient's needs), in the last 30 minutes the traditional rehabilitation group added more resistance training and physical therapies, and the technological rehabilitation group used the Riablo™ with the supervision of a therapist. This system consists of 5 wearable IMUs and a stabilometric platform linked to a software that projects exergames on a screen. We chose the motor section of FIM (FIM-M) as a primary outcome measure, and SF-12 and VAS for pain and function as secondary outcome measures. A total of 18 patients were enrolled, and we analyzed 8 patients for the traditional rehabilitation group and 7 patients for the technological rehabilitation group.

RESULTS: The FIM-M measured at admission (T0) and at discharge (T1) improved in a statistically significant way in both groups. Also, a significant between-groups difference was found in FIM-M scores in favor of the traditional rehabilitation group, which showed wider improvements. As for the secondary outcomes, all of them improved significantly after the intervention, but there was no significant difference between the two groups.

DISCUSSION AND CONCLUSION: The unexpected result of FIM-M improving more in the control group could be partly explained by the lack of randomization of the patients, which led to a technological rehabilitation group composed by significantly younger patients with higher FIM-M at T0. Therefore, there may have been a plateau effect in the FIM-M. As for the rest of our results, we can reasonably conclude that rehabilitation is an important tool for the management of peripheral neuropathies from all causes,

as already outlined in the literature [3,6,7], but further studies are needed to prove the effectiveness of technological rehabilitation in this population.

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Strategies for Managing Guillain-Barre Syndrome Patients Who Require Long-Term Ventilator Support

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BACKGROUND: GBS causes progressive bilateral muscle weakness, and up to 30% of patients require invasive ventilation with 70% needing tracheostomy. There is no standard consensus on how to wean and remove the tracheostomy in long-term ventilator-dependent GBS patients due to varying rates of recovery.

AIM: Based on our experience, we propose management strategies to care for GBS patients with ventilatory insufficiency, aiming to minimize unnecessary invasive management and reduce the duration of invasive ventilatory management prior to weaning.

METHOD: We conducted a retrospective examination of the medical records of all GBS patients who were hospitalized and treated at Gangnam Severance Hospital between 2005 and 2022. All patients who received care with a mechanical ventilator were included in the study. We excluded 1) patients who did not use a ventilator, 2) patients who died before the weaning protocol was implemented, and 3) patients who were lost to follow-up before receiving sufficient treatment (less than 1month). As GBS patients typically exhibit a pattern of restrictive lung disorder, we developed our own weaning and decannulation protocol based on previous studies, incorporating airway evaluation, dysphagia testing, and the use of non-invasive ventilation (NIV) to manage these patients.

RESULTS: A total of 60 patients (41 males and 19 females) were identified and included in the analysis. The onset age of GBS was 54.7 ± 17.6 (8.8-85.7) years. Among them, 58/60 patients underwent intubation, and only 2 patients overcame respiratory failure with non-invasive ventilation without invasive ventilation. Fifty-five patients underwent tracheostomy, and 3 patients were able to turn off the ventilator directly in the intubation state. The time from disease onset to tracheostomy was an average of 5.2 ± 8.5 (median 3.0) days, and the follow-up period after disease onset was an average of 915.8 days (median 436.0 days). At the final follow-up, 41 patients (68.3%) achieved weaning and decannulation, while 9 patients (15.0%) used NIV, 5 patients (8.3%) used tracheostomy and ventilation, and 5 patients (8.3%) used tracheostomy without ventilation. The mean time from ventilator initiation to weaning for patients who were able to turn off the ventilator was 186.4 days (median 183.0 days), and the mean time for ventilator discontinuation was 261.9 days (median 372.5 days). Eight patients used the ventilator for more than a year. A total 26 patients (63.4%) used NIV as a bridge therapy, and the duration of NIV use ranged from 3 to 353 days (mean 119.2 days, sd 93.6 days). Among them, 15 patients had to use NIV for more than 2 months.

DISCUSSION AND CONCLUSION: Many GBS patients require long-term ventilator support, and non-invasive ventilation (NIV) can be helpful in both providing ongoing care and serving as a bridge therapy for ventilator weaning. The protocol presented in this study is effective in managing long-term ventilator-dependent GBS patients.

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Lower Limb Amputations and Prosthetics 1

Powered Hip Joint Control for a Hip-Knee-Ankle-Foot Prosthesis

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BACKGROUND: A novel powered hip joint for people with hip-level amputations was designed, simulated, and prototyped. The Össur Power Knee motor was modified to transfer motor torque to the hip. The motor, battery, and electronics were located in the thigh, thereby fitting under pants and enabling sitting. A prototype powered hip unit passed ISO 15032:2000 mechanical tests (100 kg user loads). Pilot testing involved three able-bodied individuals walking on the prototype hip-knee-ankle-foot prosthesis (Power Hip, Össur Rheo 3 knee joint, Össur Pro-Flex XC foot) using a prosthesis simulator [1]. A basic control system was used for initial testing, with a pre-set hip rotation pattern. An advanced control system is needed, that can address the challenge of determining appropriate hip movements with only pelvis movement and prosthesis sensors as input. Other lower limb prostheses have user initiated thigh or thigh-shank kinematics to help determine the desired movement, but the powered hip prosthesis can only use pelvis movement as user-initiated input).

AIM: The aim for this research was to create and pilot test walking controls for a novel powered hip joint that can be attached to the prosthetic socket.

METHOD: Preliminary research involved creating a control-model that related relevant pelvis movement features to hip angles, thereby providing a means of defining appropriate powered hip moments during the gait cycle. Input for the controller included pelvic tilt angular velocity (IMU sensor at joint-socket interface), motor angle, thigh angle (IMU sensor inside power hip chassis), and forces on the chassis. The control-model was used to define swing phase initiation, termination, and swing phase duration.
For people with an intact thigh, cadence and stride length are determined by the user changing their thigh kinematics. For the powered hip, cadence was calculated from the control-model. The hip range of motion, hence the stride length, was then tuned based on an adjustable non-linear factor that defined the person's preference between changing walking speed by changing stride length or changing gait-cycle time.

RESULTS: Two able-bodied participants successfully walked with variable cadence on the hip-knee-ankle-foot prosthesis. This was an iterative evaluation process where improvements in the control software were implemented and evaluated by comparing kinematic output from the power hip device (i.e., hip angle, forces, pelvic tilt, etc.). If the person stopped walking for more than a user-specific period, the activity state was changed to standing (i.e., walking terminated).

DISCUSSION AND CONCLUSION: This research has created the first viable powered hip joint for people with hip disarticulation or hemipelvectomy amputation. The new control system enabled variable cadence walking and gait termination. Gait initiation, sitting, and standing required additional control methods that were also completed but are outside the scope of this abstract. Current research by our team involves refining the intelligent microprocessor-control system and evaluating device performance with hip amputee participants.

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Benefits of Pre-fabricated Socket in Primary Prosthetic Fitting in Patients With Transfemoral Amputation – Preliminary Resultsl

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BACKGROUND: People after lower limb amputation have lower quality of life compared to the general population (1). Quality of life is better in those who are more mobile (2), so fitting with a prosthesis might improve it. If patient is a candidate for fitting a prosthesis, it is important that they get it as soon as possible. Conventional socket fabrication takes time, so pre-fabricated prosthetic socket might be a solution.

AIM: The aim of our study was to compare fitting time with a trans-femoral prosthesis between conventional fabricated socket and pre-fabricated socket (TF Connect, Össur).

METHOD: Thirty patients after trans-femoral amputation who are candidates for first fitting with a prosthesis and fulfil inclusion criteria (amputation of one lower limb only, expected activity level K1-2, weight 40-125kg, silicon liner size 28-45, stump length 205-280mm, 18 years or older) are being included and randomly divided into experimental (TF Connect) and control (conventional fabricated socket) group. Except the socket, all prosthetic components have the same function. The primary outcome is the time from casting for prosthesis to actual fitting. Secondary outcomes are the number of adjustments, side effects and result of the six-minute walk test (6MWT).

RESULTS: Since the beginning of the study, we have admitted 29 patients with trans-femoral amputation; 11 were not candidates for fitting prosthesis, and among the remaining 18, ten did not fulfil the inclusion criteria (4 not the first prosthesis, 3 need silicon liner of another size, 2 have amputation of the other leg, one was expected to be K3). Among the eight eligible patients, two did not want to participate, three were in the experimental and three in the control group. Five were men. All patients in the experimental group got their prosthesis the day after fitting. For those in the control group, this time was from three to ten days. The prosthetist needed from zero to 7.5 hours for adjustments in the experimental group, and 20 hours on average in the control group. One patient in the experimental group was not able to don the prosthesis, so he was excluded.

DISCUSSION AND CONCLUSION: We will present the data on all patients included until the beginning of the congress. Based on the present results, one third of our patients with TF amputation are not candidates for prosthesis. Among the rest, there are only a few for whom the TF Connect prefabricated socket is appropriate. In this small group of patients, the experimental group got their prosthesis quicker and the prosthetist needed less time for adjustments. However, one patient was not able to use the TF Connect socket. For any reliable conclusion, we need to include more patients.

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A Smartphone-Based Algorithm for L Test Subtask Segmentation Applied to a Lower Limb Amputee Population

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BACKGROUND: Subtask segmentation of functional mobility tests can provide useful outcome measures such as fall risk and movement quality in patient populations. A novel algorithm to segment the L Test of Functional Mobility into stand-up, sit-down, walk, and turn subtasks has previously been designed and showed good results on an able-bodied population [1]. The algorithm uses a sliding window technique to move through the data and identify where the magnitude change and standard deviation have exceeded a threshold set to be five standard deviations above the mean of applicable signals across four walking strides. The original algorithm produced satisfactory results (> 97% accuracy, > 98% specificity, > 74% sensitivity, > 79% precision, and < 355 ± 0.237 s duration error) for all subtasks; however, the algorithm must be assessed for clinical relevance before using this method on data from a lower-limb amputee population.

AIM: The aim of this research was to assess the viability of a previously designed algorithm using data from a lower-limb amputee population.

METHOD: Data was collected from a lower-limb amputee population (31 male, 19 female) at the University Rehabilitation Institute in Ljubljana, Slovenia. A smartphone was attached to the participant's posterior pelvis via a custom belt. A custom app on a Samsung Galaxy S10+ Smartphone recorded inertial sensor data at 60 Hz. Each participant completed one trial. Video recordings were taken of the participants completing the L Test and ground truth time stamps of events of interest were determined from the video. Data were synchronized using timestamps of three foot strikes from the video and accelerometer data. The threshold-based model was applied to the pre-processed smartphone data and the subtask transition times were compared to the ground truth.

RESULTS: The algorithm produced good accuracy (91-98%) and specificity (96-99%) results across all subtasks. However, sensitivity results were much worse than results for the able-bodied test group (25-78%). Qualitative observation of the amputee participant videos showed different strategies for turning and sitting. People with crutches also had a different standing pattern.

DISCUSSION AND CONCLUSION: This research shows the applicability of an algorithm designed for able-bodied individuals in a lower-limb amputee population. Further research is required to develop new threshold algorithms for the amputee population. Other modelling methods may be required, such as machine learning to accommodate the variety of strategies used to complete each of the subtasks. With the importance of the L Test for amputee outcome measures, this research has potential to enhance clinical decision making.

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Amputation in Patients With Crps in the Lower Limbs – Experience From West Midlands, UK

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BACKGROUND: Complex regional pain syndrome (CRPS) is a chronic neurologic condition with multiple disabling symptoms - severe neuropathic pain, vasomotor dysfunction, skin ulceration, and infection and autonomic instability. Treatment modalities include medications, physical therapy, psychological therapy, and neuromodulation but it is very difficult to treat, and outcomes are usually unsatisfactory.
Amputation is often requested by patients in refractory cases but there are concerns of recurrence of CRPS, residual/phantom pain and worsening disability. The chances of with functional ambulation with prosthesis as well as the success with pain relief seem to be limited. Hence, many believe that amputation for CRPS is unlikely to have a better outcome.
National guideline suggests amputation may be considered in a selected group of patients following a thorough multidisciplinary assessment and evaluation of all risk factors. Amputation of the diseased segment of the limb offers the patient the unique prospect to turn around the natural history. It may put an end to the recurrent intractable infections. Patient can regain functional ability including ambulation and quality of life though it does not guarantee with pain relief. It is crucial to have a pre-amputation consultation with the multidisciplinary amputation rehabilitation team to have an open discussion of the caveats and risks associated with amputation and set realistic functional goals and a clear plan for rehabilitation from the start.
West Midlands Rehabilitation centre is a regional tertiary Prosthetic and Amputee Rehabilitation Centre which provides complex rehabilitation to people with amputation including those with CRPS.

AIM: The aim is to evaluate outcomes of our patient cohort at West Midlands Rehabilitation Centre and establish references for future consultations.

METHOD: It is a retrospective study. Electronic and paper medical records were reviewed. Inclusion criteria – Patient with formal diagnosis of CRPS who had undergone lower limb amputation and were referred to WMRC during February 2016 – March 2022.

RESULTS: We reviewed 12 patients – Age (19 - 65 years), Gender (Male=5 Female=7), Level of amputation (transfemoral=5, through knee= 2, transtibial=5) and sides (unilateral= 10, bilateral= 1). The event leading to CRPS varied from surgeries, crush injury to nerve damage.
8 had pre-amputation consultation with us. Primary goals for amputation were wound complications=4, pain relief=3, specific physical activities=2, walking=2 and dystonia=1. 11 out of 12 achieved primary goals. 2 from 5 wheelchair bound patients progressed to prosthetic walking. Those who were walking before amputation either improved
or maintained ambulation, but one chose to be a non-limb wearer. Pain at 1 year after amputation was phantom (3), and stump (3).

DISCUSSION AND CONCLUSION: Most people with CRPS who have undergone lower limb amputation achieved their primary goal of having amputation. The keys to this achievement are setting realistic functional goals other than just pain relief, and frank discussion at comprehensive pre-amputation consultation with MDT support through the different stages of rehabilitation.
Amputation is a life changing surgery and should be considered as a positive intervention in selected cases of refractory CRPS.

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Interesting Case Presentations 2

The Value of the Communication Among the Members of the Physicial Medicine and Rehabilitation Team for the Early Diagnosis and Treatment of Possible Complications: Case Report

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BACKGROUND:: Hospitalized patients in a PRM clinic with severe neurological deficits, after their initial evaluation and their integration in the rehabilitation program with specific goals, they should be regularly re- evaluated

AIM: The doctors and the therapists of the rehabilitation team have a very important role in order to prevent, detect and treat any possible complication of the patients.

METHOD: A 47 year old female patient, hospitalized in the PRM clinic of our hospital with left pyramidal syndrome, mild cognitive deficits (Minimental score 23/30) and uncapable of self-care with a Barthel score index of 7/100, due to a ruptured aneurysm. At her initial hospitalisation at the Neurosurgery department, she was undergone a placement of endovascular coil and due to acute hydrocephalus and external ventricular drain was placed (EVD). Then the EVD was replaced with an abdominoperitoneal drain.
During her PRM program she had a stable clinical state for 2 months, till a progressive deterioration of her mental function, including inability to cooperate with the doctors, nurses and other therapists. A contrast-enhanced MRI brain was performed which depicted marked ventricular dilatation with periventricular edema around the lateral ventricles. Increased cortical signal in the right frontal white matter, without contrast enhancement was a finding compatible with cortical necrosis.
After communication with the neurosurgery clinic, it was decided to transport the patient and undergo surgery again to change the abdominal peritoneal drainage. At the neurosurgery department, the patient was operated in order to change the abdominoperitoneal drain and establish normal cerebrospinal fluid flow.

RESULTS: The post-op brain CT showed good results and her clinical picture was stable as far as her cognitive status. The patient returned to our PRM clinic and follows the program without any disturbances.

DISCUSSION AND CONCLUSION: The regular monitoring and assessment of the patients and the daily communication and cooperation among the doctors and the therapists of the PRM program (physiotherapists, occupational and speech therapists) is essential for the proper management, safety and clinical progress of the patients.

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The Impact of Prolonged Early Rehabilitation on the Outcome of Severe Traumatic Brain Injury – Case Report

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BACKGROUND: Traumatic brain injury (TBI) is becoming a silent epidemic, which significantly burdens health systems throughout the world because it leaves motoric, functional, cognitive, and psychosocial consequences.

AIM: to examine the impact of prolonged early rehabilitation on the outcome of treatment of traumatic brain injury.

METHOD: A 19-year-old patient with severe TBI was treated at the University Clinical Center of the Republic of Srpska, Banja Luka, Bosnia and Herzegovina in the period from May 25, 2023. until 06.07.2023. years. Extended early rehabilitation started on the tenth day after admission, kinesitherapy was carried out twice a day, lasting 45 minutes, 7 days a week. As a measure of treatment outcome, the following scales were monitored: Glasgow Coma Score (GCS), Barthel Index, Functional Independence Measure at admission (FIM), 15, 30 days and 42 days at discharge, Glasgow Outcome Scale (GOS) at discharge.

RESULTS: GCS values were 6 (on admission), 9 (15 day), 10 (30 day), 12 (on discharge). Barthel index 0-0 (complete dependence), 8 (complete dependence), -65 (moderate dependence). FIM was 18-18-32 (full assistance), 75 (partial dependence), GOS at discharge 2 (mild deficit).

DISCUSSION AND CONCLUSION: There are still no clearly defined standards on the start time, intensity, and duration of early TBI rehabilitation. Deciding about the start time, intensity, and duration is based on the individual tolerance of early rehabilitation with a multidisciplinary approach. There is a positive correlation between the intensity of early rehabilitation and the outcome. Timely, individually dosed prolonged early rehabilitation is an important link in the treatment of patients with TPM because it improves the functional outcome, quality of life, and thus the successful return of the patient to work and to the wider community.

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Multidimensional Robotic Rehabilitation Application for Severe Acquired Brain Injuries: A Case Report

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BACKGROUND: Robotics is playing an increasingly important role in rehabilitation therapy. For conditions like stroke, research has shown positive effects on both motor and cognitive functions (1). However, there is limited evidence in the medical literature about the use of robotic therapy for patients with severe Acquired Brain Injury (sABI).

AIM: This report describes the early use of robotic rehabilitative treatment for a complex patient with post-traumatic coma sequelae after a severe traffic accident.

METHOD: The patient, a 65-year-old man, experienced post-traumatic coma due to a severe traffic accident. He underwent a combination of traditional rehabilitative treatment and multidimensional robotic training. His injuries included brain hemorrhage, multiple rib, pelvic, and left tibia fractures, as well as a D7 vertebral body fracture requiring surgery. Initially, he had a Coma Recovery Scale-Revised (CRS-R) score of 4, indicating non-responsive wakefulness. Six weeks after the accident, he was transferred to the Severe Acquired Brain Injury Rehabilitation Unit. The robotic treatment focused on specific muscle groups in the upper limbs and trunk. Initial assessments showed limited movement in the right upper limb but preserved grip strength. The left upper limb had some muscle contractions, shoulder and elbow movement, pronation-supination, and grip strength. Neuropsychological evaluation revealed apathy, attention-executive function deficits, and a lack of integration of the left upper limb into daily activities. Initial robotic rehabilitation involved "Pablo with Multiboard" and "Joystick" to stimulate limb movements and grip strength. The treatment was later expanded to include the "Diego" robot for both upper limbs and individually for the left upper limb. Various clinical-functional scales were administered before (T0) and after (T1) rehabilitation: Coma Recovery Scale-Revised (CRS-R), Level of Cognitive Function (LCF), Motricity Index (MI), Trunk Control Test (TCT), Functional Independence Measure (FIM), and Disability Rating Scale (DRS)

RESULTS: Improvements were observed in functional scales. T0: CRS-R off the scale, LCF 4, MI right 91/100, left 45/100, TCT 0, FIM 24, DRS 17/7. T1: CRS-R off the scale ,LCF 8, MI right 99/100, left 65/100, TCT 36, FIM 62, DRS 8/5. After around 30 days of integrated rehabilitation, there was an improvement in compliance, attention, integration of the left upper limb in daily activities, mood tone, and tolerance for a seated position in a wheelchair (from 15 minutes to over 5 hours). The patient also became more interested in robotic rehabilitation, which allowed self-assessment of progress, increased self-esteem, and a better understanding of capabilities and limitations

DISCUSSION AND CONCLUSION: This study demonstrates the feasibility of intensive rehabilitative treatment using a multidimensional robotic approach alongside conventional treatment. While further data are needed, this therapy may help achieve motor and cognitive goals in this specific group of patients with complex rehabilitation needs

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Modified Constraint-Induced Movement Therapy for a Child With Amniotic Band: A Case Report

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BACKGROUND: This case report describes the use of modified constraint-induced movement therapy (mCIMT) to improve upper-limb function in a 12-month-old baby girl with right lesion of the nervous plexus due to an amniotic band. mCIMT is a rehabilitative strategy that is used usually post-stroke to overcome upper limb impairments of patients with neurological dysfunctions (1).

AIM: The purpose of the present case report is focusing on the use of mCIMT on upper limb function in patients with peripheral nerve injuries to stimulate further studies in this area.

METHOD: The gestational age at birth was 28 weeks with perinatal hypoxic-ischemic damage. The child had Amniotic Band Syndrome (ABS) involved the right upper limb and it was managed with surgical intervention the fourth day after birth. At 1 year old the patient was referred to our hospital. The ENG/EMG examination showed: axonotmesis of the left ulnar and radial nerve> median nerve, severe chronic muscle denervation with cortical reorganization processes. The right upper limb was positioned in a flexed and pronated position of both elbow and wrist with semi-flexed and ulnar deviated fingers. The child was not able to oppose the thumb in gripping tasks and attempted to crawl but she was not able to maintain quadruped position. The rehabilitative program included: 1) intensive supervised mCIMT training delivered for 2h/day 2) specific tasks to practice at home 2h/day with a constraint mitt on the unaffected side 3) specific training for postural tasks without a constraint mitt 1h/day over a 2-week intervention period.

RESULTS: The joint Range Of Motion (ROM) and the functional use of the right upper limb improved after 2-weeks training period mCIMT. She increased bimanual use and hand supination skills, index finger extension adapted for pointing gesture. Furthermore her grip configuration to object properties improved.

DISCUSSION AND CONCLUSION: Recent studies show some neonates with neglected arm refuse to use it, even if the muscle function is restored (2). In literature there are some studies that show mCIMT is an effective method in improving hand function during chronic stages of median and ulnar nerve injury and repair (3). This case report highlights interesting perspectives for the future in fact implementation of mCIMT in a routine rehabilitation process of patients with peripheral nerve injuries may be helpful.

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A Case Study of the Use of Intensive Visual Stimulation in a Patient With Dementia and Corticobasal Syndrome

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BACKGROUND: The Intensive visual stimulation (IVS3) system is computerised technology, based on artificial inteligence and principles of action observation, motor imaginery and mirror therapy. It promotes brain plasticity and thus supports upper limb rehabilitation.(1)

AIM: To apply the IVS3 to a patient with corticobasal syndrome (CBS) due to Alzheimer's disease (AD).

METHOD: A 64-year-old right-handed female with a five-year history of memory lapses and word-finding difficulties and three-year history of progressive impairment of skilled movements of the right hand, was referred to Occupational Therapy (OT). She also had mild right.sided cortical sensory deficits and occasional mild myoclonus of her right hand. Her cognitive deficits fulfilled criteria for mild cognitive impairment. She was diagnosed with CBS based on the clinical phenotype. The diagnosis of AD was based on the cerebrospinal fluid biomarkers.(2) During OT, she was included into 20 out-patient sessions with IVS for 30 minutes with additional activities of daily living training and counselling. She was assessed by the Canadian Occupational Performance Measure (COPM) and Box & Blocks test (BB). COPM is a semi-structured interview, providing patient's perception of performance and satisfaction with their performance of meaningful daily activities.(3) BB measures unilateral gross manual dexterity.(4) Writing, being also one of her chosen activities, was additionally assessed with a writing task.

RESULTS: She prioritised the following activities: writing, playing with cards, nail care. The average initial COPM-performance score was 4,6/10; the average initial COPM satisfaction score was 4,0/10. After OT sessions, the average COPM-performance score was 6,6/10, and the average COPM-satisfaction score was 7,0/10. BB scores for the right hand changed from the initial 36 to 44 out of 76,1±6,9, and for the left hand from the initial 44 to 49 out of 73,1±6,4. Before OT, she was able to hold a pen and write a few unrecognisable words for 3 minutes only. After OT, she was able to hold a pen and write for up to 20 minutes, and her writing within three minutes was better organised and readable.

DISCUSSION AND CONCLUSION: By introducing the IVS3, the patient was engaging her hands more in her daily tasks. The transfer of learnt skills was enhanced with additional counselling and training about safe performance of daily activities. Further, IVS3 was well accepted and is promising in terms of improving patient's perception of her performance and satisfaction of meaningful and chosen tasks. It also improved gross manual dexterity. This case report suggests that IVS3 could be beneficial in CBS due to AD. Future case-control studies are necessary to confirm this, as well as to verify if IVS3 could also be applicable to CBS due to other pathologies.

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A Unique Case Report of Plantar Fibromatosis and Entrapment of the Third Digital Branch of the Medial Plantar Nerve

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BACKGROUND: Plantar fibromatosis (Ledderhose disease) is a rare fibrous tissue proliferation within plantar fascia that can be painful per se or become symptomatic due to compression of the adjacent structures. In literature plantar nerve entrapments are underreported and there are very few case reports concerning plantar nerve neuropathy due to plantar fibromatosis (1), which makes it difficult for physicians to diagnose.

AIM: To evaluate plantar and tibial nerve damage as a possible cause of sensory loss of 2nd web space in the foot as well as evaluate changes in foot pressure distribution and leg alignment.

METHOD: 47 years old female presented with a sensory loss and paresthesia of the 2nd web space of the foot for several years. Diagnostic ultrasound examination was performed using Canon aplio i600 ultrasound system with linear (7-14 MHz) and hockey stick (17Mhz) probes. Tibial nerve with its divisions of medial and lateral plantar nerves were scanned in full length. Foot soft tissue was evaluated according to EURO-MUSCULUS/USPRM basic scanning protocol (2). Podometry was performed with pressure platform RSscan footscan.

RESULTS: Plantar fascia focal, hypoechoic, slightly inhomogeneous, avascular thickening up to 0,3 cm over distal, medial side of the foot was noted. It was in proximity of the third branch of medial plantar nerve, where nerve exhibited focal swelling and a loss of characteristic echostructure. Local pressure was applied and patient's characteristic paresthesia in the 2nd web space was evoked (positive sono-Tinel sign). Other branches of plantar nerve and tibial nerve were normal. Plantar fasciitis and Achilles tendon enthesitis with characteristic sonographic changes was found as well. With podometry foot valgus position and hyperpronation was found, as well as secondary leg length discrepancy due to the scoliosis.

DISCUSSION AND CONCLUSION: Up to date literature of the plantar nerve entrapments due to the plantar fibromatosis has been extremely scarce. Here we demonstrate a unique case of the medial plantar nerve's third digital branch entrapment due to the plantar fibromatosis. This case demonstrates ultrasound as a useful tool in clinical examination of the plantar nerve pathologies, as it provides high resolution evaluation of the nerve and surrounding soft tissue. Podometry provides additional information regarding foot pressure distribution and leg alignment, which accordingly might be used in treatment planning. Foot sonographic examination in combination with podometry allows to develop individual insoles to reduce the pressure over the plantar fibromatosis zone that accordingly might reduce the symptoms. We suggest that combination of both methods provides a useful diagnostic and treatment value.

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Robotics in Clinical Practice

Effect of Intermittent Theta Burst Stimulation and Repetitive Transcranial Magnetic Stimulation Combined with Robotic Rehabilitation on Ambulation and Lower Extremity Motor Function in Chronic Spinal Cord Injury Patients

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BACKGROUND: Neurophysiological studies have showed that intracortical inhibition decreases in patients who has motor functional recovery, after spinal cord injury. Aim of applying Transcranial Magnetic Stimulation (TMS) in spinal cord injury rehabilitation is to modulate cortical excitability, reduce cortical inhibition and organize maladaptive plasticity.

AIM: To research the effectiveness of intermittent Theta Burst Stimulation (iTBS) and repetitive Transcranial Magnetic Stimulation (rTMS) combined with robotic rehabilitation on ambulation and lower extremity motor function, in patients with chronic incomplete spinal cord injury that had a functional disability.

METHOD: 20 patients with chronic incomplete spinal cord injury were included in the study. The patients were randomly divided into 2 groups: rTMS group (n = 10) and iTBS group (n = 10). The first group underwent 10 sessions of high frequency rTMS, targeting the lower extremity motor area (M1) with a conventional rehabilitation program. The second group underwent 10 sessions of iTBS, targeting the lower extremity motor area (M1) with a conventional rehabilitation program. In addition, patients in both the rTMS and iTBS groups were included in a simultaneous 10-session robotic rehabilitation program in addition to the TMS application. Patients were assessed before treatment, after treatment, and 4th week after treatment, a total of 3 times. Lower Extremity Motor Score, Walking Index for Spinal Cord Injury, Spinal Cord Independence Measurement, 10 Meter Walking Test, Time Up and Go Test, and Motor Evoked Potential measurement were used as outcome measures in the study.

RESULTS: As a result, 10 sessions of rTMS and iTBS combined with robotic rehabilitation therapy in patients with chronic incomplete spinal cord injury was found to be beneficial in lower extremity motor functional recovery and ambulation, in addition, this recovery lasted at least 4 weeks ($p<0.05$). It was determined that rTMS and iTBS applications were not statistically significantly superior to each other in terms of ambulation, motor functional recovery, and improvement in daily living activities ($p<0.05$).

DISCUSSION AND CONCLUSION: It has been determined that rTMS and iTBS, two different patterns of TMS applied with robotic rehabilitation, are not superior to each other in terms of lower extremity motor functional recovery and ambulation in patients with chronic incomplete spinal cord injury. However, studies with larger samples are needed in which imitation TMS application is added to evaluate its superiority over robotic rehabilitation applied alone.

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Robotic Gait Training and Botulinum Toxin Injection Improve Gait on Chronic Post-Stoke Adults: A Randomized Controlled Trial

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BACKGROUND: Improvement of walking ability is one of the most frequently reported goals of individuals after stroke. Intensive rehabilitation, such as robotic rehabilitation, can improve walking ability. Spasticity that occurs after a stroke can make walking more difficult. Intramuscular injection of botulinum toxin type A can be combined with non-pharmacological interventions as part of a multidisciplinary rehabilitation program to optimize individuals' walking abilities1. Previous studies compared robotic rehabilitation after botulinum toxin injection versus no non-pharmacologic intervention or using conventional physiotherapy in both groups2-3.To our knowledge, there is no comparison between the efficacy of robotic rehabilitation or conventional physiotherapy combined with botulinum toxin injection.

AIM: Comparing robotic gait training with conventional physiotherapy after botulinum toxin type A injections in the plantar flexors (at least in the triceps surae), through a randomised controlled trial.

METHOD: Chronic stroke patients with triceps surae spasticity causing gait dysfunction were included. Patients were randomised into 2 groups, after botulinum toxin injection performed on the triceps surae under electrostimulation tracking by an experienced operator. If necessary, other plantar flexor muscles or the extensor hallucis longus could have been injected. Group A received robotic gait training (Lokomat®) for 2 weeks, followed by 2 weeks of conventional physiotherapy. Group B received the same intervention in reverse order. This study was designed so that both groups would receive RGT and CP to increase the acceptability to the participants. The 6-minute walk test (6MWT) was chosen to measure the efficacy of gait training.

RESULTS: A total of 34 participants were enrolled and randomised into two groups. During the first period, i.e. between W0 and W4, Group A underwent robotic gait training and Group B underwent conventional physiotherapy. After the first period, the 6MWT increased significantly more in Group A than in Group B: the mean difference between the interventions was 33m (95%CI 9; 58 p=0.007; g=0.95), in favor of Group A; after the second period, the 6MWT increased in both groups, but the difference between the groups still remained at 30m (95%CI 5; 55 p=0.019; g=0.73).

DISCUSSION AND CONCLUSION: Robotic gait training, performed 2 weeks after BTx-A injection, increased walking capacity in chronic post-stroke patients more than conventional physiotherapy.

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Therapeutic Effect of the Use of an Assistive Wearable Soft-Robotic Glove Supporting People With Impaired Hand Strength During Activities of Daily Living on Hand Function

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BACKGROUND: Various patient populations, such as trauma and rheumatoid arthritis, experience difficulties in performing activities of daily living (ADL) due to reduced hand strength(1-3). A wearable soft-robotic glove supports the hand during ADL by strengthening grip. Previous studies in elderly with self-perceived hand problems showed, besides direct assistance, improved unsupported hand function after 4-week use.

AIM: To assess the therapeutic effect of a grip supporting soft-robotic glove (Carbonhand) as an assistive device at home during daily activities on hand function.

METHOD: A multicenter uncontrolled intervention study was conducted with three pre-assessments, and post and follow up assessments (1 and 4 weeks after intervention)(4). Eight Dutch rehabilitation centers recruited 63 participants with chronic decreased hand strength resulting from various disorders. All participants used Carbonhand for six weeks during ADL at home. Outcome parameters (grip strength, Jebson-Taylor Hand Function Test and Action Research Arm Test) were related to unilateral hand performance and all measurements were performed without Carbonhand system.

RESULTS: Significant improvements (difference pre-post) were found for grip strength (1.9 ±4.2 kg; p=0.002) and hand function, both measured by the Jebson-Taylor Hand Function Test (-7.7 ±20.8 sec; p=0.002) and Action Research Arm Test (+1.0 (±2.5) points; p≤0.001). Improvements persisted at follow up. Pinch strength improved slightly in all fingers over six-week glove use, however these differences didn't achieve significance. Participants used the soft-robotic glove for a total average of 33.0 (±35.3) hours, equivalent to 330 (±354) min/week or 47 (±51) min/day.

DISCUSSION AND CONCLUSION: Unsupervised use of a grip supporting soft-robotic glove as an assistive device for six weeks at home resulted in a therapeutic effect on grip strength and hand function. These improvements were generally sustained, or even improved, at follow-up. In addition, the observed glove use time showed that this wearable, lightweight glove was able to assist participants with the performance of daily tasks for prolonged periods. This implies that smart assistive devices can offer a hybrid type of support: assisting ADL where needed, while stimulating and motivating active and highly functional movements within the user's possibilities.

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Robotic Device for Off-Site Post-stroke Hand Rehabilitation and Diagnostics

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BACKGROUND: Stroke is the leading cause of permanent disability in the developed world. Recovery of the upper limb's motor abilities, particularly the fingers, is crucial for everyday fine motor activities. The delayed onset of hand movement rehabilitation and the onset of finger and wrist spasticity negatively affect rehabilitation success. The shortage of therapists, the increasing prevalence of chronic diseases, and population ageing motivate the development of robotic rehabilitation devices [1].

AIM: The goal was to develop a robotic device for finger and wrist movement rehabilitation after a stroke, targeted at off-site or home use. We aimed to address the issues of spasticity and limited finger and wrist movement, typical consequences of stroke. Such devices must be safe, adaptable to patients' various hand dimensions and degrees of impairment, portable and cost-effective [1, 2]. Another aim was to identify other potential device applications in the healthcare field.

METHOD: The robotic device features a unique mechanism, actively driven in one axis, facilitating coordinated movement of its segments for simultaneous wrist and finger flexion or extension. The control system allows the device to operate in four modes: passive (full device movement), assistive (device aids movement), active (device tracks user's movement), and resistive (device opposes user's movement, increasing difficulty) [1]. Using different exercise modes, we tested the device on a group of healthy individuals.

RESULTS: The results show users' interaction with the device in different exercise modes. They represent the proportion of movement supported by the device during activity and the proportion of movement executed through the users' voluntary effort. Changes in these proportions can be used to monitor long-term progress. Because the device does not allow lateral movements of the wrist, it can also be utilized in ultrasound diagnostics of the carpal canal structures, such as nerves and tendons, especially when using the passive mode [2].

DISCUSSION AND CONCLUSION: The developed device enables motor rehabilitation of the upper limb after a stroke in clinical and non-clinical settings. It aims to aid the movement of the wrist and fingers, going through simultaneous flexion or extension. The movement is coupled with interactive tasks in a computer environment, providing additional motivation for users during exercise. Monitoring the degree of the user's voluntary contribution to the movement allows for long-term rehabilitation progress tracking.
The device's key advantage is the possibility of conducting robotic rehabilitation off-site, potentially even at the user's home, made feasible by easy, one-handed donning and doffing and a design for safe, independent use. Furthermore, the device is designed to keep manufacturing costs relatively low. The robust design of the device also allows its use in ultrasound diagnostics of the wrist's anatomical structures, where lateral movements are undesirable.

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Aging and Rehabilitation

The Impact of Fear of Falling on a Multi-factorial Falls Prevention Programme: Enhancing Physical Performance in Older People with Risk of Osteoporosis, Falls, or Fractures

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BACKGROUND: Falls among older people are a significant public health burden, leading to hospitalisations, morbidity, and even mortality [1], and osteoporotic hip fractures are a major cause of morbidity and mortality [2]. Older people with fear of falling (FOF) are four times more likely to fall than those without FOF [3]. It is known that a tailored, guided, and progressive multifactorial falls prevention programme (MFFP) reduces the number of falls by at least 20 % [4], and that the outcomes of physical performance-based tests provide the strongest evidence for determining the risk of falling [5]. The impact of FOF on changes in physical performance during an MFFP remains unclear.

AIM: Our primary objective was to assess how FOF modifies the efficacy of MFFP on overall physical performance changes in older people at risk of osteoporosis, falls, or fractures.

METHOD: We utilised a retrospective, register-based methodology to examine a cohort of 276 Finnish seniors aged 65 years and older who participated in an MFFP. Baseline characteristics as well as fear-related and physical performance variables were systematically collected at initiation. At the one-year follow-up, changes in physical performance were assessed in participants with and without FOF.

RESULTS: FOF displayed a nuanced yet statistically insignificant influence on the overall physical performance metric after adjusting for baseline scores, gender, and BMI. The effect size of FOF was 0.20 (95 % confidence interval 0.05 to 0.35). However, its potential as a modifying factor for MFFP efficacy was observed.

DISCUSSION AND CONCLUSION: This study enhances the existing literature by articulating the intricate relationship between psychological elements like FOF and physical performance outcomes. This underscores the need for a more tailored and effective approach to falls prevention strategies, specifically targeting the self-rated health, mobility, balance, and pain management of older people with FOF.

This study offers invaluable insights for healthcare providers in crafting effective falls prevention policies and programmes. Further prospective research with larger populations is warranted to substantiate these findings and explore the underlying mechanisms connecting FOF with physical performance outcomes.

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Development of a Peer Coaching Program To Slow Down and/or Prevent the Progression of Frailty on Older Adults

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BACKGROUND: The Telephone Self-Management Coach Program was developed in 2014 by Self-Management BC and since then has been implemented to nearly 4,000 seniors experiencing difficulty managing chronic health conditions.

AIM: To develop a peer-led intervention that would slow down and/or prevent the progression of frailty in older adults.

METHOD: Two studies (a longitudinal study and a RTC study) have been completed which investigated feasibility, viability and effectiveness of self-management peer coaching with seniors have been completed.

RESULTS: The first longitudinal study (1) found that a pragmatic low-cost telephone self-management peer coaching intervention assisted persons with type 2 diabetes to improve healthy behaviours and better self-manage their diabetes. The second study (2), a RCT, evaluated the relative effectiveness of using peer coaches compared to using coaches where participants were also provided with three assistive devices, namely: a wrist watch; a scale which tracked weight, heart rate, body composition and environmental data; and a sleep pad that tracked sleep cycles. Several results stood out, namely that participants who worked with a coach (alone) reported decreased depression, higher activation levels, better handling of role limitations due to physical health, higher energy levels, better social functioning, and better communication with their physician. Participants who had devices along with a coach showed similar improvements on all of these measures, with even larger decreases in depression severity. In addition, participants with devices also improved in terms of their self-efficacy, better handling of role limitations due to emotional problems, higher level of emotional well-being, lower pain, and higher general health ratings. None of the covariates tested - sex, age, education level and number of chronic conditions - contributed to the differences in outcome measures. The additional use of home-based electronic devices connected to an app showed further benefits. These results held for all participants and were not impacted by the COVID-19 interruption, nor were there differential effects based on age, sex and education level.

DISCUSSION AND CONCLUSION: The key implication for public health practice and policy is that a relatively inexpensive, easy to implement peer-delivered telephone Self-Management Health Coach Program has been shown to be effective in helping people with chronic health conditions manage their health outcomes, even without devices. Adding the devices further enhanced the experiences of the participants. The shortage of general practitioners could be eased by incorporating peer coaches, with or without the devices, to help patients, likely of all ages, manage their chronic health issues. A third study, which started in March 2023 implemented and evaluated a community peer-led coaching three-month weekly intervention that may slow down and/or prevent the progression of frailty in older adults. The intervention included teaching participants to use self-management support strategies and provision of education on incorporating the Canadian Frailty Network AVOID strategy into their lives.

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Lower Limb Amputations and Prosthetics 2

Co-morbidities in Patients Admitted for Primary Rehabilitation After Lower Limb Amputation

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BACKGROUND: Etiology, physical fitness, pre-amputation living status, amputation level, age, physical fitness, and comorbidities are moderate to strongly supported predictive factors for prosthetic fitting in patients after lower limb amputation (LLA) (1). Patients after LLA may have up to thirty different co-morbidities (2). Most of them are elderly, amputated due to peripheral vascular diseases (3).

AIM: The aim of our study was to find out how many co-morbidities patients after LLA admitted to our institute for primary rehabilitation had and which are the most frequent.

METHOD: All patients admitted for primary rehabilitation after LLA to our institute between March 1 2021 and June 30 2022 who gave written consent to use their clinical data for research were included into the study. At admission, medical doctor checked for all co-morbidites and assessed the patients using BLARt. The study was approved by the Medical Ethics Committee of our institute.

RESULTS: We included 298 patients. They were mainly men (212). Most had trans-tibial amputation (156), 101 trans-femoral and 41 bilateral amputations. On average they were 69 years old (SD 12 years, range 20–91 years). The main cause of amputation was diabetes (136), followed by peripheral vascular disease (PVD, 110 patients). The patients had none to 10 co-morbidities (mean and median 3), the most frequent being diabetes and PVD, followed by stroke (44 patients). The number of comorbidities had low statistically significant correlation with age, and moderate with BLARt.

DISCUSSION AND CONCLUSION: Similarly to other researchers, we observed that patients after LLA are elderly and had many co-morbidities which might influence rehabilitation outcome. Further research is needed to find out influence of these co-morbidities on rehabilitation outcome.

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Assessing Risk of Hospital Falls in Patients after Lower Limb Amputation

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BACKGROUND AND AIM: We applied various regression models for count data in order to assess risk factors for falls among people after lower limb amputation, and to test whether a short inpatient education program reduced fall risk.

METHOD: The study included all the patients after lower limb amputation who were admitted to inpatient rehabilitation at our institute between 2015 and 2017. Upon admission, they were asked about falls at home and/or in the acute hospital since the amputation. The data on comorbidities was also recorded. Six months after discharge, we called the patients (157 replied) and asked them about falls in their home environment. In 2016, a test group (127 patients) took part in a 30-minute education during inpatient rehabilitation about fall prevention. We applied tobit, negative binomial, logistic, Poisson, zero-inflated Poisson and proportional odds regression models to assess the effect of potential fall risk factors. All regression models were fitted with main effects only (without interactions). The models for falls during inpatient rehabilitation were adjusted for the length of hospital stay: number of hospital days (logarithmised because of highly right-skewed distribution) was used as offset variable in the logistic model for falling at least once and the Poisson and negative binomial model for the number of falls, and as predictor in the tobit and proportional odds model.

RESULTS: The study included 876 patients. Different regression models led to essentially equivalent conclusions. Unilateral amputation was associated with increased fall risk before and after inpatient rehabilitation as compared to bilateral amputation. Age increased fall risk before and during inpatient rehabilitation. Having previously survived stroke and/or myocardial infarction greatly increased fall risk during inpatient rehabilitation. Having fallen before admission to inpatient rehabilitation was possibly a risk factor for falls during inpatient rehabilitation, and very likely after discharge to home environment. In addition, men were at higher risk of falling during inpatient rehabilitation then women. The education program did not appear to reduce the risk of falling at least once during the stay in our hospital, but it did appear to reduce the number of falls per hospital day; the possible effect disappeared in the home environment.

DISCUSSION AND CONCLUSION: Different regression models with different assumptions led to similar conclusions. A very limited effect of the education program was observed. Unilateral lower-limb amputation, age, falls before admission to inpatient rehabilitation and stroke and/or myocardial infarction proved to be the main risk factors for falls at various stages after lower limb amputation.

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Phantom Pain and Walking Ability With a Prosthesis

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BACKGROUND: Prosthetic rehabilitation offers great potential for improving the physical and emotional state, as well as the quality of life of people with lower extremity amputation (1,2). The percentage of patients who will be able to walk with a prosthesis after lower extremity amputation varies from 26 to 95% and many factors influence this ability (2). One of these factors is phantom limb pain (PLP). PLP represents sensation of burning, stabbing,crushing or squeezing associated with missing limb that usually appears immediately after surgery (1,2).

AIM: To examine the frequency of PLP and whether its presence, intensity and duration affect the ability to walk with a prosthesis in people with lower extremity amputation.

METHOD: Data from 63 patients (average age 61,81±10,40 years, men 74,6%) admitted to the prosthetic rehabilitation program were collected. The patients declared the presence of PLP, its frequency and duration in the last four weeks. The intensity of PLP and how bothersome the pain was in the previous four weeks were reported on a numerical rating scale (NRS) from 0 (no pain) to 10 (worst imaginable). At the end of the prosthetic rehabilitation functionality was evaluated with Timed Up and Go (TUG) and Two-minute walking test (TMWT). Two regression analyses were applied where the predictors included the presence of PLP, its frequency and the duration in the last four weeks, the intensity and how disturbing the pain was, while the dependent variables were TUG and TMWT.

RESULTS: The presence of PLP was confirmed in 45 patients (71.4%), of which 18 patients reported pain several times a day in the last four weeks (28.6%), 12 of them two to five times a week (19.0%), 9 of them once a week (14.3%) and 6 of them once or twice a month (9.5%). Most patients had pain that lasted for a few seconds 24 (38.1%), in 15 of them (23.8%) it lasted for a few minutes, and in only 6 patients (9.5%) the pain lasted several minutes to several hours. Average pain intensity was 3,59±2,84 on NRS. The majority of patients had transfemoral amputation 45 (71.4%) compared to transtibial 18 (28.6%). The regression model shows that the joint influence of the explanatory variables is not statistically significant when it comes to the TUG (F=1.316, p=0,274) or TMWT (F=0,831, p=0,534).

DISCUSSION AND CONCLUSION: In this research, presence of PLP, its intensity, frequency and duration in the last four weeks is not statistically significant in predicting achievement on TUG and TMWT. The reason for this may be that in most subjects the pain was of short duration and therefore did not significantly affect the functionality of the patients. PLP does not significantly affect the functionality of most patients with lower extremity amputation who have undergone prosthetic rehabilitation in our sample.

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Hand Function in Patient Admitted to Primary Rehabilitation after Lower Limb Loss

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BACKGROUND: People with lower limb loss (LLL) do not need good grip strength and hand dexterity as healthy individuals for activities of daily living only, but as well for transfers, walking with walking aids and donning their prosthesis. From the existing literature is not clear whereas people with lower limb loss had normal hand function and whereas hand function influences rehabilitation outcome.

AIM: The aim of our study was to determine the grip strength and dexterity in patients with LLL admitted for primary rehabilitation after amputation and its influence on independent donning of a prosthesis.

METHOD: All patients admitted for primary rehabilitation after trans-tibial (TT) and trans-femoral (TF) amputation to our institute in 2020 and 2021 were included into our study. At admission and before discharge we measured grip strength with Jamar digital dynamometer and hand dexterity with Nine Hole Peg Test. All the participants were included into a comprehensive rehabilitation program and fitted with prosthesis based on cardiorespiratory function, Amputee Mobility Predictor no-prosthesis score (AMPnoPRO), range of motion of joints of lower limbs, muscle strength of lower limbs and results on the Montreal Cognitive Assessment Procedure (MoCA). The study was approved by the Medical Ethics Committee of our institute.

RESULTS: We included 149 patients (112 men) after TT and 90 (55 men) after TF amputation, 68 and 71 years old on average, respectively (SD TT 11 years, TF 10 years). The main cause of amputation was diabetes in those after TT amputation (84) and peripheral vascular disease in those after TF amputation (52 patients). At admission, we observed lower grip strength and worse dexterity than the norms for healthy subjects in all age groups. There was no statistically significant difference in grip strength either in dominant or in non-dominant hand between patients with and without diabetes, either at admission or at discharge. The patients with diabetes had worse dexterity of both hands on average than those without it at admission, whereas at discharge the differences disappeared. In all (TT and TF amputation), we observed statistically significantly lower grip strength and dexterity of both hands among those who were not fitted with a prosthesis, with no statistically significant difference between those independently donning prosthesis and those not able to do that.

DISCUSSION AND CONCLUSION: We found out that the grip strength and dexterity are decreased compared to the healthy population, more so in patients amputated due to diabetes. These with decreased the grip strength and dexterity are more likely not fitted with a prosthesis. The main limitation of our study is that we did not analyse the influence of grip strength and hand dexterity on performance of daily activities, neither include other factors that might influence fitting a prosthesis.

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The Association Between the Obesity Stage and Functional Status of the Amputees in an Inpatient Rehabilitation Setting

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BACKGROUND: An unhealthy lifestyle (diet, smoking, and excessive alcohol consumption) can be a direct or indirect risk factor for most lower limb amputations. Therefore, when admitted to rehabilitation, many patients are obese and limited in function and mobility. Despite known allometric inaccuracies (disregarding body composition), body mass index (BMI), i.e., a measurement obtained by dividing a person's weight by the square of the person's height, is still the most commonly used method for obesity classification.

AIM: To analyse the effect of the obesity stages (based on adjusted BMI) on the functional status upon admission, for the evaluation of which we used a Six-Minute Walk Test (6MWT), and a measurement of the functional status of lower-limb amputees without the use of a prosthesis (AMPnoPRO).

METHOD: We included inpatients admitted to the Rehabilitation Department for Patients after Amputation at the University Rehabilitation Institute in Ljubljana between March 2021 and May 2022. We used adjusted BMI, according to the level of amputation, to divide the patients into five classes, from normal body weight to extreme obesity (class III). Using one-way ANOVA, we compared the mean values of the 6MWT and AMPnoPRO, and assessed the equality of variances using Levene's test.

RESULTS: A total of 108 included patients (aged 47-91, mean 71 years; 71% men) scored an average of 21 points (SD 14 points) on AMPnoPRO and walked on average 98 m (SD 94 m) in 6 minutes. The majority (51 patients) had a below-knee amputation, 35 had an above-knee amputation, 12 had bilateral amputation (a combination of below-knee, above-knee, and foot amputation), and one had a foot amputation. They were ranked in five classes: 33 were overweight, 31 had class I obesity, 14 had class II obesity, 5 had class III obesity, and 25 had BMI in the normal weight range. According to the adjusted BMI, the groups had no significant differences in the 6MWT ($p= 0.797$) and AMPnoPRO ($p= 0.374$).

DISCUSSION AND CONCLUSION: According to our sample, high BMI does not seem to have a significant effect on inpatients' (with lower limb amputation) functional status (AMPnoPRO and 6MWT). Similar studies (1) concluded that high BMI should not decide whether a patient is entitled to rehabilitation and fitted with a prosthesis. Nevertheless, the correlation between obesity (especially sarcopenic) and comorbidities that affect the outcome of rehabilitation remains significant. To conclude, the integration of nutritional, physical/ functional rehabilitation, psycho-educational, and rehabilitative nursing interventions in rehabilitation programs are important and should be considered in all amputees with an increased BMI (2).

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Botulinum Toxin for Amputation Stump In War Amputees

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BACKGROUND: Stump hyperhidrosis is a common condition after lower limb amputation. It affects the prosthesis use, and the quality of life of patients(1). Several case reports tried to prove benefit of using Botulinum toxin in its treatment (2-4).

AIM: This study was to conduct a larger workforce clinical trial and to demonstrate benefits of botulinum toxin injection in the treatment of stump hyperhidrosis.

METHOD: A prospective clinical trial was conducted. War amputees who complained of annoying excessive sweating of the stump were included. They received intradermal injection of botulinum toxin A in the residual limb area in contact with prosthetic socket. Abundance of sweating and degree of functional discomfort associated with it were assessed before, after 3 weeks, 6 and 12 months.

RESULTS: Seventeen male patients, followed for post-traumatic limb amputation were included in the study. Discomfort and bothersome in relation to Hyperhidrosis did decrease after treatment ($p<0,001$). Reported satisfaction after 3 weeks was 73,33%. Improvement of prothesis loosening up after 3 weeks was 72,5% [±15,6]. Mean injection-induced pain on the visual analogue scale was 5.17/10 (±1.58). The mean interval after the onset of improvement was 5.13 days [min:3, max:8]. The mean time of improvement was 10.4 months after the injection [min:6, max:12]. No major adverse events were reported following treatment.

DISCUSSION AND CONCLUSION: Intradermal injections of botulinum toxin in the symptomatic treatment of stump hyperhidrosis are effective and have few adverse effects (2-4). It improves the quality of life of our patients thanks to a better tolerance of the prosthesis. However, larger studies are needed to properly study the results.

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Telerehabilitation

The Acceptance of a Telerehabilitation Portal Among Patients After Large-Scale Implementation in a Regional Clinic

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BACKGROUND: In various reviews the potential of telerehabilitation to increase the quality and accessibility of care and to decrease the cost of care is emphasised [1]. Despite this potential, the widespread implementation of digital tools to support patients during their rehabilitation process is low. Besides various factors it is known that tools accepted by end-users are more likely to be successful [2].

AIM: To assess the patients' acceptance of a digital tools to support patients during their rehabilitation process after large-scale implementation in a regional clinic.

METHOD: After various pilots Roessingh Centre of Rehabilitation (Enschede, Netherlands) started with the large-scale implementation of a telerehabilitation portal (www.telerevalidatie.nl). This digital tool supports patients during their medical rehabilitation process and offers them remotely accessible information, exercises and questionnaires, and a direct messaging service with their healthcare professionals. To assess the acceptance of this tool among patients an questionnaire is developed based on common theoretical approaches to access the acceptance of technology. According to Dutch law, the nature of this questionnaire did not require formal medical ethical approval.

RESULTS: The acceptance questionnaire was between December 2021 and June 2023 automatically pushed to 777 patients and 31% completed this questionnaire. The average age of the participants was 48 year (SD 18 / Range: 1-83). 57% of the participants identified themselves as female, 42% as male and 2% as other. Children, patients with brain injury and patients with chronic pain were the three main treatment groups. Most participants (83%) used the digital tool 1-10 minutes per day and 1-3 days a week (91%). Only 15% of the participants needed help to use the tool. These participants needed help with the general use of the tool, to log in correctly and to complete questionnaires. Overall, 79% of the participants claimed that the use of the tool during their treatment had an added value for them, such as their healthcare professionals were easier to reach, participants had the possibility to re-read all available information and the participants felt more involved during their treatment. 22% of the participants think the use of this tool can replace parts (exercising at home, asking short and simple questions, re-reading information) of their treatment. The participants marked the digital tool with a 6.4 (SD 2.1 , N=163) on a scale for 1 (low) to 10 (high).

DISCUSSION AND CONCLUSION: Most participants accepted the digital tool as part of their treatment and some even agreed that the tool can replace parts of their current rehabilitation process. By improving all the care pathways and included the digital tool even more in all rehabilitation processes will improve its acceptance among patients.

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Efficacy of Non-immersive Virtual Reality-Based Telerehabilitation on Postural Stability in Parkinson's Disease: a Multicentre Randomized Controlled Trial

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BACKGROUND: The implementation of regular, extended, and effective rehabilitation for individuals with Parkinson's disease is crucial for ensuring a high quality of life [1,2]. However, the continuity of rehabilitation care may face obstacles related to economic, geographical, and social factors[3]. In such situations, telerehabilitation could offer a potential solution to ensure ongoing care.

AIM: To assess the effectiveness of non-immersive virtual reality-based telerehabilitation in improving postural stability in individuals with Parkinson's disease compared to structured conventional motor activities administered at home.

METHOD: A multicenter randomized controlled trial (RCT) was conducted, involving five rehabilitation hospitals within the Italian Neuroscience and Rehabilitation Network (RIN). Ninety-seven participants were randomly assigned to two groups: 49 to the telerehabilitation group (non-immersive virtual reality-based telerehabilitation) and 48 to the control group (structured conventional motor activities self-administered at home). Both treatment regimens consisted of 30 sessions, conducted 3-5 days a week over a period of 6-10 weeks. Measurements of static and dynamic balance, gait, and functional motor outcomes were taken before and after the treatments.

RESULTS: All participants showed improvements in their outcomes by the end of the treatment period. The primary outcome, as measured by the mini-Balance Evaluation Systems Test, exhibited a significantly greater improvement in the telerehabilitation group compared to the control group. Gait and endurance showed significant improvements in the telerehabilitation group only, with significant differences observed both within and between the groups. No adverse event has occurred in the experimental group due to the treatment.

DISCUSSION AND CONCLUSION: Our results demonstrate that non-immersive virtual reality-based telerehabilitation is a feasible approach that enhances both static and dynamic balance. It presents a valuable alternative for reducing postural instability in individuals with Parkinson's disease. While not everyone is suitable for telerehabilitation due to technical and personal conditions, it still presents a valuable alternative for reducing postural instability in individuals with Parkinson's disease. Therefore, non-immersive virtual reality-based telerehabilitation is an effective and well-tolerated rehabilitation modality that can help enhance access to and expand rehabilitation services, aligning with the goals of the World Health Organization's Rehabilitation 2030 agenda.

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How Does Telerehabilitation Compare to In-Person Rehabilitation for Psychological Outcomes in Chronic Pain Patients?

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BACKGROUND: The quarantine era of the covid-10 pandemic necessitated changes in the format of rehabilitation delivery. At University Rehabilitation Institute, Republic of Slovenia, standard in-person interdisciplinary rehabilitation programs for chronic pain patients were transformed to a part-telerehabilitation format. In a randomised control trial, results showed an improvement in pain intensity, depression levels, pain catastrophising and on quality of life in patients with fibromyalgia that participated in a telerehabilitation program (1). Transitioning therapeutic options toward a video-based platform is an option in situations of poor access to therapy (2, 3).

AIM: The aim of our research was to establish whether the change in the format of treatment affected rehabilitation outcomes for levels of kinesiophobia, pain catastrophizing and depressive symptoms.

METHOD: In this retrospective study we reviewed data of 308 chronic pain patients taking part in an interdisciplinary rehabilitation program: 161 of them participated in an in-person and 147 participated in a hybrid version: a combination of in-person and telerehabilitation program. We used an ANCOVA model to evaluate means of Tampa Scale of Kinesiophobia, Pain Catastrophizing Scale and Beck Depression Inventory, while controlling for effects of different rehabilitation program formats and intensities.

RESULTS: Patient groups in different rehabilitation formats were comparable at baseline in all psychological variables. There were no statistically significant differences in pain catastrophizing and depressive symptoms levels means between in-person and hybrid groups. Kinesiophobia was the only psychological outcome where we found statistically significant differences between in-person and hybrid groups, achieving better results in the hybrid group.

DISCUSSION AND CONCLUSION: Format of interdisciplinary rehabilitation was not a significant factor in levels of pain catastrophizing and depressive symptoms in patients with chronic pain. Partly online rehabilitation treatment of chronic pain can lead to psychological outcomes of equal quality as in-person rehabilitation treatment. An unexpected finding was the hybrid group achieving statistically significant better outcomes in lowering levels of kinesiophobia than the in-person group. The possibility that physical therapy in a home environment could facilitate gaining trust in the body's ability to move without fear of injury is discussed. Overall, the study supports previous findings (2) that telerehabilitation can be successfully implemented in conjunction with in-person treatment for chronic pain.

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Pasient Satisfaction and Expierence With the Digital Group-Based Self-Managment Patient Education Program on Myalgic Encephalopaty /Chronic Fatigue Syndrom (ME/CFS)

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BACKGROUND: Patients with ME/CFS can develop debilitating functional impairment and poor quality of life . (1). The goal of the management/treatment programme is optimizing the patient's ability to maintain function in everyday activities, being as active as possible within their boundaries and then gently extending those boundaries , to achieve better functional capacity and life quality. (2) Telerehabiliation (TR) is the use of information and communication technology to deliver rehabilitation at a distance and can be as effective as traditional rehabilitation (3).

AIM: Evaluate pasient satisfaction and expierence with the digital group-based self-managment patient education program on ME/CFS, as a novel telerehabiliation service.

METHOD: Patients are selected after a referral from a general practitioner. Most of the patients have low capacity and difficulties to follow traditional rehabilitation. Service is developed in collaboration betwen the Physical and Rehabilitation Medicine (FMR)/PMR outpatient clinic, Learning and Coping Skills Service (LMS) and ME assosiation. The course takes place three times a year, in groups of up to ten pateints. We use the telematic studio which is specially arranged for these occasions. Patients follow up course from their homes on their digital devices. via secure digital platform Whereby. The course duration is three hours per day, over a course of three concequtive Mondays. Main topics of the course are related to the most distressing symptoms and coping strategies. Pasients feedback is collected via Questback survey system.

RESULTS: So far we have evaluated five courses, with 37 patients in total (24% men and 76% women.). Overall satisfaction with all of the topics was on average 84%. The survey includes also an open section where the patients can freely write about their own expierences with everday living with chronic illnes and what they are learned through program. We use this valubale feedback in furtehr developing the service, as well as follow up selectied patients inidividualy.

DISCUSSION AND CONCLUSION: TR can be an effective and feasible alternative or a supplement to the traditional rehabilitationton.. Our preliminary results support the need for an increased use of TR services for people with ME/CFS and other chronic iillness, as it is far more accessible than traditional rehabiliitation programs. As our program is still in its developing stage, further follow up and cost effectivnes analysis are required to assess the full benefits of the service.

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Prolonging the Effects of Conventional Rehabilitation and Radial Extracorporeal Shock Wave Delivery through Tele-rehabilitation Strategies For Stroke Survivors

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BACKGROUND: Stroke is one of the main causes of disability and death worldwide implying long-term recovery and rehabilitative programs. Due to the onset of the COVID-19 pandemic, rehabilitative and follow-up strategies for stroke survivors have changed, and tele-rehabilitation became a more accessible way to promote recovery and healthcare delivery continuity.

AIM: The focus of the case report was highlighting the long-lasting efficacy of a conventional physical therapy (CPT) protocol and radial extracorporeal shock wave therapy (rESWT) delivery and a following tele-rehabilitation strategy after discharge for a stroke survivor.

METHOD: A 50-year-old male, stroke survivor, with right spastic hemiplegia and patellar clonus, received rehabilitative services which were delivered during his hospital stay (CPT and two rESWT sessions) as well as a tele-rehabilitation program after discharge. The evaluations were conducted remotely through a self-adapted instrumented treadmill and stabilometric hardware which were both connected to the Internet. Trunk amplitude, limits of stability, and gait parameters were assessed. Additional clinical outcome measures were correlated with the stabilometric and gait parameters.

RESULTS: At discharge and at 20 weeks follow-up, the stroke survivor showed a decreased spasticity grade and clonus score, reduced pain intensity, improvement in sensorimotor function, balance, functional mobility, and walking distance.

DISCUSSION AND CONCLUSION: The case highlights the usefulness of tele-rehabilitation strategies in prolonging and even enhancing the effects of a CPT program and rESWT delivery in lower limb post-stroke spasticity. The continuity of these encouraging results translates into creating an interface that is designed to retrieve parameters and outcomes such as range of motion, spatiotemporal and kinematic parameters of stroke survivors undergoing a CPT protocol and rESWT delivery. The interface allows for displaying graphical data in accordance with the patient's movement and transferring data in real-time to the evaluating physician or assessor. It can also detect various dysfunctions specific to the patient's gait or balance and calculate certain statistics. The input data are the files acquired through medical devices for gait and balance assessment. The data can be displayed comparatively, at admission and discharge, giving the opportunity to track progress. Additionally, for more advanced stages, the interface can be developed to target other conditions.

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Treatment of Spasticity and Muscle Overactivity – Oral

Retrospective Study of Botulinum Toxin Treatment for Acquired Deforming Hypertonia in a French Clinical Gerontology Department

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BACKGROUND: Acquired Deforming Hypertonia (ADH) significantly impacts the daily care of many institutionalized elderly patients (1). Botulinum Toxin Injections (BTxi) are a relatively unfamiliar treatment option for this condition (2).

AIM: The aim of this study was to describe the practice of botulinum toxin injections in an older population for the management of Acquired Deforming Hypertonia (ADH).

METHOD: Between January 2018 and December 2021, 41 patients over 70 years of age, naive to toxin treatment, underwent toxin injections in the geriatrics department of Saint-Étienne University Hospital. Clinical characteristics of the patients, descriptions of the type of ADH, injection modalities, and treatment goals defined using the Goal Attainment Scaling (GAS) were recorded. A prospective questionnaire collected the benefits of the injections and the occurrence of side effects. The study received approval from the Ethics Committee of Saint-Étienne University Hospital (IRBN 1682021/CHUSTE).

RESULTS: Most of the population is highly dependent (96% ≤ GIR 2), institutionalized (66%), and experiences significant morbidity and mortality, with more than one-third of patients (37%) passing away within a year following the first injection. The targeted objectives of the injections are mainly a reduction in pain (29.6%), facilitation of hygiene and dressing care (24%), and prevention of macerations or skin lesions (17.5%). The analysis of GAS scores reveals a median score improvement of 1 ($p < 0.001$), achieving the objective in 43.5% of cases. No complications were recorded.

DISCUSSION AND CONCLUSION: Injections of botulinum toxin for ADH in older people often involve individuals with multiple comorbidities and institutionalization (3). Injections in this population are well-tolerated and appear to improve comfort care.

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Feasibility and Efficacy of a Selective, Pattern-Specific, Goal-Dependent Diagnostic Nerve Block Protocol in Patients With Upper Limb Spasticity Eligible for Neuro Orthopedic Surgery: A Pilot Study

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BACKGROUND: Although the treatment of spasticity of the upper limb is a common practice in rehabilitation settings, there is still no consensus on the most effective evaluation protocols that can lead to a more appropriate treatment. Often the choice of a specific treatment results from clinical assessments and the application of spasticity rating scales that may not be well tailored on the specific needs of each patient. In recent years, diagnostic and therapeutic nerve blocks have been performed in order to evaluate and treat spasticity. [1]

AIM: With this study, we propose protocol for a systematic approach to the management of upper limb spasticity (ULS). Indeed, we suggest a patient-centered model with the use of the Goal Attainment Scale - Evaluation of Outcome for Upper Limb Spasticity (GAS-eous) [2] for goal identification, together with Selective Diagnostic Nerve Blocks (SDNB) in order to predict the results of long-lasting treatment options such as phenol or botulinum toxin injections and especially nerve surgery (neurectomies).
The clinical hypothesis is that the use of pattern-specific and goal-dependent SDNBs is a valid and effective method to choose the best treatment option for ULS.

METHOD: In the first stage, we developed a diagnostic protocol based on the recognition of a few realistic and personalized goals using the GAS-eous tool. We then performed, under ultrasound and electrostimulation guidance, specific SDNBs considering not only the pathological neuromotor patterns, but also the goals shared with the patient and codified using the GAS-eous tool. Next, we evaluated the impact of the proposed SDNB protocol using the GAS-eous.

RESULTS: 30 patients with ULS were enrolled. The data show that after SDNBs, an increase in GAS-eous score was achieved in 85.7% of patients. In addition, in 12.9% of cases in which the target GAS-eous score was not achieved after SDNBs, the protocol was able to identify the causes (e.g., contracture of soft tissues, appearance of new pathological patterns). In addition, important insights have emerged from the execution of SDNBs: I) to correct the pattern in elbow flexion in our sample, it was more effective to eliminate the component given by the brachialis and biceps muscles, rarely that provided by the brachioradialis muscle; II) to correct the wrist flexion pattern almost always it was sufficient to eliminate only the flexor component determined by the flexor carpi radialis muscle.

DISCUSSION AND CONCLUSION: We believe that this protocol is a valid and feasible method for assessing upper limb spasticity. It is effective in determining pathological neuromotor patterns and predicting surgical treatment outcomes, therefore achieving a higher level of patient satisfaction.

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Effectiveness of abobotulinumtoxinA in Adults With Lower Limb Spasticity: Top Line Results From the AboLiSh Observational Study

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BACKGROUND: While the efficacy and safety of abobotulinumtoxinA (aboBoNT-A) in reducing lower limb spasticity has been established in controlled clinical trials, there is a paucity of information from real-life clinical goal attainment in practice.

AIM: We aimed to assess the longitudinal attainment of person centred and function related goals after one or more aboBoNT-A injections in the lower limb over a period of 16 months using the cumulated Goal Attainment Scaling – Leg (GASleg) T score in a real-life clinical setting.

METHOD: Prospective, longitudinal (16-month), observational study (NCT04050527) exploring the real-world utilization and effectiveness of aboBoNT-A for lower limb spasticity. Ambulatory adult patients (≥18 years) with unilateral lower limb spasticity (able to take ≥5 steps with or without assistance) were treated in accordance with local prescribing guidelines to achieve individualized treatment goals. The primary endpoint was goal attainment as assessed using the cumulated (mean) Goal Attainment Scaling-Leg (GAS-leg) T score, across all treatment cycles for each patient.

RESULTS: A total of 430 participants from 9 countries were enrolled, of which 384 (n=255 male/ n=129 female, mean±SD age 53.9±13.8 years) underwent ≥1 BoNT-A injection cycle and had ≥1 GAS-leg assessment (effectiveness population). Overall, participants underwent a median [range] of 5 [1-6] lower limb injection cycles during the 16 months of follow-up; the median [Q1,Q3] injection interval was 17.0 [14.7, 18.4] weeks. Approximately two-thirds of patients (65.9%) also received treatment for upper limb spasticity. Patients generally achieved their goals as expected over repeated cycles; the mean [95% CI] GAS-leg T score at baseline was 38.0 [37.7, 38.3] and the mean cumulated GAS-leg T score at 16 months was 48.2 [47.4, 48.9] (mean change from baseline of 9.9 [9.1, 10.7]). Patients who were injected without injection guidance at baseline were significantly less likely to attain their goals than those where guidance was used (odds ratio: 0.38 [0.25, 0.58], p<0.0001). Patients treated concomitantly for upper limb spasticity were more likely to attain their goals than those only injected in the lower limb (odds ratio: 2.3 [1.3, 4.3], p=0.005). Adverse events were reported by 56 (13.5%) patients; most were mild-moderate and considered unrelated to study treatment. Six patients (1.4%) had an AE possibly/probably related to treatment.

DISCUSSION AND CONCLUSION: This large, international study provides evidence for the benefit of repeated cycles of aboBoNT-A for lower limb spasticity, demonstrates the importance of appropriate injection guidance techniques and points to the benefit of treating the upper limb in combination with lower limb when clinically indicated. Treatment with aboBoNT-A was generally well-tolerated and safe; no new safety issues were identified.

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Rehabilitation in Sleep, Pain, and Bladder Symptoms of NESA Neuromodulation Application in Multiple Sclerosis Patients: A Innovative Treatment

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BACKGROUND: Multiple sclerosis is an autoimmune demyelinating inflammatory disease of unknown cause and chronic progression caused by damage to myelin, which impairs the nerves' ability to conduct electrical impulses (1). This results in a variety of symptoms including spasticity, fatigue, neuropathic pain and/or urinary incontinence. As they often do not remit and respond poorly to conventional medical treatment, recent attention has focused on novel interventions for , pain (2), sleep control (3) and bladder (4). Non-invasive superficial neuromodulation using the NESA device
can help restore the body's electrical balance by regulating the autonomic nervous system and is beginning to show promising results in patients with sleep disorders. It may therefore provide an opportunity for an autonomous approach to sleep, bladder, and pain management (5).

AIM: The aim of the study was to improve sleep quality, urinary incontinence control and pain perception in patients treated with NESA technology alone.

METHOD: A quasi-experimental randomized prospective study will be conducted with patients diagnosed with multiple sclerosis. They were divided into two non-invasive neuromodulation treatment groups with different treatment programs (Combination A and Combination B) (5)(6). Data on sleep quality, urinary incontinence and pain will be measured using different rating scales at three different points in the study.

RESULTS: The analysis of the variables of urinary incontinence and pain show significant and favourable data in the treatment group with combination A, with a positive improvement throughout the 3 weeks of treatment. The variable sleep quality shows a significant improvement in both experimental groups, with a more favourable score in the Combination A treatment group.

DISCUSSION AND CONCLUSION: This first study using the Nesa non-invasive neuromodulation device in patients with multiple sclerosis reveals its efficacy in improving urinary incontinence, pain, and sleep quality.

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Rehabilitation in Patients With Metabolic Conditions

Nutritional Risk of Patients in a Rehabilitation Unit; Results of the NutritionDay 2022 Project in Slovenia

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BACKGROUND: Malnutrition is one of the nutrition disorders and nutrition-related conditions [1] that can be present in patients undergoing rehabilitation and represents an independent risk factor for complications, longer length of stay and recovery period, and higher mortality [2]. The prevalence of disease-related malnutrition is high in hospitalized patients and is estimated at 30-50%. To raise awareness of malnutrition in healthcare settings, NutritionDay (nDay) is held annually globally. In recent years, more and more attention has been paid to nutritional treatment as part of the rehabilitation program. As far as we know, until 2022, no rehabilitation centre was included in the nDay project.

AIM: To assess the prevalence of malnutrition at the University Rehabilitation Institute Republic of Slovenia Soča (URI Soča), to determine which patients in the rehabilitation environment have the highest risk of malnutrition and need the most nutritional attention.

METHOD: The study, carried out for the first time at the URI Soča, took place as part of nDay 2022. The cross-sectional study included 110 (84% of all) inpatients (30 women, 80 men) who were hospitalized at URI Soča on November 10, 2022. Data were collected using nDay questionnaires available online (www.nutritionDay.org). All patients over 18 years of age with signed consent to participate, who were cognitively able to participate were included in the study.

RESULTS: According to the nDay questionnaire, 34% of patients were malnourished. The prevalence of malnutrition identified by the nutrition team at URI Soča was 39%. Twenty-nine percent of patients were receiving oral nutritional supplements and 2% parenteral nutrition, and only one patient had a feeding tube inserted. Furthermore, 46% of patients were included in the nutritional treatment by the nutrition team. Patients with traumatic brain injury, spinal cord injury, polytrauma and peripheral nerve damage had the most indications for nutritional treatment. The actual prevalence of malnutrition was also the highest in those groups of patients.

DISCUSSION AND CONCLUSION: Based on the results of the research the proportion of nutritionally compromised and malnourished patients in the rehabilitation environment is high, so active screening and identification of malnourished patients is essential. The goals for the future are aimed primarily at raising awareness about the importance and recognition of nutrition disorders among physical and rehabilitation medicine specialists and involving dietitians at the primary and secondary levels of healthcare.

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Assesing Awareness and Management of Overweight and Obesity Among Physical Medicine and Rehabilitation Physicians in Spain: A Pioneering Survey Study

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BACKGROUND: Obesity is a chronic and multifactorial disease that significantly impacts the adult population, contributing to disability and leading to economic consequences. People with obesity have significantly lower number of disability free years, what leads to an increase demand of rehabilitation.

AIM: The aim of our survey is to analyze the current situation in Spain in relation to awareness and e management of patients with obesity in the Physical Medicine and Rehabilitation (PMR) services, as it has never been studied before in our county. With this study we
would like to know what methods doctors use to analyze obesity, what barriers they find to prescribe exercise and also the level of training they feel to have in order to manage obese
patients.

METHOD: In this cross-sectional study, an online survey was sent out from the Spanish Society of Rehabilitation (SERMEF) to their PRM members from May 1st to July 31st 2023. It was developed by the obesity working group and it included 22 questions. Data was collected in REDcap.

RESULTS: 205 (10.07%) PRM physicians participated, half of them (n=102, 49.8%) worked with obese patients and 99% (n=201) considered obesity a disease.
52.2% (n=107) recognized that obesity influences functional prognosis of patients that receive rehabilitation treatment.
However, 83.3% (n=184) considered that the facilities at their working areas were not adapted to the needs of obese patients, and only 9.8% (n=20) felt they had received enough training to asses properly this kind of patients.
Regarding the assessment of body composition as a measurement method, 93.4% (18) used the scale and 71.9% (n=141) the stadiometer, while bioimpedance was only used by 12% (n=24) of the professionals.

Only 21%(n=43) had an interdisciplinary unit to manage morbid obesity, and in those only half of the units had a PRM doctor who worked 2 ±1.61 hours/week.

DISCUSSION AND CONCLUSION: This study shows that despite PRM physicians are aware of the implications of obesity in functional outcomes, improvements in the management in hospitals of these patients including PRM departments are required. Multidisciplinary units for addressing obesity should be developed including PRM physicians to get better functional outcomes.

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Whole-Body Cryostimulation: A New Adjuvant Treatment in Central Sensitization Syndromes?

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BACKGROUND: Central sensitization is defined as an increase in the reactivity of nociceptive neurons in the central nervous system with a decrease in their normal or subthreshold input. It consists of a maladaptive increase in the function of nociceptive pathways in the spinal cord and brain, resulting in hyperexcitability to noxious and non-noxious stimuli. This mechanism can be caused by various stimuli (e.g., mechanical, chemical) that act on structural plasticity and can sensitize the central nociceptive system, leading to pain hypersensitivity, sometimes with persistence of the condition. Treatments for pain in central sensitization often focus on interrupting or reducing this increased neuronal activity to relieve pain. Conventional treatments are based on pharmacological approaches (e.g., analgesics or nerve blocks) that target the peripheral and central components of pain, or manual therapy techniques such as manipulation or physiotherapy. Recent research provides some initial evidence that Whole-Body Cryostimulation (WBC) may have a beneficial effect on central sensitization syndromes and pain perception.

AIM: The aim of this presentation is to describe the effects of WBC in three different conditions, such as phantom limb pain, fibromyalgia, and rheumatic polymyalgia, characterized by central sensitization and provide preliminary speculations on its mechanism of action.

METHOD: We present 3 different case-reports with a common feature of chronic pain. Two of them (i.e., phantom limb and rheumatic polymyalgia) underwent only WBC treatment, whereas the fibromyalgia patient underwent rehabilitation with WBC. Pain (Numerical Rating Scale), physical function (6-minute walking test), psychological aspects (Psychological General Well-Being Index) and sleep quality (Pittsburgh Sleep Quality Index) were assessed.

RESULTS: Preliminary results show in all of the 3 cases improvements in pain perception, physical function, psychological aspects and sleep quality.

DISCUSSION AND CONCLUSION: The pain pathway involved in pain modulation is complex and involves several neurophysiological mechanisms. Central sensitization and WBC may have a significant interplay in the context of pain perception, suggesting that the latter may have the potential to modulate central sensitization and alleviate pain. One proposed mechanism for the analgesic effects of WBC is its capacity to modulate the release of neurotransmitters and hormones involved in the pain pathway, such as endorphins, serotonin, and norepinephrine.
In the 3 cases observed, WBC seems to have the potential to counteract central sensitisation and provide relief from chronic pain. Larger studies and follow-up data are needed to confirm these observations. As chronic pain negatively affects mental health and is often associated with anxiety and depression, addressing pain management may also be effective in improving patients' well-being and quality of life.

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Evidence Based Practice in Rehabilitation & Clinical Trials Outcomes

Rehabilitation Program During an Allogenic Stem Cell Transplant, a Perspective Into Our Future

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BACKGROUND: Oncohematological diseases have a prevalence of around 50,000 cases per year according to the Spanish Society of Medical Oncology.
In Spain, 1,461 allogeneic bone marrow transplants were performed in 2021, from which 310 were done in the Community of Madrid, according to the National Transplant Organization.
The majority are related allogeneic. Most frequent indication is leukemia, followed by lymphoproliferative diseases.

AIM: To support the benefit of exercise in oncohematological patients during an allogenic stem cell transplant.

METHOD: A retrospective study in a tertiary hospital in Madrid, Spain from May 2021 to May 2022, with a sample of 19 patients from the Onchohematology Unit.
Functional assessment tests were performed upon admission and before discharge [Sarc F Scale, 30-second sit-up test (percentile), and Short Physical Performance Battery (SPPB)].
Aditional data was collected: age, gender, days of hospital admission, diagnosis, joint limitation, vertebral fracture and pain according to the Visual Analog Scale (VAS). Also, hospital readmission, admission to intensive care unit (ICU) and deaths.
Patients were given guidance of a simple exercise and training program to complete in their rooms with treadmills (10 min, 3/day), and dumbbells (2/day), according to their capabilities.

RESULTS: Most prevalent on women 58,82% (10/17) with an average age of 49,76. Main diagnosis was acute myeloid leukemia 41% (7/17). All patients received rehabilitation.
Initial Sarc F scale: 47% (8/17) pointed 0pts (normal), 47% (8/17) 1 or 2pts (prefragile A or B), and 5% (1/17) 3pts (fragile). Second evaluation, near the end of the hospitalization, classified 86% (13/15) normal, and 13% (2/15) prefragile. No sarcopenic patients.
Mode for the first sit-up test was P10 (well below average), corresponding to 47% (8/17) of the patients, and only 18% (3/17) obtained results above P50. Before discharge, 20% (3/15) improved their score percentile, 33,3% (5/15) maintained a P10, and 20% (3/15) achieved >P50.
Initial SPPB showed 41% (7/17) of the patients with none/very low limitation (10-12pts), 41% (7/17) low limitation (7-9pts), and 18% (3/17) moderate (4-6pts); values that increased to 86% (13/17) with none/very low limitation and 14% (2/17) low limitation (7-9pts) before discharge.
Only one patient referred joint limitation (shoulder) and there were no vertebral fractures. No session was interrupted from pain.
At the beginning of treatment, 65% of the patients had 8-10 mg/dl hemoglobin; 53% <3.500 leucocytes; and 53% >100.000 platelets. This was not a limitation to exercise.
The mean stay was 48 days. Only 2 patients required ICU and no patient required admission on the following two weeks. 2 patients died during this period. 4 relapsed the following year, and 4 were reported dead further on.

DISCUSSION AND CONCLUSION: Adding an exercise program in oncohematological patients during their stay for transplantation could benefit their functional capacity.

Collaboration with the hematology and endocrinology departments as a multidisciplinary team optimizes patient's condition and treatment response.
By not showing deterioration or even observing improvement in the different scales measured, we can infer success of the program.
No side effects were detected.

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Comparability of an Online-Hybrid Version of a Previously Clinic-Based Interdisciplinary Program for the Management of Chronic Pain and Mental Health in Injured Workers: A Retrospective Cohort Study

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BACKGROUND: Chronic pain (lasting >3 months) is a debilitating condition affecting roughly ~ 30% of adults worldwide (1).
A growing interest in the use of telehealth programs to treat chronic pain has emerged, especially under COVID-19 pandemic and resulting lockdowns, which forced the temporary closure or significant reduction in client capacity of many tertiary healthcare providers (2,3).
The interdisciplinary Pain and Medication Management Program (PMMP) for injured worker was delivered exclusively in-clinic prior to the COVID-19 lockdowns and was relaunched from June of 2020 as a hybrid program offered via telehealth. It is unknown how in-clinic interdisciplinary pain management programs compare to themselves when that same program is then delivered via online/telehealth services.

AIM: To understand if online-hybrid interventions held during the COVID-19 pandemic were comparable to in-clinic interventions for injured workers.

METHOD: Data was analysed from 57 adults (N= 27,In-Clinic Group=ICG and N=22, Online/Hybrid Group OHG) enrolled in an interdisciplinary, single-centre Pain and Medication Management Program (PMMP) via workers compensation insurance scheme in Canada. Baseline variables compared included age, sex, job attachment, diagnosis of Chronic Regional Pain Syndrome (CRPS), mental health disorder, and medical comorbidities as per the Charleston Comorbidity Index (CCI). Comparable effectiveness and feasibility were evaluated via attendance and score changes at intake and discharge on the Brief Pain Inventory Interference subscale (BPI-I), the Beck Depression Inventory (BDI), and the Morphine Equivalent Dose (MED). Differences in baseline variables and score changes were analysed using descriptive statistics and tests of significance.

RESULTS: From 57 people screened, 49 (27 ICG and 22 OHG) provided complete data basis for analysis. There was no group difference at baseline regarding age, sex, formal mental health or CRPS diagnosis, CCI, program attendance, BDI or MED baseline scores ($p>0.05$). However, the ICG having significantly more job attached participants at intake and discharge than the OHG ($p<0.05$). Participants in the ICG scored higher on the BPI-I and experienced greater score reductions from intake to discharge, and job attachment in the ICG was associated with higher BPI-I scores. ($p<0.05$).

DISCUSSION AND CONCLUSION: The online/hybrid version of the PMMP was comparable to the in-clinic version in terms of attendance, depression, and pain medication usage, but not pain interference. Being job-attached was associated with higher pain interference at both intake and discharge; however, no decisive conclusions can be drawn due to the extraordinary circumstances of the COVID-19 pandemic. Further research is needed under typical conditions to explore the comparability of in-clinic versus online/hybrid delivery of similar programs for those with chronic pain.

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Interesting Case Presentations 3

Hirayama Disease- Case Report of 10 Year Period Follow-Up

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BACKGROUND: Hirayama's disease is a rare neurological disease that is more frequent in males, in a ratio of 7:1. It usually begins between adolescence and the third decade of life, but its presentation is insidious, which often leads to a delay in the definitive diagnosis.

AIM: To make a description of case report of Hirayama disease patient and it's follow-up in a 10-year period.

METHOD: case report

RESULTS: We describe the case of a 17-year-old boy with no significant pathological history who is observed by complaints, with a year and a half of evolution, of strength deficit in the right hand, pain in the cubital border of the anterior aspect of the right forearm and fine motor deficit in the 4th and 5th fingers of the right hand. On physical examination, unilateral atrophy of the right upper limb (RUL) was observed in the thenar, hypothenar and intrinsic muscles of the hand, as well as on the cubital side of the anterior aspect of the forearm, in association with unilateral muscle strength deficit in the distal extremity of the RUL, grade 3 and 4 on the medical research council (MRC) scale, in the myotomes dependent on C7, C8 and T1. No changes in sensation, osteotendinous reflexes, or gait pattern were evident.
Initial electromyography (EMG) documented bilateral extensive neurogenic changes (more pronounced on the right) in the myotomes of C6, C7 and C8-T1. Motor nerve conduction studies documented low diffuse amplitude of the right cubital nerve.
Cervical, and brachial plexus MRI showed mild atrophy of the right trapezius muscle, mild spinal cord atrophy at the C6 level, a slight increase in hyper signal on the T2-weighted sequence, and flattening of the right anterior aspect of the spinal cord. In view of the clinical suspicion of Hirayama's disease, a dynamic cervical MRI with contrast and cervical flexion was performed, which showed an increase in the volume of the epidural plexus, a reduction in the amplitude of the subarachnoid space, and a reduction in the anteroposterior diameter of the spinal cord on the right between C6 and C7-D1, which confirmed the diagnosis of Hirayama's disease, approximately 20 months after the initial onset

DISCUSSION AND CONCLUSION: After the diagnosis, he started the usage of a soft cervical collar daily for 3 years with the association of a rehabilitation program focusing on cervical muscle strengthening, manual dexterity training, fine motor skills and activities of daily living. After 2 years, progression of the disease had stopped and subsequent gradual recovery from the atrophy of the muscles involved and the muscle strength of the RUL, proven by serial evaluations of dynamometry. Electromyography the disease stabilized after 4 and half years after the initial diagnosis.
Currently, 10 years after the inaugural symptomatology, the patient presents without pain, with muscle strength and trophism of the distal extremity of the RUL almost completely preserved, being very independent in ADLs, sporadically requiring physiatrist treatment in periods of exacerbation related to cold weather.

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The Buttock Claudication, a Rare Type of Claudicatio Intermittens: Brief Review and a Case Report

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BACKGROUND: Intermittent claudication (IC) typically refers to lower extremity skeletal muscle pain that occurs during exercise because of insufficient oxygen delivery for the metabolic requirements of skeletal muscles or of the related neural roots. IC is a common manifestation of spinal stenosis or peripheral arterial disease and is commonly localised to the thigh, hip, buttock, and calf muscles. Pain is induced by walking and relieved with rest.(1)

AIM: In the differential diagnosis of IC, one should not forget to consider the buttock claudication (BC), an infrequent disorder due in most cases to an obstruction in the superior gluteal artery or at the origin of the internal iliac artery (IIA).
We provide a short review of the literature from the functional point of view of PRM and a case report.

METHOD AND RESULTS: Literature evidences that BC is an uncommon complication after surgery for occlusive (2.1%) or aneurysmatic aortoiliac lesions (1.5%). It can also occur as the result of atherosclerotic occlusive disease: in this case is more evident because the only compensatory system is represented by collateral vessels from contralateral IIA, whose efficacy is limited.(2)
A low Ankle-Brachial Index (ABI) ≤0.90 is a first-line test for the diagnosis of lower extremities arterial disease. BC is a diagnostic challenge because usually there is a lack of a low ABI.
The treadmill test (3 km/h speed; 10% slope) is an excellent tool for functional assessment and exercise rehabilitation follow-up. The test ends when patient is unable to walk further because of pain (maximal walking distance).
Doppler ultrasonography is the first line imaging exam, followed by Computed Tomography Angiography and Magnetic Resonance Angiography.
Imaging data should always be analysed considering symptoms and hemodynamic tests prior to treatment decision.

DISCUSSION AND CONCLUSION: According to international guidelines, these patients should receive a wide therapy approach consisting of cardiovascular risk management, lifestyle counselling and exercise therapy.(3)
Current evidence supports supervised exercise therapy as primary treatment to improve walking capacity and health-related quality of life (QoL).(3)
Endovascular revascularization does not provide significant benefits compared with supervised exercise alone in terms of improvement in functional performance or QoL; instead, a synergetic effect may occur when it is combined with exercise.(3)
Alternative modes of supervised exercise training, such as cycling, nordic-walking and strength-training are associated with a significantly improved walking capacity. Nonetheless, recent studies have not shown a significant difference between traditional walking and alternative types of exercise regarding maximum and pain-free walking distance, which means that both interventions yield similar improvements.(3)

Combination of aerobic activities and low-intensity strength-exercises of gluteal muscles might be preferable, as these provide development of compensatory collateral arterial circle with the most extensive health benefits, according to Physical Activity Guidelines.(4)
The PRM specialist, while evaluating an IC, must remember the existence of BC as a possible, although infrequent cause.

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Effect of Intermittent Cervical Traction in Patient With Cervical Radiculopathy: Case Report

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BACKGROUND: A whiplash injury to the neck worsens the symptoms of cervical radiculopathy.

AIM: The paper aims to show the effect of cervical spine traction applied as part of physical treatment in a patient with cervical radiculopathy at the C5-C6 level.

METHOD: A 49-year-old female patient was admitted to hospital rehabilitation after a whiplash injury to the neck sustained in a traffic accident 6 months earlier. She complains of neck pain and stiffness, pain in the right shoulder radiating to the right shoulder. Earlier she had radicular pain along her left arm. An NMR of the C spine was performed which showed a focal left subarticular disc protrusion at the C5-6 level with compression of the anterior radix of the left C6 nerve and consequent compressive myelopathy. Performed outpatient physical therapy with partial improvement. On admission, the clinical report showed signs of right-sided C5-C6 radiculopathy. Involved in physical treatment of a total duration of 14 days, which included: kinesitherapy, intermittent traction of the cervical spine at the C5-C6 level, hydrotherapy, thermotherapy, and occupational therapy 6 days per week. Monitoring parameters were: VAS scale of pain, Shober index for cervical spine, NDI (Neck Disability Index) and MR of the cervical spine. The follow-up period was 14 days for all the mentioned parameters, except for MR, which was performed 3 months after the completion of hospital rehabilitation.

RESULTS: After completed hospital rehabilitation, the VAS pain scale dropped from the initial 7 to 1. The value of the Shober index for the cervical spine was 5.5 cm at the admission, and 10 cm at the discharge. There was no neurological deficit at discharge. The NDI was reduced from the level of moderate disability (48%) to the level of severe disability (26%). Control MRI of the cervical spine showed complete correction of the protrusion at the C5-C6 level.

DISCUSSION AND CONCLUSION: Intermittent traction of the cervical spine as a therapeutic procedure can significantly reduce symptoms and signs of cervical radiculopathy caused by disc protrusion. There is no accurate description of the mechanism of relief provided by cervical traction. The theory behind its efficiency emphasizes the widening of the intervertebral foramen upon traction, with separation of the facet joint. This will relieve the sustained pressure on the nerve roots, and hence alleviate symptoms of radiculopathy. Other theories suggest that traction allows for cervical muscle relaxation, and is not involved in intervertebral separation.

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Peripheral Nerve Block in the Treatment of Complex Regional Pain Syndrome

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BACKGROUND: Complex regional pain syndrome (CRPS) is a debilitating condition that affects millions of people worldwide and it can severely impact an individual's quality of life and daily functionality. (1)

AIM: This case report aims to describe the effectiveness of nerve block in the management of neuropathic pain in a patient who suffered from CRPS in the context of median nerve release due to carpal tunnel syndrome.

METHOD: A 54-years-old woman was diagnosed with carpal tunnel syndrome on the right hand and underwent median nerve release. One month after surgery, she began experiencing neuropathic pain (VAS 9/10), with pericicatricial allodynia. In the douleur neuropathique 4 questions (DN4) she scored 6/10. On physical examination, she presented marbled skin, hyperhidrosis and edema of the right hand and wrist, pain when mobilizing the wrist, decreased active mobility and decreased grip strength. The patient was diagnosed with CRPS. She was treated with a 5% lidocaine patch, NSAIDs and gabapentin and began a rehabilitation program with contrast baths, ultrasound therapy, laser therapy, tactile and thermal desensitization techniques and mirror therapy (visual feedback), with an improvement in her pain complaints to 6/10 (VAS). She underwent an MRI of the right wrist which revealed no major changes.

RESULTS: Due to the persistence of pain, a right median nerve block was performed with ropivacaine 40 mg/ 20 mL 2 ml and saline solution 1.5 ml, without complications. One month after the procedure, the patient reports a significant reduction in allodynia, intensity 2/10 (VAS). On physical examination, there was minimal hypersweating, no edema and no pain or limitation to active mobilization of the wrist. The patient increased adherence to the rehabilitation program, leading to functional improvement, and he was able to return to work.

DISCUSSION AND CONCLUSION: The management of neuropathic pain requires a multidisciplinary approach, including pharmacological and non-pharmacological interventions, and aggressive management when necessary. (2) According to the literature, peripheral nerve blocks in the median nerve resulted in significant pain reduction in the hand two weeks after injection and were well-tolerated in patients with CRPS. (3) This case report highlights the effectiveness of peripheral nerve blocks in neuropathic pain management and as a promising alternative in patients who have failed conventional treatments.

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Special Sessions

Session of PRM Board

The European Survey on PRM education

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The Implementation of Revised ETR and EPA

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The UEMS Board for Physical and Rehabilitation Medicine (PRM) has been responsible for educational affairs since 1991. In line with the aims of the UEMS, the European PRM Board aims to promote patient safety and quality of care by developing the highest standards of medical training and health care across Europe. The European training requirements (ETR) for PRM represent the main regulatory document defining essential theoretical knowledge required for proficient practice in the PRM speciality and the minimum competencies that trainees must exhibit upon training.

The first version of the ETR for PRM, issued by the Board in 2017, marked a significant milestone. It underwent a comprehensive review of existing training requirements for PRM across European countries, defining the scope of PRM as "the medicine of functioning" and outlining the training standards for trainees, trainers, and training institutions. The curriculum was a culmination of the 2011 European Curriculum in PRM, integrating the core competencies the PRM physicians were required to achieve, to complete their postgraduate education. In 2022, the EBPRM embarked on the first update of the ETR in PRM, incorporating recent advancements in medical specialist education and assessment, and aligning with the provisions of the "Guide for using a contextualized competency framework to develop rehabilitation programmes and their curricula". (1). The ETR indicates learning outcomes, establishing the level of competence a PRM trainee must exhibit to allow independent clinical practice and to be able to care for patients at any stage of the disabling health condition. The level of performance may vary across European countries and places; however, the list of theoretical knowledge issues and skills describes the basic requirements one would expect of a European PRM physician. The key competencies and relevant activities that a resident/trainee is expected to achieve by the end of the training program are grouped into five different domains: PRACTICE, PROFESSIONALISM, LEARNING and DEVELOPMENT, MANAGEMENT and LEADERSHIP, and RESEARCH.

A novel addition in this version of the ETR is the incorporation of Entrustable Professional Activities (EPAs). The EPAs are presented as an annex, with the competencies which should be attained in varied clinical settings. EPAs provide a practical framework for assessing the proficiency of PRM trainees in real-world scenarios. This list is adaptable, allowing training authorities and institutions to modify it according to local requirements and circumstances.

The introduction of EPAs in the training process signifies a shift towards a more practical and competency-based approach. This evolution in training methodology is expected to directly translate into enhanced patient care. By ensuring that PRM physicians are well-trained, with the necessary competencies and skills, the ETR update contributes significantly to improving rehabilitation services and patient outcomes in Europe.

The European PRM Examination: From MCQ Making to the Analysis of the Results

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The European Board of Physical and Rehabilitation Medicine (EBPRM) conducts an annual computer-based examination, comprising one hundred multiple-choice questions (MCQs. The questions are meticulously prepared, based on the learning objectives outlined in the European PRM curriculum. The Examination Blueprint ensures a balanced set of questions, with specific percentages allocated to each chapter of the curriculum.

The creation of MCQs for EBPRM examinations entails a rigorous process. Initially, examiners undergo training to improve their skills in writing high-quality MCQs. Subsequently, questions are prepared by the trained examiners, on the domain of their expertise. The MCQs are presented and get thoroughly evaluated during workshops organized for the examiners. Finally, the EBPRM Examination Committee conducts a comprehensive revision of the MCQs to ensure their quality and relevance.

For the question writing process, the EBPRM adheres to established principles of effective item writing, as outlined in the guidelines issued by the Council for European Specialist Medical Assessments (CESMA). EBPRM aims to assess not only knowledge and recall but also comprehension and critical thinking skills. Therefore, candidates receive scenarios that necessitate higher-order cognitive abilities such as analysis, evaluation, and decision-making.

The quality of the European PRM Board Examination is achieved through a systematic quality assessment procedure.

A. Feedback from Examinees and National Managers:
Immediately following the examination, examinees are anonymously surveyed, addressing various aspects of the examination's organization, administration, and scientific content. The feedback from national managers, responsible for coordinating the examination at a national level, as well as invigilators, is also collected. The results of these surveys are presented to the Jury and are taken into account during the discussion of examination results.

B. Post Hoc Analysis of Results:
The primary statistical validity analysis of examination results is conducted, encompassing parameters such as mean and median scores, standard deviation, internal consistency coefficient, skewness, kurtosis, error ratio, and standard error. These metrics provide insight into the quality of the examination compared to previous years. Furthermore, the difficulty and discriminative power of each question are statistically evaluated and an option analysis is performed to identify potential issues with the correct answer or the plausibility of distractors. The secondary clinical validity analysis reviews questions that were problematic during the primary statistical assessment. A panel of experts evaluates the scientific soundness of these questions. The panel's recommendations are presented to the Examination Jury, which is responsible to decide whether problematic items should be excluded from grading and corrections be made to eventually erroneous key options.

C. SWOT Analysis:

The Examination Committee conducts an annual SWOT analysis to identify strengths, weaknesses, opportunities, and threats, facilitating continuous quality improvement and strategic planning for future examinations.

In conclusion, the meticulous evaluation procedures employed by the EBPRM underscore its commitment to maintaining the highest standards in the assessment of PRM physicians. Through a systematic approach that includes feedback collection, thorough statistical analysis, and ongoing strategic evaluation, EBPRM ensures the validity, reliability, and relevance of its examinations.

Integrating the European PRM Examination in the National Qualification System

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The European Physical Medicine and Rehabilitation Board examination has a long tradition in Belgium. The first examination was held in Ghent about thirty years ago. In the last ten years or so, this examination has become compulsory in the country. It is part of the final examination required for certification in physical and rehabilitation medicine. This presentation will discuss the advantages and limitations of this examination. Feedback from residents and academic leaders will be presented. The long positive Belgian experience with the examination will be shared.

Rehabilitation in Emergencies

WHO Rehabilitation in Emergencies approach: Ukrainian experience

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Rehabilitation Response in Israel Following Gaza Conflict

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On October 7th, 2023, a devastating terrorist attack struck the southern region of Israel, employing coordinated air, sea, and ground assaults against civilian populations. The Soroka Medical Center in Beer Sheva found itself at the forefront of a mass casualty event, facing hundreds of individuals injured by gunfire, explosives, burns, stabbings, and crushing injuries.

In response to the overwhelming scale of the crisis, the Soroka rehabilitation department swiftly enacted emergency measures to provide urgent and effective care to the growing influx of patients. Their goal was to support the acute care surgical departments in managing the unprecedented workload.

Reorganization of the Rehabilitation Department: Initially, the rehabilitation department prioritized patients who were on weekend leave at home, a routine practice for Fridays and Saturdays. These patients were divided into two categories:

- Those Requiring Continued Inpatient Rehabilitation: Patients in this category, regardless of the war-related circumstances, were identified and prioritized for ongoing inpatient care within the facility.
- Those Suitable for Ambulatory Care: Patients deemed likely to fare well with the transition to ambulatory care, such as through a day rehabilitation center, were identified and prepared for this transition.

Additionally, patients who expressed a preference to remain at home in areas deemed safer from the ongoing conflict or missile impacts were honorably discharged upon their request. This strategic decision effectively freed up more than half of the department's beds to accommodate new patients requiring immediate care.

Located within the same medical center as the emergency room, intensive care unit, and surgical departments responsible for treating the majority of the wounded, the Soroka rehabilitation department possessed a unique advantage: it could admit patients in close proximity to their initial admission or surgical interventions. This proximity facilitated daily inspections by surgeons, enabling many patients to commence inpatient rehabilitation as early as one day following their surgeries. In numerous instances, patients underwent further surgical interventions while undergoing rehabilitation in our department, swiftly returning to rehabilitation as soon as possible thereafter.

Adapting Rehabilitation Practices for Prolonged Military Conflict:

As the realization of an extended military conflict dawned in the aftermath of the initial days of warfare, collaboration between the rehabilitation department, mobile rehabilitation teams, and acute care surgical departments evolved into a more streamlined approach:

- Enhanced Patient Turnover: With the surge in demand for inpatient rehabilitation services, the focus shifted towards achieving a high turnover of patients. This involved conducting thorough initial assessments of patient goals, followed by structured rehabilitation periods and comprehensive discharge planning.
- Expansion of Inpatient Rehabilitation Facilities: To accommodate the increased caseload, the inpatient rehabilitation department expanded its capacity by establishing a second site. This site featured a dedicated area exclusively for individuals injured in the 7.10 attacks and subsequent conflict. Staffing requirements were met by reallocating personnel from ambulatory services, which had experienced reductions in capacity due to the ongoing warfare.
- Expanding Psychosocial Support: Recognizing the acute stress experienced by all admitted patients, particularly in the wake of extreme violence, the psychosocial service underwent significant expansion. Each conflict-affected patient received an initial assessment for signs of Acute Stress Reaction.

Additionally, heightened emphasis was placed on addressing sleep disturbances, with nearly all patients reporting difficulties in this regard.

- Integration of Therapeutic Services: In response to the influx of volunteers eager to aid the wounded, various therapeutic services were introduced. Notably, a therapy service utilizing emotional support canines was successfully integrated into the rehabilitation process. Moreover, volunteers consistently organized group activities and musical therapy sessions, providing additional avenues for healing and support.

Rehabilitation of earthquake victims in Turkey

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What We Experienced in Earthquake and Post-Earthquake Rehabilitation?
In February 2023, a devastating earthquake struck the Southeast of Turkey, marking one of the most catastrophic natural disasters in the country's recent history. This seismic event not only caused significant loss of life and destruction in Kahramanmaraş but also affected surrounding provinces and extended its impact to neighbouring countries. The death toll rose rapidly, with thousands of injuries reported. More than fifty thousand people died and hundreds of thousands have been injured.

Referral of Earthquake Victims to Rehabilitation Units
There was no center left in the region to rehabilitate the injured victims. According to the multicenter descriptive study of the Turkish Society of Physical Medicine and Rehabilitation (TSPMR), the vast majority of patients (92%) were referred for treatment outside the cities of the earthquake (1).
Clinical, Social and Economic Profile of Injured Earthquake Victims
As patients began to be admitted to PRM clinics, the specific situation created by the earthquake became clearer. The TSPMR study in which 1571 patients from 54 centres were recorded, the following striking information was obtained.

- 10.5% of the patients were refugees under temporary protection.
- Of the 1571 patients who needed rehabilitation after the earthquake, 113 patients received outpatient services, 91 patients were hospitalized for 1-10 days, 447 patients for 10-30 days and 920 patients for more than 30 days. 505 of the patients were followed up in the intensive care unit when they were first admitted to the hospital.
- According to the, about half of the patients hospitalized for rehabilitation had a first-degree relative loss. 72.9% of patients were trapped under debris and 63.5% of the victims had been waiting for rescue for one to three days. The longest waiting time for rescue was 195 hours.
- Most patients had more than one disabling medical condition. The most common diagnosis were soft tissue trauma and regional pain, peripheral nerve damage-plexopathy, compartment syndrome, fractures, spinal fracture and amputation respectively.
- The rate of multiple fractures was 82% among patients with fractures. Most of the fractured patients were complicated with another clinical condition such as compartment syndrome or peripheral nerve injury.
- Multiple fasciotomies were performed in 23,3% of the patients.
- At least one peripheral nerve injury was detected in 38.4% of the patients.
- Spinal cord injury occurred in 12% of the patients.
- Amputation rate was 11.2%. 19.9% of patients with amputation had amputation in more than one extremity. The three most common amputation levels were transfemoral, transtibial and foot amputations.
- PRM specialists predicted the final status of patients as follows according to their clinical experience. 76% of patients were expected to be able to live independently, 19% of patients will be able to return to social life with caregiver support, and 5% of patients will need nursing home or long-term rehabilitation services (1).

Osteoarthritis

Update in Rehabilitation of Hand Osteoarthritis

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BACKGROUND: Hand Osteoarthritis (HOA) is a common musculoskeletal disease,affecting small joints of hands and wrists,increasing with age. The symptoms and signs of HOA;are hand pain,stiffness,functional limitation in daily activities of life,decreased grip strength and reduced quality of life.

AIM: In this research article ,our aim is to present research about Update in Rehabilitation of Hand Osteoarthritis (HOA).

METHOD: New information from Guidelines, SRs and RCT published in last 5 years,is mentioned in this update research about Rehabilitation of HOA,which made recommendations or evaluated the persons with HOA.
Essentially in 2022,Management of HOA from an US evidence‐based medicine guideline,to a European patient‐centric approach is published and written by an ESCEO expert working group about management and rehabilitation especially which gave much importance,to patient preferences research in HOA.
Research covered «Pubmed Database» and «Web for Management of HOA guidelines» written in English and extracted their recommendations.
Also referred to earlier guidelines,especially,(Eular Recommendations for HOA Management and Eular Recommendations for Hand OA Diagnosis,when guideline updates referred to these former guidelines where evidence and recommendations were not changed.(4,5)

Intended to provide guidance for management of HOA and to disseminate best evidence-based strategies in management of HOA,from these revised guidelines.

RESULTS: Available guidelines and consensus recommendations on HOA;recommend exercises as part of current best practice,for HOA rehabilitation.
Also the combination of splints,for thumb base OA, orthoses and exercise regimen reduce pain and improve functionality in the short and long term and prevent/correct lateral angulation and flexion deformity.
There is strong evidence to support the recommendation of strengthening, stretching and joint mobility exercises for rehabilitation of HOA. These recommended exercises, however, lacked specific details regarding the type and dosage (frequency, intensity and time) for optimal uptake, which therefore need to be established through research.
Hand exercise recommendations for the HOA rehabilitation:
1)Exercises to improve hand function and muscle strength, and reduce hand pain such as strengthening, stretching and joint mobility exercises should be considered for every patient with HOA. These exercises can either be prescribed as home- based or supervised weekly exercises over several weeks.Grade of recommendation(A)Strength of recommendation(Strong)
2)Hand strengthening exercises should be considered for HOA rehabilitation due to their clinically beneficial effect on hand pain and grip force.
Grade of recommendation(B)Strength of recommendation(Strong)
3)Exercise in combination with orthosis improves hand pain and functionality in both short and long term.Grade of recommendation(B)Strength of recommendation(Strong)

4)Education regarding an exercise regimen including muscle strengthening and ROMexercises in combination with joint protection techniques should be recommended for all HOA patients.
Grade of recommendation(GCP /good clinical practice based on expert opinion)
Strength of recommendation(Weak)
5)Advise people with HOA to exercise as a core treatment irrespective of age, comorbidity, pain severity or disability. Exercise should include local muscle strengthening and general aerobic fitness
Grade of recommendation –GCP (good clinical practice based on expert opinion.) - Strength of recommendation – Weak (1)
In pharmacological treatment of HOA; chondroitin sulphate among SYSADOAS (Symptomatic Slow Acting Drugs for Osteoarthritis)is the only agent which has shown efficacy for pain and function.(2)
Regarding intra-articular hyaluronic acid,or,steroid injections,patients emphasised that they need to see some proof of efficacy,and,that they would prefer devices using small needle,minimal volume of injection and,if possible,as few injections as possible.(2)

Patient preference research and the derived health economics research support the use of a pharmacological management of HOA in addition to rehabilitation.
Corticosteroid injections appear to be a promising approach in acute phase of disease with hyaluronic acid for chronic symptoms but both require further demonstrations of efficacy and safety.
Biologic agents have shown no significant benefit,to date. (2)In pharmacological treatment of HOA,with respect to Update of the EULAR recommendations for management of HOA topical treatments are preferred over systemic treatments because of safety reasons. (3) Topical NSAIDs are first pharmacological topical treatment of choice. (3)
Oral analgesics,particularly NSAIDs,should be considered for limited duration for relief of symptoms.(3)
Also according to Kloppenburg et al.; (3) Chondroitin sulfate may be used in patients with HOA for pain relief and improvement in functioning.Intra-articular injections of glucocorticoids shouldn't be generally used in patients with HOA,but may be considered in patients with painful interphalangeal joints.Patients with HOA should not be treated with conventional or biological disease-modifying antirheumatic drugs.Surgery should be considered for patients with structural abnormalities when other treatment modalities have not been sufficiently effective in relieving pain. Trapeziectomy should be considered in patients with thumb base OA and arthrodesis or arthroplasty in patients with interphalangealOA. (3)

DISCUSSIONS AND CONCLUSION: As a result of this research ,it is concluded that;
Optimal Management of Hand OA requires;a combination of,especially Rehabilitation and Pharmacological management modalities and must be individualised to the patient's requirements,best results are achieved when both Pharmacological,and,especially Rehabilitation modalities are applied together.Long-term follow-up of patients with HOA should be arranged according to to the patient's individual requirements.
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Update in Rehabilitation of Hip Osteoarthritis

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UPDATE IN REHABILITATION OF HIP OSTEOARTHRITIS

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BACKGROUND: Osteoarthritis (OA) is one of the leading musculoskeletal causes of global disability, mainly affecting the hip, knee and hand with increasing prevalence worldwide and inflicts a significant burden on the individuals affected, including activity limitations and reduced quality of life (1-7).

AIM: This update provides an overview of the important strategies – the core PRM strategies for optimal activity, participation and quality of life – in the treatment of individuals with hip osteoarthritis.

METHODS: Reviews, meta-analysis, guidelines with the keywords hip osteoarthritis, prehabilitation, rehabilitation, non-pharmacological and non-surgical approaches or management were reviewed by PubMed-listed publications until October 12th 2023.

RESULTS: Core Treatments for Hip OA included arthritis education (Since education, motivation and/or initiative are often lacking, these procedures have been used not regularly in clinical practice) and supervised exercise with the aims improving pain, flexibility and function, disability, participation and quality of life. (8,9)
Higher comorbidity count and lower vitality should be stabilized and/or improved because of their prediction of deterioration of physical functioning.(9) Activation by exercise therapy (strengthening, aerobic exercise, physiotherapy with instruction to self-management and/or tai chi) is recommended. (1,6,9,11)
There is no evidence which kind of exercise is best for outcome in hip OA.(6) An approach combining exercises to increase strength, flexibility, and aerobic capacity is likely to be most effective in the management of lower limb and hip OA (12). For obese people weight loss is recommended with a combination of exercise and diet with low evidence for hip OA. (6,13) But this evidence is largely from trials in patients with knee osteoarthritis.
Nonsteroidal antiinflammatory drugs (NSAIDs with low dose for a short period of time) orally unless contraindicated (or topical, e.g. for older adults >75y; effects and side/adverse effects should be monitored) and surgical interventions were recommended for disabling OA that had not improved with nonsurgical care. (1)
In case of surgical interventions / total hip arthroplasty prehabilitation in the form of a prehabilitation exercise therapy seems to be an effective prehabilitation measure with regard to postoperative physical functioning, while prehabilitation in the form of education has no significant effects. (14)

DISCUSSIONS AND CONCLUSIONS: Core Treatments for Hip OA in first-line include patient centered ongoing education, exercise (strengthening, aerobic exercise and/or tai chi) and weight loss (where appropriate). Second-line NSAIDs and third-line surgical interventions were recommended for disabling OA that had not improved with nonsurgical care.

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Improving Functioning in Patients With Musculoskeletal Diseases – Data From Evidence

New Trends in the Pharmacological Treatment of Osteoporosis

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The rising healthcare demand due to an aging population has amplified the impact of osteoporosis, a condition leading to fragility fractures with significant consequences on morbidity, mortality, and socioeconomic burden. In Italy, for instance, about 18.5% of women and 10% of men grapple with osteoporosis, with an estimated annual incidence of over 400,000 fragility fractures. This prevalence is projected to soar by 25% in the coming decades, posing serious implications for public health systems. Of particular concern are the ramifications of fragility fractures, especially hip fractures, which have affected over 500,000 elderly individuals in Italy. These traumatic events not only increase hospitalization rates but also impede healthy aging by compromising the independence and overall quality of life of affected patients. Shockingly, osteoporotic fractures rank as the fourth leading cause of morbidity associated with chronic diseases in Europe, contributing to more than 2.6 million disability-adjusted life years (DALYs) annually, surpassing hypertensive heart disease and rheumatoid arthritis. Furthermore, the financial costs incurred by hospitalizations due to hip fragility fractures rival or exceed those associated with major cardiovascular diseases like strokes and acute myocardial infarctions.

Despite the gravity of these epidemiological figures and the colossal financial burden borne by National Health Systems, two predominant issues persist in the realm of osteoporosis management: underdiagnosis and, more significantly, undertreatment, especially concerning secondary prevention care.

Pharmacological therapy remains the cornerstone of interventions for osteoporotic patients. The available anti-osteoporotic drugs boast substantial evidence regarding their efficacy and favorable safety profiles.

Bisphosphonates, the most commonly employed osteoporosis treatment, demonstrate effectiveness in reducing the risk of low-trauma fractures, with a number needed to treat (NNT) of 10 for secondary prevention. While they are effective in increasing bone density up to a certain threshold, they exhibit limitations in restoring lost bone structure or significantly improving bone microarchitecture. However, despite the robust evidence supporting the role of anti-osteoporotic drugs in fracture prevention, several factors impede their efficacy in clinical practice, such as those related to the compliance and persistence to therapy. Denosumab, an advancement in antiresorptive therapy, shows promise in enhancing treatment adherence and persistence. Additionally, it potentially stimulates osteoblastic activity in specific cortical bone areas, as indicated by animal studies, although this effect has yet to be confirmed in humans. Moreover, the bone turnover suppression induced by antiresorptive drugs might explain adverse events such as osteonecrosis of the jaw and atypical femoral fractures, particularly in patients undergoing high-dose or prolonged treatment.

Teriparatide, the primary bone anabolic drug, stimulates bone formation before enhancing bone resorption, thereby creating a maximal anabolic period (anabolic window), limiting further bone mass accrual. Novel administration routes for teriparatide, like oral, transdermal, and intranasal formulations, exhibit potential effectiveness and enhanced tolerability compared to subcutaneous injections, potentially improving patient compliance to anabolic therapy.

Abaloparatide, a synthetic analog of a parathyroid hormone-related peptide approved for clinical use, binds to the same receptor as teriparatide but with distinct binding affinities. Its strong binding to a particular receptor conformation results in higher anabolic activity of bone cells, reducing bone remodeling and early cortical porosity. In a phase III trial, it showed promise in reducing vertebral and major nonvertebral fracture risks, but concerns emerged regarding adverse effects like back pain, arthralgia, and palpitations. While initial fracture prevention findings were encouraging, claims of its superiority over teriparatide in reducing fracture risk and demonstrating enhanced anabolic effects have faced scrutiny due to limited differences observed in fracture rates and bone-related outcomes between the two drugs.

Recent developments in the pharmacotherapy of osteoporosis involve innovative approaches targeting the Wnt signaling pathway. Monoclonal antibodies against sclerostin, a protein inhibiting Wnt activity, have been developed, demonstrating promising outcomes in clinical trials. For instance, romosozumab, a monoclonal antibody, has shown significant efficacy in reducing fractures, especially vertebral fractures, albeit raising concerns about cardiovascular events and potential tumorigenic effects linked to the Wnt pathway stimulation.

Novel therapeutic solutions have been proposed, including the use of existing drugs in succession (sequential therapy) or new molecules primarily targeting bone formation stimulation. Sequential therapies involve the administration of drugs with different mechanisms of action in a sequence based on bone turnover physiology. Various combinations of predominantly antiresorptive agents with drugs exhibiting prevalent anabolic activity have been proposed, with the sequence of teriparatide followed by antiresorptive drugs showing potential effectiveness for fracture prevention, although this deviates from established regulatory norms.

In conclusion, osteoporosis and its associated fractures pose critical health and societal challenges, necessitating the precise identification and treatment of high-risk patients. While current anti-osteoporotic drugs demonstrate robust evidence, the introduction of novel pharmacological approaches aims to address persistent issues in osteoporosis management, emphasizing the need for improved long-term efficacy, safety, and patient adherence. The exploration of sequential therapies and the development of drugs targeting the Wnt signaling pathway represent promising avenues toward enhancing osteoporosis treatment outcomes.

Musculoskeletal Health in the Light of Rehabilitation 2030

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In the context of Rehabilitation 2030, a key focus has been on musculoskeletal health, encompassing an array of conditions like arthritis, osteoporosis, fractures, and pain-related issues, which collectively pose a substantial burden globally. These conditions severely impact mobility, daily function, and quality of life, leading to increased healthcare utilization, disability, and early retirement in many cases. Musculoskeletal conditions top the list as the leading cause for the need of rehabilitation, with low back pain standing out as a primary contributor across nations.

The Global Alliance for Musculoskeletal Health (G-MUSC) has rallied international efforts to address this mounting concern, calling for a global strategy to mitigate the multifaceted health, social, and economic ramifications of musculoskeletal impairments. As populations age and experience an upsurge in non-communicable diseases and injuries, the prevalence and costs associated with musculoskeletal health conditions are predicted to soar, particularly in low and middle-income countries.

These projections underline the urgent need for robust health systems capable of better preventing, managing, and alleviating the burden of musculoskeletal impairments. Rehabilitation services are being spotlighted as pivotal in this scenario. Defined as interventions addressing limitations in physical, mental, or social functioning due to health conditions or ageing, rehabilitation covers a broad spectrum of needs across diverse health conditions and impairments. Evidence suggests that cost-effective rehabilitation interventions have been successful, especially in resource-limited settings, yielding improved functional outcomes for various health conditions.

From Gait Analysis to Better Walking

Frane Grubišić, Igor Gruić

Performance and movement analysis have became a viable assessment tools not only used in sports science or basic biomechanical research, but trough conservative gait analysis, those have also expanded to be a very valuable instrument in clinical diagnostics, monitoring functional recovery and musculoskeletal rehabilitation.

For qualitative and quantitative insight and gait pattern management, feedback is provided, along with an experienced clinical analytical protocol, by fully or partially automated kinematic, kinetic, electromyographic and other systems, e.g. VICON (Vicon Motion Systems Ltd UK), BTS GAITLAB/SPORTLAB (BTS Bioengineering Corp., USA; BTS S.p.A., Italy), APAS (The Ariel Performance Analysis System; Ariel Dynamics Inc, USA), KINECT (Kinect for Windows v2, Microsoft, USA). Optoelectric or applicable 2D/3D video analysis systems integrated with IMUs and predominantly capacitive, resistive or likewise sensors and platforms, with all complementary solutions, support clinical and biofeedback solutions in various areas of application - neurorehabilitation, foot surgery, orthopaedic procedures, in patients after lower limb amputation or musculoskeletal diseases etc.

Thorough knowledge of underlying condition or disease, abberation from normal walking pattern and results from gait analysis are key information in the planning of rehabilitation protocol in order minimize the impairment and to restore this important physiological function. On the other hand, gait analysis is still not integrated in everyday clinical practice as part of standard functional assessment in both healthy population and patients due to its sensitivity and need for highly educated and experienced team.

Study performed by Marin et al. identified several important domaines when designing gait analysis protocols: (1) patients' understanding, (2) guiding the gait tests, (3) which professionals guide the gait tests, (4) gait test reports, (5) requesting gait tests (doctors and test guide communication), and the (6) conceptual design of the service with the gait test.

Gait analysis with motion capture (MoCap) during rehabilitation can provide objective information to facilitate treatment decision making. The complexity of human body anatomy as well as of neurophysiological control of locomotion have resulted with many a research endeavor pursuing novel approaches to data analysis (besides inverse dynamics and standard signal analysis) including data mining, neural networks, AI, expert systems, etc (in Medved et al 2022).

However, designing a test to be integrated into healthcare services requires considering multiple design factors. The difficulty of integrating a 'micro-service' (gait test) within a 'macro-service' (healthcare service) has received little attention in the gait analysis literature.

Key words: gait analysis, rehabilitation, outcome; kinesiology, diagnostics, intervention

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Session of Professionals Practice Committee

The Rehabilitation in Intensive Medicine – The role of Physical and Rehabilitation Medicine

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In structural, functional, multifactorial clinical contexts and disabling health conditions, Rehabilitation and Physical and Rehabilitation Medicine (PRM) play a fundamental role in a holistic activity for diagnosis, therapy, prevention and functional clinical prognosis, in critical / acute medical and surgical pathologies in Intensive Care Medicine-ICM (Intensive Care– IUC and Intermediate Care-IntUC Units), with a multiprofessional and inter-multidisciplinary approach.

The scientific literature shows clinical - health management (cost-effective) evidence of multiprofessional and inter-multidisciplinary teams, based on studies of multiprofessional/disciplinary intervention models advantages versus non-integrated mono-professional/disciplinary intervention models. It includes interdisciplinarity between medical specialties and multidisciplinary among health professionals (in rehabilitation: PRM physicians, rehabilitation nurses, physiotherapists, speech therapists, occupational therapists,..). Rehabilitation Team Work is the best clinical and management model for WHO.

Rehabilitation team organization in ICU/IntUC, under the coordination of a PRM Physician, is a clinical and management impact team model, based on the organizational, clinical activities and financing levels for rehabilitation and PRM; in the biopsychosocial model, centered in the patient; in interdisciplinary with other medical and surgical specialties, in various areas and phases of intervention.

The approach to Critically Ill's Rehabilitation is multiprofessional, inter-multidisciplinary, multimodal, individualized (even with flowcharts and protocols -"adapted standardization"), depending on patient's level of awareness and degree of collaboration, on pathology(ies) and it (their) severity, on clinical and functional complexity, on previous and current functional degree.

It includes a range of heterogeneous interventions, from 48 hours until the 5th day in IUC (accomplished the exclusion criteria), due to (medical and surgical) population heterogeneity and clinical-functional situation.
The role of the PRM Physician includes: Patient's holistic clinical- functional assessment, metric instruments and functional tests application, (additional) subsidiary diagnostic exams (SDE) performance, correlation of previous SDE and the PRM requested or applied exams, the performance of clinical and functional diagnoses, clinical meetings with other medical colleagues, PRM clinical and functional prognosis, rehabilitation team coordination (clinical discussion, prescription, supervision of multiprofessional interventions), critically ill's alignment decision at IUC discharge to other levels of health (rehabilitation) care.

In the various rehabilitation interventions for critically ills are: promotion of early removal of sedation, improvement of delirium, promotion of ventilatory weaning and tracheostomy decannulation, functional respiratory reeducation, neuromuscular electrical stimulation, early mobilization, transfers and gait training, orthopedic, neurological and effort reconditioning functional training. Metric assessment instruments are need as: Chelsea Critical Care Physical Assessment tool or Physical Function ICU test, Perme Intensive Care Unit Mobility Score, Morton Mobility Index. Also, different PRM/ multiprofessional functional texts, ICF, others SDE should be carried out.

The PRM role and Rehabilitation Team Work enables high level and earliest respiratory functional reeducation, neuromuscular electrical stimulation and mobilization in critically ills.

In health management, we allocate limited economic/financial resources to virtually unlimited needs of Health, namely in critical, acute, subacute and chronic patient's rehabilitation, through the continuum of different levels of care. Health management "opportunity cost" of developing Rehabilitation and the activity of the PRM Physician in ICM is measurable in "Monetary units", "Functionality", Activity", "Participation", "Quality of Life", "Years of life saved" versus "Mortality" and "Co-morbidities".

Frailty: definition/ assessment The definition of the frailty syndrome and methods for assessing frailty and The bidirectional relationship of frailty and cardiovascular disease

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Frailty emerges as a critical concept in the rehabilitation management of aging populations. The session aims to dissect the multifaceted nature of frailty, starting with its definition, transitioning into the methodologies employed in its assessment, and unraveling the intricate bidirectional relationship it shares with cardiovascular disease (CVD).

In this session we will emphasize in its recognition as a clinical syndrome that embodies more than just physical weakness or the inevitable consequences of aging. We will overview various tools and indices used in clinical settings and research to evaluate the presence and severity of frailty. The relevance of tailored assessment strategies to accurately capture the nuanced presentation of frailty across diverse populations will be underscored. Finally we will delve into the complex, bidirectional relationship between frailty and cardiovascular disease. Evidence will be presented to illustrate how frailty not only predisposes individuals to increased vulnerability to CVD but also how the presence of CVD can accelerate the progression of frailty. This section will highlight key mechanisms underpinning this interplay which collectively contribute to the exacerbation of both conditions. We will address the challenges in managing CVD among frail individuals, including the heightened risk of adverse outcomes and the need for careful consideration of therapeutic interventions. Strategies for the integration of frailty assessment into the cardiovascular care pathway will be discussed, aiming to enhance patient-centered care, guide decision-making, and improve outcomes.

Long Covid - Challenges, Difficulties and Opportunities to PRM

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Spinal Cord Injury: Prevention Is Better Than Cure

Special Prevention Session of ESPRM SCI SISC and ISCoS

Christina-Anastasia Rapidi

A Memorandum of Understanding (MoU) has be developed between ISCoS (International Spinal Cord Society) and ESPRM (ESPRM SCI SISC) and signed in 2023, targeting to:

- Partnering for promotion of education, research, and best practice care for SCI
- Facilitating webinars and other joint training/exchange programmes
- Facilitating European Network of Affiliated Societies.
- Strengthening SCI services / human resources in parts of Europe where specialised SCI services remain limited.
- Raise awareness on the causes, consequences, secondary conditions and complications of SCI

OBJECTIVES TO BE ACTIONED THROUGH THE MoU

An Implementation Working Group (IWG) by members of ISCoS and ESPRM has been established to determine priorities and to support practical implementation of the MoU. The IWG consists of sub-groups which will formulate annual operational plans based on the following objectives:

1: Mapping Exercise& 2: Survey: To map existing services, key organizations and points of contact in countries in Europe. To design and circulate a survey to, organizations/individuals identified in the mapping exercise, to determine strengths and weaknesses of SCI service provision

3: Training and Capacity Development Support: To establish a training and capacity development programme for countries in Europe where SCI service remain limited and require strengthening.

4: Advocacy and Awareness: To establish an advocacy and awareness programme related to the causes and consequences of SCI and the benefits of comprehensive SCI management service provision

5: Minimal Standards: To determine minimum standards relating to SCI service provision, human resources, information and data collection, financing, and policy

6: Autonomic Dysreflexia (AD) – Information Card: To develop a European/International standardized AD information card highlighting causes, management and prevention of AD

7: European Regional SCI Network: To establish an appropriate and relevant European SCI Regional Network

This special session on prevention is one more action of the implementation of the ISCoS-ESPRM MoU focusing on training and continuing medical education concerning SCI.

ISCoS Prevention Committee - Preventing SCI - Introduction

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Prevention of spinal cord injury (SCI) and subsequent secondary complications is extremely important in reducing the morbidity, mortality and costs associated with these injuries. Prevention of SCI begins with raising awareness and implementing evidence-based strategies to reduce risk factors in various areas, including motor vehicle accidents, falls, sports-related injuries and violence. Public education campaigns, legislation promoting safety measures, and integration of injury prevention protocols into clinical settings are key components of primary prevention initiatives. By addressing modifiable risk factors and promoting a culture of safety, healthcare professionals and policy makers can significantly reduce the incidence of SCI.

Furthermore, prevention of secondary complications after SCI is of utmost importance for optimising long-term outcomes and improving quality of life for individuals living with SCI. Secondary complications such as pressure ulcers, musculoskeletal problems, neurogenic bladder and bowel dysfunction, respiratory complications, pain, autonomic dysreflexia and cardiovascular problems can worsen disability and reduce quality of life and functional independence. Through comprehensive care plans including patient education, regular follow-ups and multidisciplinary interventions, healthcare teams can reduce the occurrence and severity of secondary complications.

Furthermore, the economic burden associated with SCI and its secondary complications emphasises the importance of prevention. Preventive measures not only alleviate the burden on health resources, but also the financial and psychosocial burdens on individuals affected by SCI and their families.

In conclusion, prioritizing prevention efforts for both primary SCI and secondary complications is essential in reducing the incidence, severity, and impact of these devastating injuries. By advocating for and implementing effective prevention strategies, we can strive towards a future where SCI and its associated complications are minimized, allowing individuals to lead healthier, more fulfilling lives.

Preventing complications following SCI, Acute phase

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Preventing Complications Following SCI, Sub-Acute Phase: Highlighting Muscle & Bone Health

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Spinal cord injury (SCI) causes an extreme and sudden immobilization that leads to an altered pattern of loading of the extremities and alteration in skeletal and muscle structure due to denervation. Bone and muscle loss occur prematurely and at a higher prevalence in this population. There is a need to quantify the changes and prevent the related complications to keep SCI persons in good functional status. Many factors influence bone and muscle loss in SCI, including age and sex, level of injury, duration of paralysis, neurological complete injuries, hormonal status, ambulatory status, spasticity, and rehabilitation interventions. However, despite their importance, bone and muscle are usually neglected. Beyond drugs, rehabilitation countermeasures for bone and muscle loss include standing, electrically stimulated cycling, resistance training, and walking exercises. The purpose of this presentation is to give an update on the pathophysiological mechanisms leading to bone and muscle changes, and increase the awareness of the treating physicians with respect to bone, muscle and their consequences aiming to obtain measures to prevent bone and muscle loss.

Treatment of Spasticity and Muscle Overactivity 1

Spasticity in neurological diseases (pathophysiological mechanisms, modern diagnostics and treatment)

Mauro Zampolini[1]

Factors Associated With Favorable Response in Real-World Use of Botulinum Toxin Type A Products for Adult Patients With Upper Limb Spasticity

Klemens Fheodoroff[1]

EMG and US guided state of the art BoNtx injection for spasticity

Serdar Kocer[1]

New indications for BoNTx therapy

Jorge Jacinto[1]

EARM 1 - Architecture and Participation

Architecture and Physical Medicine and Rehabilitation Centers

Jean Paysant[1]

A new center of Physical and Rehabilitation Medicine in a University Hospital in France Process, concepts and issues

Brigitte Perrouin-Verbe[1]
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Created at the end of seventies, the university PRM center of the University Hospital of Nantes was initially set up in pre-existing buildings dating from the early 1970s.

As it was not adapted to the most severe disabilities, and no longer met the needs of patients and carers, we decided to rebuild a new centre.
The process was participative and involved both carers and patients, as well as immersion trips to other French and European centres, bringing together administrators, the medical and rehabilitation team and architects.
We had to answers to the needs of our University Department of PRM which is composed of two subdepartments /services :

- A Neurological PRM Department, a regional referral centre for spinal cord injuries (70 beds) and brain injuries (60 beds). 130 beds with highly specialized units, early post-acute beds, an important ambulatory activity.
- A more polyvalent Musculo-skeletal and Pulmonary PRM department of 80 beds.
- i.e. a total of 210 beds and 76 days hospital places

The major concepts and objectives of this project were

- What we called the principle of universal accessibility, especially for the most severe disabilities such as C2 tetraplegics and Locked-in syndromes. Accessibility not only of the building (wide spaces and circulation) with well thought-out ergonomics for patients and staff. But, above all, a digital building, with domotization and multimedia connection of all patient areas and a smartphone application that allows a free circulation for all types of patients (door opening, elevator calls).
- A greater technical platform for consultation, evaluation and rehabilitation allowing the improvement and /or the development of new technologies as for example.
  - The upgrading of our electrophysiological and autonomic investigations laboratories, the upgrading of our motion analysis laboratory
  - And for the rehabilitation platform, the development of innovative technologies
- The third major principle was a centre open to the outside world with the concept of a social integration hall, a place for relaxation and meetings where patients, carers, families and visitors can meet and share a meal or a drink. The design of the building itself allows access to the outside world, with patios in all units, a lot of light and full height windows.

The 5,000 M2 technical rehabilitation platform has been designed according to the usual main areas of activity (Occupational therapy, speech therapy, neuropsychology, Sport…) which are shared between the two departments. Only the physiotherapy areas are individualized by type of pathology. A great deal of emphasis is placed on innovative therapies (robotics, exoskeletons, virtual reality, etc, as well as simulation areas (housing simulator, driving simulator and daily life training flats, etc.) and exercise training.

This new centre is a 23,000 m2 building, spread over 5 levels, provides a unique and comprehensive access to care and meets all the health and rehabilitation needs of in particular, patients with severe neurological disabilities.

Treatment of Spasticity and Muscle Overactivity 2

Intrathecal Baclofen therapy for Spasticity. The pump is in – and now what?

Klemen Grabljevec[1]
[1]*University rehabilitation institute Republic of Slovenia Soča, Ljubljana, Slovenia*

On the recovery of disorders of consciousness under intrathecal baclofen administration for severe spasticity?

Pucks Faes[1]

Surgical Treatment of the Upper and Lower Limb Spasticity

Paolo Zerbinatti[1]

Multi-Modal Therapy in Spasticity Management: Definition and Clinical Implications

Rajiv Reebye[1]
[1]*Division of Physical Medicine and Rehabilitation, University of British Columbia, , Canada*

This lecture will define the term multimodal therapy approach in spasticity management and address the importance regarding the use of the multimodal approach in spasticity management.

It will also differentiate the term multi-modal and adjunctive therapy in spasticity management.

The mechanism of multimodal approaches and how it can act both at the central and peripheral nervous system in order to optimize spasticity management will be discussed.

This lecture will also address strategies on how to choose specific modalities for the multimodal approach and how it should be considered in order to help achieve patient and team-based active and passive treatment goals.

Session of Clinical Affairs Committee

Quality management in rehabilitation

Anda Nulle[1]

[1] *P.Stradins Clinical University Hospital , Riga, Latvia,* [2]*Clinical Affairs Committee UEMS PRM, ,*

Rehabilitation is an integral part of health care. According to the publication on the European Framework for Rehabilitation Services, rehabilitation services are very diverse, with different organizational structures for inpatients and outpatients at different stages and management, but the quality of rehabilitation services is essential in all types of services to achieve the goal of rehabilitation.

Quality management includes structure, processes and specific quality indicators for analysis. Self-assessment and external knowledge are essential for quality management. The accreditation process of the PRM programs of the Clinical Affairs Committee of the UEMS PRM Section is an effective tool for developing rehabilitation services and improving the quality of patient care. This includes the structure of the care program, collection of available epidemiological data, integration of individual rehabilitation projects with rehabilitation goals expressed in IFC categories, patient inclusion/exclusion criteria, documentation of rehabilitation processes, staffing, responsibilities in the multidisciplinary team, and strategy for further development. The rehabilitation application must describe the structure, objectives, and content of the program. The accreditation process reviews organizational aspects, including the program's human resources and technical equipment. The accreditation process is an excellent opportunity to get feedback and expertise from European PRM bodies during the review and accreditation process. In 2004, the UEMS PRM department established a European scheme for the accreditation of PRM care programs. During the pilot phase, the European jury accredited 12 programs. Later, the accreditation procedure was modernized, and 21 PRM programs have been accredited using the new system.

The program accreditation system of the Clinical Affairs Committee of the UEMS PRM Section is helpful for the quality management of PRM programs.

CAC accreditation process. Why it is important for the applicant and his team, and how to enjoy the procedure? In UEMS PRM CAC Special Session

Iuly Treger[1]

[1]Soroka University Medical Center, Beer Sheva, Israel, [2]Ben Gurion University of Negev, Beer Sheva, Israel

Describing a PRM Programme of Care in writing documents our rehabilitation practice in a structured framework, rather than to import a ready-to-use procedure. This process allows better understanding of the goals and the nature of each intervention and provides a structure for PRM activity.

Clearly describing a PRM Programme of Care is a good basis for developing a quality approach. Describing a Programme of Care will help emphasise the core elements of rehabilitation activity. The accreditation process may raise elements which can be improved through a further action plan. Structured accreditation assessments can also produce interesting data about rehabilitation outcomes.

PRM Programmes of Care can adapt general principles applicable to rehabilitation in different settings. For example, early PRM intervention in an acute care hospital for people with a brain injury will be a different programme than a community based unit. A Posture and Movement Assessment Unit may involve another type of programme structure. If you work in an urban academic environment which receives tertiary referrals from other centres, your programme may address a specific population.. On the other hand, your programme may have to satisfy diverse rehabilitation needs of a mainly rural population. Various types of rehabilitation programmes can be considered for accreditation.

Successful participation in the Accreditation of a PRM Programme of Care will provide your programme with a series of practical benefits:
Validation of the scientific background and structure of your Programme of Care.
Improvement of the quality of care for your patients.
Recognition of your PRM programme by the European body – UEMS PRM.
Visibility by the display of your programme on the public UEMS PRM website.
Advice on Programme of care structure from a panel of experts in PRM
Access to on line examples of successfully accredited programmes.
Direct exchanges within a quality network of accredited programmes.
Contribution to the comprehensive description of the European PRM Specialty.
Opportunity to participate in International and National Congresses with free registration to some.
Opportunity to publish papers in PRM Journals and to be referenced in papers published by the CAC.

Geriatric Rehabilitation, What We Need To Create an Accredited Facility

Eleftheria Antoniadou[1]

[1]*Centre Hospitalier Du Nord, luxembourg, Luxembourg*

The accreditation process of a scientific program is the best way for health care workers, stakeholders, and patients to ensure a high standard of care. In the rehabilitation of older people little is known on how to create such a program. At the same time the demographic trend globally is quickly shifting towards an "ageing population" that demands more and more high-quality rehabilitation services. In this presentation we are trying to navigate the process of accreditation of a geriatric rehabilitation unit focusing on the best evidence available, the peculiar characteristic of this population that must be addressed, all in the basis of the ICF concept of activity and participation and the comprehensive geriatric assessment as an interdisciplinary tool of evaluation and intervention.

Advancing Stroke Rehabilitation in the 21th Century: From Clinical Practice to Laboratory and Back

Shay Ofir-Geva[1], Iuly Treger
[1]*Loewenstein Rehabilitation Medical Center, Raanana, Israel*

Stroke is one of the top causes of permanent disability in the world. In the Neurological Rehabilitation department at the Loewenstein Rehabilitation Medical Center (LRMC) we strive to improve the functioning of stroke survivors in all aspects of the ICF. One of our cardinal missions is to improve stroke rehabilitation via the development of novel therapeutic techniques. This development is a multi-faceted effort which includes all the spectrum between pure neural science to clinical trials and is aided by a diverse multi-disciplinary team of clinicians, scientists and engineers.

In this short lecture I will describe how we maintain a research-oriented clinical system which benefits both the individual patient and rehabilitation science, via examples from recent works of our laboratory.

From acute department through rehabilitation and back home: regional PRM service for critically ill patients

Lena Lutsky Treger[2], Iuly Treger[1,3]
[1]Soroka University Medical Center, Beer Sheva, Israel, [2]Sought Regional Department, Clalit Medical Services, Beer Sheva, Israel, [3]Ben Gurion University of the Negev, Beer Sheva, Israel

This presentation explores the comprehensive journey of critically ill patients, starting from the acute department, progressing through rehabilitation, and ultimately transitioning back to their homes.
Focusing on the regional Physical and Rehabilitation Medicine (PRM) service, the discussion will delve into the pivotal role played by interdisciplinary teams in optimizing patient outcomes.
The example of Soroke Medical Center regional hospital as a part of regional rehabilitation service will be presented and discussed. The program was accepted for the certification process of the UEMS PRM CAC committee. Tailoring rehabilitation programs are adapted to individual patient needs, promoting seamless transitions between care settings, and fostering the ultimate goal of reintegrating patients into their homes with improved functionality and quality of life. Case studies and success stories will underscore the importance of a holistic approach to patient care in the continuum from acute illness to rehabilitation and home reintegration.

Individual Members Role and Participation in ESPRM

Individual Member Special Session

Roberto Casale

This is the first European ESPRM congress where a special session dedicated to ESPRM Individual Members (IM,s) is given.
After the many contacts via email, having a "physical" place where we can meet in person is a first step towards recognizing ourselves as a vital element within the European Society.
We will therefore have the opportunity to learn more about the opportunities that being an IM means and therefore be able to exploit them.

In this context of opportunities that being an IM's means, we will have the opportunity to find partners for our research by presenting research projects and proposing collaborations. This IM ‘s Special Session will therefore be a place of exchange of ideas and proposals of "works in progress" and not of presentation of research and data already acquired.

This opportunity is particularly valuable for those who, for example, do research in sectors such as:
- the rehabilitation of rare or uncommon diseases
- use particularly innovative or not widespread rehabilitation tools.

Precious opportunity also for those who need:
- collect more data
- test questionnaires on a large scale
- launch surveys on particular topics
- start the so-called pilot trials

Opportunities not to be missed even for those who simply have specific skills and make their skills available, for example:
- computer science, big data processing, meta-analysis, data mining etc.
- interventional skills or methodologies
- graphic skills
- English writings

Finally, and not to be overlooked, the possibility of individual IMs who have never had research experience being able to actively participate in research even if they are not part of large institutes. In all these fields, the creation of research networks outside of classic research calls becomes a winning element.
In this edition we already have the following collaboration proposals which will be presented during the special session immediately after a brief presentation on IMs activities.
Presentations will be highly informal and interactive:

1) IMs “working in progress” (Roberto Casale)

2) Platelet-rich plasma benefits for osteoarthritis (Anna Boada)

3) Are professional athletes -with or without microtrauma- at higher risk of developing osteoarthritis of the knee? (Kamala Bozan)

4) Whole-Body Cryostimulation (WBC): a new booster in PRM ? (Paolo Capodaglio)

5) Complex Regional Pain Syndromes CRPS in a rehabilitation context (Roberto Casale)

6) Adaptation and validation of patient-reported outcome measures useful for disability assessment in the countries belonging to the ESPRM (Marco Monticone)

Cochrane Rehabilitation

Providing evidence to the WHO: Cochrane Rehabilitation activities within the Rehabilitation 2030 initiative

Carlotte Kiekens[1]
[1]*IRCCS Galeazzi-Sant'Ambrogio Research Hospital, Milan, Italy*

This presentation is the first of four in the Cochrane Rehabilitation session (workshop)

BACKGROUND: Shortly after the launch of Cochrane Rehabilitation in December 2016, the World Health Organization (WHO) launched "Rehabilitation 2030: a call for action" with the aim to strengthen and upscale rehabilitation services in health systems worldwide in response to the growing needs. Cochrane Rehabilitation collaborated with the WHO Rehabilitation Programme in several projects on rehabilitation interventions in the framework of Rehabilitation 2030 and the COVID-19 pandemic.

OBJECTIVES: The aim was to provide methodological support and Cochrane evidence at the request of the WHO to inform clinical recommendations and guidance on rehabilitation management.

METHODS: Different methods have been used according to the needs of the specific projects. For the Package of Interventions for Rehabilitation (PIR), developed for 20 selected health conditions, we performed an overview of all the CSRs according to the inclusion criteria defined with WHO. The CSRs identified during the screening process were summarized using an evidence map. We grouped outcomes and comparisons of included CSRs, indicating the effect and the quality of evidence to provide a comprehensive view of what is known. Regarding the COVID-19 pandemic, we created an interactive living evidence map based on priorities for research defined in collaboration with the WHO rehabilitation programme: limitations of functioning (disability) of rehabilitation interest, the phases of the disease, and research questions at the rehabilitation micro, meso and macro level. Furthermore, indirect evidence on symptoms of post COVID-19 condition was extracted and synthesized from CSRs on the same symptoms in other health conditions.

DISCUSSION: In its collaboration with the WHO, Cochrane Rehabilitation has developed different strategies and methodologies to respond rapidly to emerging questions regarding rehabilitation interventions. The aim is to inform clinicians and policymakers to allow evidence-based decision-making. Cochrane also became a member of the World Rehabiltiation Alliance at its launch in July 2023 and participates in the research and the workforce workstream.

Navigating evidence in rehabilitation: from the ebook project to the production of overviews of systematic reviews

Francesca Gimigliano[1], Claudio Cordani, Carlotte Kiekens, Chiara Arienti, Stefano Negrini
[1]*University Of Campania "Luigi Vanvitelli", Napoli, Italy*

INTRODUCTION: Evidence-based clinical practice is a cornerstone of health services including rehabilitation. Many barriers exist between evidence derived from clinical research and practical application for clinicians. The mission of Cochrane Rehabilitation is “to improve the production, synthesis, dissemination, implementation and impact of rehabilitation evidence at an individual, organisational and health policy level, with a global view beyond professions, culture, language and economic resources”. Therefore, one of the main efforts of Cochrane Rehabilitation has been to synthetise and simplify the language of Cochrane Systematic Reviews (CSRs) to make them accessible to all rehabilitation stakeholders. Recently, we have decided to develop a new project aimed at producing overviews of CSRs with mapping to enhance knowledge translation in our field.

MATERIALS AND METHODS: Following the ebook index we will perform overviews of all the CSRs selected according to the inclusion criteria defined by the new rehabilitation definition and concerning a specific topic and. The CSRs identified during the screening process will be summarized using an evidence map, a specific methodology for identifying the literature within a research field to provide a comprehensive view of what is known and where evidence gaps exist. We will group outcomes and comparisons of included CSRs indicating the effect and the certainty of evidence to provide a comprehensive view of what is known.

RESULTS: We will present the methodological process to produce the overviews and an example of an evidence map on a specific rehabilitation topic.

CONCLUSION: This project can allow clinicians to consult the best available evidence rapidly and easily on rehabilitation and deliver updated evidence-based tools for a high-level daily practice.

Rehabilitation – COVID-19 Evidence-Based Response (REHCOVER) Action: The Last Update of the Rapid Living Systematic Review

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SARS-CoV-2 continues to infect several thousands of people daily, leading to preventable morbidity and mortality worldwide. Globally, as of January 14, 2024, there have been 774,145,135 confirmed cases of COVID-19 (278,615,939 confirmed cases in Europe), including 7,013,153 deaths, reported by the World Health Organization (WHO)(1) At the outset of the pandemic, the rehabilitation needs for patients recovering from COVID-19 were based on evidence from the critical care population and in the sequelae of COVID-19 in the short- and medium-term. Patients with severe pneumonia and admitted to the intensive care unit (ICU) were at higher risk of developing post-intensive care syndrome. So, early rehabilitation became an indispensable part of the multidisciplinary management of critically ill patients. However, all hospitalized patients, ICU and non-ICU, reported new illness-related fatigue, breathlessness, post-traumatic stress disorder symptoms, pain, voice change, cough, dysphagia, anxiety, depression, and problems with concentration, memory, and continence. From the outset of the pandemic, healthcare services have prioritized enhancing the survival of SARS-CoV-2 infected patients. This emphasis has centered on critical care, drug treatments, and vaccine development and distribution (2). However, considering the high impact of COVID-19 on motor and cognitive functions, effective rehabilitation management seems to be one of the most relevant needs for patients in the post-acute phase or with PCC. In 2020, Cochrane Rehabilitation launched the REH-COVER (Rehabilitation – COVID-19 Evidence-based Response) action to address this need. (3) REH-COVER evolved in the subsequent years and focused on updating and synthesizing the growing evidence on the role of rehabilitation in managing COVID-19 patients. In February 2022, we documented increasing evidence about the clinical rehabilitation of patients with COVID-19. Overall, the evidence was of low methodological quality, boosting the need for good-quality studies of interventions (4).

Therefore, we ran a systematic search of PubMed, EMBASE, CENTRAL , CINHAL , and the Cochrane COVID-19 Study Register to identify randomized controlled trials (RCTs) of the effectiveness of interventions for rehabilitation for COVID-19-related limitations of functioning of rehabilitation interest in adults with COVID-19 or post COVID -19 condition (PCC).

The risk of bias and certainty of evidence were evaluated using the Cochrane Risk of Bias tool and GRADE, respectively. Out of 18,950 individual records, 53 RCTs met the inclusion criteria. The narrative synthesis suggests that the effect of breathing and strengthening exercise programs on dyspnea and physical exercise capacity is uncertain compared to no treatment in non-severe COVID-19 patients. Multicomponent telerehabilitation may slightly increase physical exercise capacity compared to educational intervention in adults with PCC, but the superiority of its effect on lung function and physical exercise capacity compared to no treatment is uncertain. Finally, the effect of inspiratory muscle training on maximal inspiratory pressure compared to no treatment in adults with PCC is uncertain.

With this review, we concluded the series of rapid living systematic reviews promoted by the REHCOVER action. Over the pandemic years, the collected evidence has shown several methodological limitations that impose cautiousness in interpreting findings. Hence, high-quality evidence from other pulmonary conditions should be considered when choosing interventions for rehabilitating patients with COVID-19 or PCC.

The multifaceted nature of COVID-19 and PCC-related limitations of functioning impose the involvement of a multi-professional, interdisciplinary team, ensuring a thorough assessment of any body-function impairment and activity limitation before planning an individual rehabilitation project (IRP) that aims at the recovery of the optimal subjects' functioning. As recently emphasized in the Evidence-Based Position

Paper released by the UEMS PRM Section (5), at the end of a Consensus procedure, PRM physicians should be involved in the care process dedicated to people with COVID-19 as early as possible, addressing the patients' rehabilitation needs from the acute to the post-acute phase, in any setting, including the screening and assessment of PCC, to plan and supervise IRP delivery in the continuum of care. The PRM physician should work on the implementation and improvement of specialized rehabilitation services dedicated to people with limitations of functioning due to COVID-19 or PCC.

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Problems and solutions for evidence-generation in rehabilitation

Stefano Negrini[1]

Workshops

Putting the Biopsychosocial Model of Pain Management Into Practice - A Case Based Interactive Workshop

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In this workshop, we will introduce three cases of persistent pain in a child, an adolescent/young adult, and an adult. Different aspects and options of a biopsychosocial approach that apply to chronic pain management in patients at various stages in life are introduced. We will discuss assessment of pain and functioning in a holistic way, importance of pain education, individualized treatment and rehabilitation plan with a variety of pharmacological and non-pharmacological treatment options, importance of peer support etc.. The workshop invites participants to interact both through smartphones and live discussions. Participants can also ask questions about their own patients with persistent pain.

AnuYoga – Iyengar Yoga Rehabilitation Workshop

Lena Lutsky, Shai Kaplan, Iuly Treger
[1]*Anuyoga, Tel-aviv, Israel*

Scope

AnuYoga Workshop- 3 Hours Theory & Experiential

Background

Yoga as a way of life and with regular practice contributes to healthier lifestyle, sense of wellbeing and inner peace and is relatively common in most western countries. Yet, Yoga is also a simple yet extremely powerful and transformative rehabilitative and therapeutic tool that enables patients to improve their physical and mental health, as well as the quality of their everyday life.

Iyengar Yoga is a method developed by B.K.S Iyengar, practiced today in over 80 countries. There is an emphasis on precision of the Yoga poses which comes from a deep understanding of the connection between the body, mind, energy, and spirituality. Through precise execution of the poses, synchronized breathing and engagement of the mind, the practitioners can heighten awareness to self and surrounding.

AnuYoga is a pioneering initiative in Israel founded for the purpose of making the benefits and qualities of rehabilitative and therapeutic yoga, accessible to the widest possible population. All of our work is endorsed by research about treatment efficacy, in collaboration with leading medical and academic centers in Israel and abroad.

Goals

1. Practical experience AnuYoga as a toolbox for rehabilitation doctors, coping with challenges and burnout effects
2. Introduction to AnuYoga rehabilitative effects for patients, optimized by integrating with multidisciplinary rehabilitation teams
3. Understanding how to integrate a Yoga department in multidisciplinary rehabilitation facilities

Plan

1. Lecture – 45 minutes
   a. 35 minutes – Yoga as a rehabilitative method worldwide and the AnuYoga way. The ripples of Yoga, how to influence the well-being of the whole support system of the patients and staff
   b. 10 minutes – Ancient world meets modern world, when AnuYoga meets technology
2. Practical experience – 80 minutes
   a. The participants take part in a practical Yoga class
   b. This class will allow the staff a glimpse into efficient, simple tools for coping with burnout effects
   c. Takeaways for the participants
      i. Immediate improvement for energy, vitality, and focus
      ii. Practical tools for coping with burnout effects
         1. Physical aspects

2. Emotional stability
3. Cognitive aspects
4. Harmony of the body and mind

3.Break – 10 minutes

4. Clinical cases presentation – 20 minutes

a. Orthopedic
b. Neurological
c. Digestive System

5. Discussion, Q&A – 15 minutes

Team

AnuYoga team

- Shai Kaplan, Founder
- Teachers with rehabilitation experience

Ultrasound Muscle Anatomy (Neck, Upper Limb, Lower Limb) for Botulin Toxin Injection – Hands-On Practice on Healthy Models Workshop

Klemen Grabljevec[1]

[1]*University rehabilitation institute Republic of Slovenia Soča, Ljubljana, Slovenia*

EMG Examination and Interpretation of the Cases

Gulseren Akyuz[1], Evrim Karadağ Saygı[2], Ozge Kenis-coskun[2], Esra Giray[3]

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Electroneuromyography (ENMG) aims to provide information about the neurophysiological status of the anterior horn cell, peripheral nervous system, neuromuscular junction, and muscle. Electrophysiological consultation is essential because the definite diagnosis will bring effective treatment and follow-up procedures in the involvement of PNS. The approach to any electrodiagnostic study begins with a review of the referring information, related history, and neurological examination. The electromyographer should select the appropriate techniques/muscles/nerves based on the referring physician's request and their clinical assessment. Without the clinical guidance provided by a comprehensive knowledge of neuromuscular systems, the electrodiagnostic studies cannot be rationally selected, and the generated information may be inappropriate and lead to misinterpretation despite the technical skills of the electromyographer. Motor and sensory nerve conduction studies, needle electromyography (EMG), and special tests such as reflex responses are used to assess all parts of the peripheral nervous system (PNS). Three parameters for motor nerve conduction studies are estimated after recording, including distal latency, compound muscle action potential (CMAP) amplitude, and conduction velocity. For sensory nerves, antidromic or orthodromic studies can be employed. The assessment of sensory nerves includes distal latency, sensory nerve action potential (SNAP) amplitude, and conduction velocity. Needle EMG examination determines the duration and severity of involvement and helps distinguish the type of lesion. In this workshop, the properties of general electrophysiological ordering and reporting will be explained, and electrophysiological findings in the diagnosis of radiculopathies, entrapment neuropathies, and polyneuropathies that can be seen in the upper extremity will be discussed through cases.

Diagnostic US of Musculoskeletal system

Levent Özçakar[1]

[1]*Hacettepe University Medical School, Ankara, Türkiye*

This 1/2-day course will comprise theoretical and practical training on ultrasound examination of the upper limb joints i.e. shoulder, elbow and wrist/hand. Starting with basic principals, the participants will be able to follow lectures on joint scanning, exemplary pathologies as well as pertinent interventions. During the hands-on practical sessions, they will image normal subjects in groups of 6-7 participants per station i.e 1 instructor and 1 ultrasound machine.

Pros and cons of routinely collecting data in PRM

Ruud Selles

The growing significance of collecting clinical care outcomes is widely acknowledged. Many guidelines describe how collecting data should be part of daily clinical care and decision-making. And with the introduction of ChatGPT and other AI technologies, it is increasingly evident that big data can be a source of valuable information, new tools, and innovative science. However, effective integration of collecting data into practical healthcare settings remains a challenge. Collecting data is a potential burden to patients and clinicians and can be costly. An important question is, therefore, if the pros outweigh the cons.

At Rijndam Rehabilitation Center in Rotterdam, the Netherlands, we started several years ago with a comprehensive approach of measuring outcomes in all patient populations with a similar although diagnosis-specific approach. This workshop will present this comprehensive framework for collecting data in PRM. We will discuss that one of the current obstacles is a lack of clear and precise objectives for data collection, often revolving around vague intentions like 'providing patient information' or 'gaining insight into outcomes.' As an alternative, we will describe how outcome data can be effectively collected digitally and how the same data can 1) support individual patient decision-making, 2) elevate the quality of care, and 3) advance scientific inquiry and be used in AI applications such as prediction modeling.

Amongst others, we will discuss the following Frequently-Asked Questions (FAQ) in clinical data collection:

1) How do I select the right outcome instruments?
2) What software can I use to collect data efficiently?
3) How can the collected data be visualized for both clinicians and patients so that they effectively contribute to shared decision-making?
4) How can the data be a basis for decision support tools like prediction models and decision aids?
5) Do you need medical ethical approval?
6) What are clinician and patient experiences with collecting data in PRM?
7) How can routine measurement assist in improving quality of care and reducing costs?
8) What is the scientific value of these ‘real world data’?

Degenerative Meniscus Rehabilitation

Joao Pinheiro, Pedro Pereira, Joao Branco, Pedro Figueiredo, Lurdes Rovisco
[1]*Faculty of Medicine - University of Coimbra, Coimbra, Portugal*

Short WS - degenerative meniscus rehabilitation (90 min)
Chair: João Pinheiro

Introduction – João Pinheiro, Pedro Lemos (05 min)
Current elements of the topic and epidemiological references are presented.
Anatomical and functional concepts – Pedro Figueiredo (15 min)
Aspects related to structure, vascular and innervation characteristics and their relationship with meniscus function are presented. Topics in degenerative process of meniscus as well as the impact in functionality.
Clinical diagnosis – João Paulo Branco (15 min)
The clinical examination of the degenerative meniscus, the specificity and sensitivity of the tests are presented. We also described the diagnostic correlation between clinical manoveurs and imaging.
Program definition and validation – Lurdes Rovisco (15 min)
We present the clinical validation methodology of this program, through the intervention of experts supported by individual experience and the best evidence.
Rehabilitation program - João Pinheiro (15 min)
The different phases of the rehabilitation program are presented, organized into weeks and objectives. Pain and inflammation, joint mobility, muscle strength, prorioception and aerobic condition are mentioned as main intervention areas. The importance of counseling and access to information is also described.
Discussion and conclusions – Pedro Lemos, João Pinheiro (15 min)

Exploring the potential of Extracorporeal Shockwave Therapy: A comprehensive workshop on musculoskeletal applications

Nikolaos Barotsis, Aleksandra Ilieva

Extracorporeal Shockwave Therapy (ESWT) has emerged as a promising non-invasive treatment modality in the field of musculoskeletal rehabilitation. This innovative approach employs shockwaves to stimulate healing and alleviate pain in various musculoskeletal conditions. The aim of this workshop is to provide an in-depth understanding of focused and radial ESWT, its mechanisms of action, current evidence-based applications, and practical challenges faced in its clinical implementation.

- The workshop will commence with an introduction on the technology and mechanisms of action behind ESWT, shedding light on the science that underpins its therapeutic potential.

- The latest research findings on ESWT will be presented, discussing indications and contraindications to ensure safe and effective treatment decisions. Understanding when ESWT is most appropriate and when caution is warranted is crucial for healthcare practitioners wishing to integrate this modality into their practice (1).

- As with any medical intervention, ESWT presents complexities. The therapeutic challenges and dilemmas associated with ESWT will be addressed in the first part of the workshop.

- A dedicated question and answer session will provide participants with an opportunity to seek clarification, share insights, and engage in fruitful discussions.

The workshop will then transition into a hands-on demonstration, where participants will be divided into two groups, rotating through stations. The instructor will guide one group through the intricacies of ESWT in the context of rotator cuff tendinopathy and myofascial pain syndrome (2), offering practical insights and tips for optimal outcomes. Meanwhile, the other group will be led by its instructor in an exploration of ESWT applications in conditions such as plantar fasciitis and Achilles tendinopathy (3,4), illustrating the versatility of this therapeutic approach.

In summary, this workshop on ESWT promises to be a comprehensive and interactive experience, offering valuable insights into the technology, evidence-based applications, and practical challenges of ESWT. Participants will aquire the knowledge and skills necessary to effectively incorporate ESWT into their clinical practice, ultimately enhancing patient care and outcomes.

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Review Procedure in Scientific Publishing

Henrik Jan Stam, Kristian Borg

This workshop is intended for clinical researchers who aspire to develop further as reviewers of scientific articles in Rehabilitation Medicine.
The workshop has an interactive character and is led by the Chief Editors of the Journal of Rehabilitation Medicine.
It will cover the advantages and disadvantages of the review procedure.
A reviewer must follow some written and unwritten rules. Practical examples will be used to discuss the various components of a submitted article.
Learning objective: Participants can independently review a scientific journal after attending the workshop.

Urodynamics Workshop
The Importance of ISNCSCI Before Urodynamics

Metka Moharić[2]

[1]University Rehabilitation Institute Republic of Slovenia, Ljubljana, Slovenia, [2]University of Ljubljana, Faculty of medicine, Ljubljana, Slovenija

The range of bladder symptoms caused by neurologic lesions is wide; it depends on whether the lesion primarily affects pontine-sacral neural circuit, sacral reflex center or the sacral nerves, and whether these lesions are predominantly motor or sensory or both. The position of conus medullaris varies in the adult population and it can extend from lower end of the T11 vertebra to the upper third of L3 vertebra. Because spinal cord, conus medullaris and cauda equina are very close in this region, a fracture in the thoracolumbal junction may cause damage to the spinal cord, conus medullaris or cauda equina and result in upper or lower motor neuron lesions or mixed lesions over legs and urinary/bowel/sexual dysfunction. Clinicians presume that an injury at the sacral level (conus medullaris) and infrasacral level (cauda equina) leads to areflexic and acontractile detrusor, resulting in urinary retention or overflow incontinence, whereas suprasacral lesions above conus medullaris lead to overactive detrusor muscle (DOA) and detrusor sphincter dyssynergia. Therefore it is important that before we make a decision on patients neurogenic bladder management we make a thorough assessment, including ISNCSCI.

Urodynamics in Patients With Neurogenic Lower Urinary Tract Dysfunction (NLUTD) Following Spinal Cord Injury

Christina-Anastasia Rapidi[1], Pierre Denys[2], Metka Moharić[3], Antonios Kontaxakis[4], Angeliki Galata[5], Ana Saksida[3]

[1]PRM Department, General Hospital of Athens "G.Gennimatas", Athens, Greece, [2]Department of PRM at Raymond Poincaré hospital in Garches, Neuro Urology and Andrology Unit , Paris, France, [3]URI-Soča, Ljubljana, Slovenia, [4]PRM Department, 414 Military Hospital, Penteli, Attiki, Greece, [5]2nd PRM Department, National Center of Rehabilitation, Athens, Greece

Workshop co-Chairs:
Christina-Anastasia Rapidi MD PhD, As.Prof. Metka Moharić and Prof.Pierre Denys

The importance of ISNCSCI before urodynamics. (highlighting conus medullaris or cauda equina syndrome) 7min+3min discussion
As.Prof. Metka Moharić, Metka.Moharic@ir-rs.si

The importance of blood pressure monitoring, why and when during the care pathway of persons with SCI. (highlighting NLUT and sexual life dysfunction)
7min+3min discussion
Prof.Pierre Denys, denysaphp@gmail.com

The importance of long-term follow-up of NLUTD (highlighting deterioration of lower urinary tract and newly added restrictions in functionality)
7min+3min discussion
Christina-Anastasia (Annie) Rapidi MD, PhD, rapidicha@hotmail.com

Workshop Lecturers:
Case report 1 (a case of cervical SCI revealing “ethical” and “long-term” problems of choosing the bladder emptying method) 12min+8min discussion
Antonios Kontaxakis MD, PhD, akontaxakis@yahoo.gr

Case report 2 (a case of incomplete SCI revealing problems of patients’ compliance and increased risk of complications due to combined methods of bladder emptyind, i.e. IC and “voluntary” voiding)12min+8min discussion
Aggeliki Galata MD, PhD, aggelgalata@yahoo.gr

Case report 3 (a case of cauda equina lesion revealing problems of patients’ compliance and “long-term” problems of deterioration of the upper urinary tract due to Crede or Valsava as preferred method by the patient)12min+8min discussion
Ana Saksida MD

Target group: colleagues with special interest in urodynamics and NLUTD
Level: medial, prerequisite basic knowledge of NLUTD

The workshop is aiming to clarify:
The best conditions for referring a patient to urodynamic tests
The importance of the detailed medical report and clinical examination

The importance of having a clear urodynamic question before starting the test
The importance of long-term follow-up of patients with NLUTD
And finally reveal some tips and tricky management of neurogenic bladder dysfunction.

- Detailed clinical examination and history will provide a clear urodynamic question
- Blood pressure monitoring why and when during the care pathway of SCI patients

Spinal cord injury modifiy significantly the autonomic regulation of cardiovascular function. Autonomic dysreflexia is one of the manifestation that can be observed and is at the origin of acute severe complications. Diagnostic and prevention of autonomic dysreflexia is very important to be considered specially during urological evaluation and care.

- Long-term follow-up for NLUTD is needed for preventing complications of urinary tract and for the reassessment of the functionality of the person with SCI taking into consideration ageing, any changes in the family members or the caregivers. Changes of functionality may require re-evaluation of the bladder management method.

Presentations of interesting case reports will be followed by interactive discussion on urodynamics, diagnosis of the specific neurogenic bladder dysfunction, management, and follow-up.

Clinical Diagnostics for Sciatica Patients

Janne Pesonen, Olavi Airaksinen, Marinko Rade

It is generally accepted that the SLR produces some caudal movement mainly of L5 and S1 nerve roots, but the magnitude of this displacement is still a matter of debate. Our in vivo measurement by MRI data show that the spinal cord in the thoracolumbar region slides distally in response to the clinically applied SLR test. The high correlation values in this study show that these movements are consistent and reproducible. Because of the neural continuum, we speculate that this movement might be directly proportional to the sliding of the L5 and S1 neural roots. This study offers baseline measurements on which further studies in diagnosis of lumbar disc protrusion and radiculopathy may be developed. (PhD by Marinko Rade and awarded by ISSLS – young Investigator Award 2014)

In our next trial in patients with lumbar disc herniation (LIDH), the neural displacement on the symptomatic side is significantly reduced by the compressing IVD herniation. To our knowledge, these are the first data in intact human subjects to support the limitation of neural movements in the vertebral canal with LIDH. (Awarded by ISLLS Young investigator Award 2017). After follow-up of these LIDH patients 1,5 years after, when the LIDH was improved, also the neural displacement was almost recovered.

The high incidence of asymptomatic 'pathologic' findings in the magnetic resonance imaging (MRI) scans may cause verification bias to these results. We studied an extended SLR (ESLR) by adding location-specific structural differentiation movements (hip internal rotation or ankle dorsiflexion) to the traditional SLR for it to better differentiate neural symptoms from musculoskeletal. The ESLR shows high validity in detecting neural symptoms and is strongly associated with pathology seen in the MRI when judged positive. We suggest the use of ESLR in clinical practice as a part of clinical examination, where it may prove to be a valuable tool in detecting patients with sciatic symptoms.

Prosthetic Puzzles in Finger and Partial Hand Amputations

Corry K. Van Der Sluis[1], Maaike Lange
[1]*University Medical Center Groningen, Groningen, Netherlands*

Finger and partial hand amputations are the most frequently treated amputations in clinical practice. However, for a long time only scarce attention has been paid to the prosthetic solutions for these distal levels of amputations. Since a few years, more prosthetic solutions are available on the market. Furthermore, many adaptive devices are available. Since not only the finger and partial hand amputations vary largely, but also the patients' features and preferences, the best prosthetic solution for a patient can be a puzzle. To achieve the best solution, a team effort is mostly required. During this interactive workshop, we will share some cases with finger or partial hand amputations with the audience. We will reveal the patients' goals for treatment. The audience will be asked to share their thoughts about prosthetic solutions or adaptive devices. Finally, for each case we will show how we solved the prosthetic puzzle in collaboration with the patient.

Ethical Dilemma's

Henrik Jan Stam[1]
[1]*Erasmusmc, Rotterdam, Netherlands*

In Rehabilitation Medicine, ethical questions are more common than most can imagine. This is because we usually do not recognize a particular situation as an ethical issue but rather as a common problem that requires a simple solution. The more experienced we become, the more we tend to solve problems without further careful consideration, "jumping to solutions."

In this interactive workshop, I will increase your awareness of ethical issues in clinical practice, research, and rehabilitation medicine education.
An important principle is that ethical issues or dilemmas are best resolved by considering several options instead of focusing on one correct answer or solution. Reflecting on different options and attempting to provide arguments for each solution assists in creating a broader vision of the ethical question and understanding people with different viewpoints.
As a result, there is no single right or wrong answer for an ethical question: the best answer or solution may depend on the personal circumstances of the patient or the physician, religious or cultural influences, legal restraints, etc.

Post-Concussive Cephalalgia

Nathan Zasler[1]

[1]*Conconcussion Care Centre of Virginia LTD, henrico, United States*

This session will provide attendees with an update on post-concussive headache. Topics to be covered will include biomechanics in relation to cerebral, cervical and cranial trauma; historical controversies regarding classification; epidemiology, pathophysiology and neurobiology; common versus uncommon headache variants as well as prognosis. The speaker will also review evaluation of the patient with post-concussive headache complaints including details of taking a headache history and performing an appropriately focused physical exam (involving both neurological and musculoskeletal systems). Clinical indications for neurocognitive, psychoemotional and neurodiagnostic testing will be reviewed. Management strategies involving neuromedical, rehabilitative and psychological treatments will also be referenced. The lecture will be followed by a demonstration led by the speaker with audience participation and interaction.

POSTERS

Poster Session A

Does It Get Any Better? Aphasia Group Therapy Efficiency on Health-Related Quality of Life in Slovenia: A Pilot Study

Patricija Širca Ule[1,2], Gaj Vidmar[1,3,4]

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BACKGROUND: Aphasia, one of the most common consequences of a stroke, has a serious impact on daily life. The quality of life of people with aphasia changes dramatically. It has been proven that people with aphasia have a lower health-related quality of life than people with other health-related conditions. In other countries such as the USA and Australia, where health services and health insurance are provided to a lesser extent than in Slovenia, group therapies for people with aphasia have been started. They have found that group therapy is comparable in effectiveness to individual therapy while reducing the costs associated with therapy. In Slovenia, the only group therapy for stroke aphasia is available at the University Rehabilitation Institute of the Republic of Slovenia. To date, there has been no aphasia group therapy in Slovenia whose effectiveness has been measured in terms of health-related quality of life. Although patients' reports on their state of health are not the only elements that should be measured, they are an important component in achieving therapeutic goals.

AIM: This study aims to explore potential benefits of aphasia group therapy on health-related quality of life. It is designed to investigate whether the speech group therapy improves quality of life on communication and psychosocial fields.

METHOD: For aphasia severity Frenchay Aphasia Screening Test was used and for health-related quality of life measurement we used The Slovenian Stroke Aphasia Quality of Life-39 scale Generic Version (SAQOL-39 - SI). Scoring was performed before and after the study was conducted. 10 people, 4 females and 6 males with broad range of aphasia severity and times post-onset of stroke were included in the study. Group therapy lasted for 3 months, 1,5 hour per week.

RESULTS: Even though there was no significant difference in speech and langugage abillities, all the participants showed improved QOL overall.

DISCUSSION AND CONCLUSION: In the aphasia group treatment described in this study, we found a significantly better quality of life for the participants. They had more communication opportunities to practise real life situations and they felt more confident to participate in everyday tasks. These results suggest that there are important differences in the communication of patients participating in the group, even if there is no significant difference in speech and language abilities overall.

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Effects of Robot-Assisted Upper Limb Training Between Subacute and Chronic Stroke Patients: A Multicenter Randomized Controlled Trial

Soo-Kyung Bok[1], So Young Ahn[1], Hyeon Woo Ryoo[1], SeulYi Lee[1], Tae-Woo Kim[2]
[1]Chungnam National University Hospital, Daejeon, South Korea, [2]National Traffic Injury Rehabilitation Hospital, Yangpyeong, South Korea

BACKGROUND: Upper limb weakness after stroke is common, and upper limb paresis persist even after three to six months, limiting the independence and social participation of affected individuals and thereby significantly reducing their quality of life. Robot-assisted therapy is a novel approach to neurorehabilitation that is repetitive, focused, task-oriented, and quantifiable.

AIM: The present study was conducted to compare the clinical effectiveness of robot-assisted therapy using InMotion with that of conventional occupational therapy according to the onset of stroke.

METHOD: In this multicenter randomized controlled trial at two centers in South Korea, subacute and chronic stroke patients (1 week to 5 years after the first stroke) aged ≥20 years and exhibiting upper limb weakness were randomized (1:1) to receive robot-assisted therapy or conventional occupational therapy. The robot-assisted training group received 30 minutes of robot-assisted therapy twice and 30 minutes of conventional occupational therapy daily, while the conventional therapy group received 90 minutes of occupational therapy daily. Therapy was conducted 5 days/week for 4 weeks. It was defined as subacute and chronic stroke based on 3 months after the onset of stroke. The primary outcome was the Wolf motor function test (WMFT) score after 4 and 8 weeks of therapy. Secondary outcome measures included the Box and block test (BBT), Fugl-Meyer Assessment (F-M), Medical Research Council Score (MRC), Motricity Index (MI), motor evoked potential (MEP), and diffusion tensor imaging (DTI) findings.

RESULTS: Overall, 113 and 115 patients received robot-assisted and conventional therapy, respectively. A significant improvement was detected after treatment in both the control group (CG) and the Robot-assisted training group (RATG), but no significant variation was observed among the intervention groups. For MI (trunk), a significant improvement was observed in only the subacute group for the RATG. For MRC, the level of significant improvement was greater in the subacute group than in the chronic group in most cases, while a significant improvement in wrist extension in the subacute group was observed for the RATG. For DTI and MEP, the chronic group showed a significant improvement after the robot-assisted treatment only for the mean FA in DTI ($p=0.0348$).

DISCUSSION AND CONCLUSION: The functions of the upper limbs and the ability to perform activities of daily living after stroke improved in both conventional and robot-assisted training groups regardless of the onset of stroke. But in the subacute stroke, the strength of the upper limbs was mainly improved, and the strength of the wrist extensor muscle was further improved by the robot-assisted training. The results of this study are anticipated to serve as the basic data for future follow-up studies and provide evidence for the clinical application of upper limb rehabilitation robots.

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Integrating Dysphagia Risk Assessments in Post-Stroke Rehabilitation: Retrospective Findings From Endovascular Thrombectomy in Anterior Circulation Large Vessel Occlusion Patients

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BACKGROUND: Post-stroke dysphagia (PSD) is a frequent complication. Previous studies have identified various factors that contribute to prolonged swallowing difficulties in post-stroke patients [1,2]. However, concerning to the special entities of post-endovascular thrombectomy (EVT) stroke survivors, no study to date investigates the predictors of PSD in patients after EVT of large vessel occlusion (LVO) at anterior circulation.

AIM: Our study aimed to identify the predictive variables for PSD among stroke patients with LVO who underwent EVT.

METHOD: This retrospective cohort study enrolled hospitalized patients with anterior LVO stroke who underwent EVT between January 1, 2018 and October 31, 2022. PSD was defined as the unsuccessful removal of the nasogastric (NG) tube. Data on various factors, such as premorbid characteristics, laboratory results, EVT, rehabilitation-related parameters, and neuro-imaging, were analyzed for correlations to PSD at 4 and 12 weeks. The retention rate of NG tubes was depicted with the Kaplan-Meier method and subgroup analysis with the log-rank test.

RESULTS: The study enrolled 136 patients and found that lower albumin, lower body mass index (BMI), higher initial and 24-hour post-EVT National Institute of Health Stroke Scale (NIHSS) scores, presence of stroke-associated pneumonia, poor initial sitting balance, and ability to sit up, presence of insula or frontal operculum lesions, and bilateral hemisphere involvement were all associated with PSD at both 4 weeks and 12 weeks in the univariate logistic regression. Moreover, the multivariate analysis revealed that lower BMI, insular lesions, and bilateral hemisphere involvement were significant predictors of PSD at both time points. Subgroup analysis showed PSD tended to present in patients with poor premorbid function, lower baseline Alberta Stroke Program Early Computed Tomography Score (ASPECTS), and bilateral hemisphere involvement.

DISCUSSION AND CONCLUSION: Our study was the first to identify predictive factors of PSD in anterior circulation LVO patients who underwent EVT. Key factors influencing PSD included BMI, initial and 24-hour post-EVT NIHSS scores, insula and frontal operculum lesions, and bilateral hemisphere involvement. Notably, a higher NIHSS score 24 hours after EVT was a novel observation, indicating the significance of early neurological status assessment post-procedure. Our research also emphasized that bilateral hemisphere involvement markedly impacted swallowing recovery, owing to the intricate control mechanism of the swallowing function involving both brain hemispheres. Additionally, there was a distinct relationship between impaired initial sitting balance and prolonged PSD, underscoring the importance of early rehabilitative interventions. Despite our findings, the study's limitations included a modest sample size and a short follow-up period. Hence, future research should consider larger sample sizes, extended monitoring, and evaluate the impact of different therapeutic interventions.

In conclusion, this study identified key predictive factors for PSD in anterior LVO patients post-EVT. Understanding these factors can significantly enhance clinical decision-making, especially concerning the

timing and method of enteral feeding tube placement, ultimately aiding in timely interventions and improving patient care.

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Functional Independence of Stroke Patients 6 Months After Discharge

Chrysanthi Ntasiopoulou[1], Aikaterini Tsiligeridou, Aikaterini Anagnwstopoulou, Krystalia Pantsiou, Konstantinia Tziotzou, Eirini Mouza
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BACKGROUND: Many of the stroke survivors experience disability with profound effects on their lives. Stroke units and rehabilitation facilities were founded in order to improve survival rates and reduce the negative impact on the patient's quality of life. Follow up programs and maintenance protocols are aiming to prevent patients from deteriorating.

AIM: The objective in this study is to investigate the factors that may influence the functional independence of stroke patients after their discharge from the rehabilitation center like age, gender, side of hemiplegia, stroke type (ischemic or hemorrhagic) and caregiver (spouse, children, salaried caregiver).

METHOD: 98 first-ever stroke patients, aged 39 to 95, were admitted for attending an inpatient rehabilitation program in Anagennisi Rehabilitation Center. Protocols were completed and included medical and social parameters of the patients history as well as FIM scale scores assessing the functional abilities of the stroke patients at admission, discharge and 6 months after discharge. The total FIM scores and the scores of the 4 subgroups (1: transfers and locomotion, 2: self - care and sphincter control, 3: communication and 4: social cognition) were compared and correlated to parameters like age, gender, side of hemiplegia, stroke type and caregiver in order to estimate their effect on the patients functional status.

RESULTS: 91 (92.9%) patients returned home. Seven patients (7.1%) needed a nursing home. Sixty two patients (63.3%) improved after their discharge, 24 patients (24.5%) remained at the same functional status and 12 patients (12.2%) deteriorated. FIM total mean score as well as FIM subgroups mean scores were improved 6 months after discharge. The presence of a spouse had positive effect on the patient's condition (FIM total score phone and subgroups 1 and 2 phone) as well as the presence of the children as caregivers. There is a statistically important difference between the type of stroke (ischemic /hemorrhagic) and the FIM score in the phone interview p: 0.005 as well as the FIM subgroup scores. The FIM scores of patients with hemorrhagic strokes were higher (in total FIM and in every subgroup in the phone interview) than the patients with ischemic strokes. No differences were found concerning sex (male-female), right/ left hemiplegia and comorbidities in the FIM phone scores ($p>0.05$).

DISCUSSION AND CONCLUSION: Many studies investigate the functionality of the patients after their discharge from rehabilitation facilities. The worsening of the functional ability achieved during inpatient treatment may be prevented with a post-discharge outpatient treatment (1). The Kauhanen ML, et.al. (2000)(2) study showed improvement in the domains of physical functioning and physical role limitations during the 1 year follow-up. Our study showed that the interactive pair of patient-caregiver is important in order to avoid the patient's deterioration. Long –term follow up will provide us with more information.

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Effects of Anxiety and Depression on the Effectiveness of Rehabilitation in Patients With a Stroke

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BACKGROUND: Worldwide, cerebrovascular disease is the second leading cause of death and the third leading cause of disability [1]. About 80-87 percent stroke survivors become disabled due to motor and cognitive impairments. Disorders associated with stroke have a wide variety of clinical signs and symptoms, and disability varies depending on the degree of neurologic involvement, site of stroke, patient condition, and environment [2]. Depression and anxiety are among the often overlooked neuropsychological consequences of stroke, which have biological, psycho-behavioral and social aspects [3].

AIM: To determine the prevalence of anxiety and depression in patients with a stroke and their influence on the effectiveness of rehabilitation.

METHOD: 140 respondents participated in the study (adults who have experienced a stroke and were treated at the Hospital of Lithuanian University of Health Sciences, Department of Rehabilitation. According to the established research protocol, the patients' documentary data, Hospital Anxiety and Depression Scale (HADS), Mini-mental state examination test (MMTS), rehabilitation efficiency with functional independence measure test (FIM), Barthel index, at the beginning and end of rehabilitation were evaluated.

RESULTS: Post-stroke depression and anxiety occurred in 20% (n=28) patients. Patients with a HAD depression scale of 0-7 (80%) - the mean Barthel index and FIM scores were higher than patients with a HAD depression scale of 8 or more points (20%) ($p < 0.05$) at the beginning of rehabilitation and at the end. Patients with mild cognitive impairment had higher HAD depression scale scores than patients with moderate or no cognitive impairment as assessed by the MMTS. No statistically significant difference was found between stroke location groups in experiencing depression and anxiety ($p>0.05$). No statistically significant difference ($p>0.05$) was found between women (47%) and men (53%) who experienced a stroke in the assessment of anxiety and depression HAD scale. However, there is a trend towards higher HAD test scores in females than in males. No statistically significant difference ($p>0.05$) was found between younger (31%) and older than 65 years (69%) stroke patients in the HAD scale assessment of anxiety and depression.

DISCUSSION AND CONCLUSION: Post-stroke depression and anxiety occurred in 20% patients who have experienced a stroke. Manifestation is influenced by impairment of cognitive functions. There is a tendency for anxiety and depression test scores to be higher in women than in men, and in patients aged 65 and over. No significant differences were found in the development of post-stroke depression depending on the localization of a stroke. Depression and anxiety contribute to worse functional outcomes in individuals with a stroke at the end of rehabilitation.

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Effect of Repetitive Transcranial Magnetic Stimulation in Patient With Post Stroke Headache

Seo Ra Yoon, Min Gil KIM, Nam Gyu Im
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BACKGROUND: Headache frequently occurs after stroke, yet their characteristics have not been documented. Approximately 10% of stroke patients experience chronic headache. [1,2] The exact causes of post-stroke headache are not well-established. [3] Generally, post-stroke headaches are described as tension-type headaches. [4] One study found high-frequency rTMS on dorsolateral prefrontal cortex (DLPFC) effectively reduces chronic tension headaches and migraine. [5] Based on the above results, we assumed rTMS would be effective for headache in patients who have experienced a stroke.

AIM: To investigate the effect of rTMS in patients with post-stroke headache.

METHOD: This study was designed by double-blind and placebo-controlled study. 20 patients with post stroke headache were recruited. Participants were assigned to 2 groups: 'Real rTMS group' (n=10) and 'Sham rTMS group' (n=10). The stimulation was delivered with butterfly-coil on left DLPFC. In one session, 10 Hz of 1000 pulses at an intensity of 90% of rest motor threshold (RMT) was delivered for a period of 20 minutes. One session were administered 5 times per week for 2 weeks (10 session). The Sham group was used sham coil that sound and the sensation of scalp similar to the real rTMS coil, but does not induce a magnetic field. Visual Analogue Score (VAS), Headache Impact Test (HIT)[6] were assessed before rTMS, at last session and at 2 month after the last session.

RESULTS: The baseline VAS, HIT scores were not significantly different between two groups. After last session, VAS and HIT scores were significant improved compared to baseline in real rTMS group. ($P.<0.05$) But at after 2 month from the last session, all scores were not significantly different between real rTMS group and Sham rTMS group. ($P.<0.05$)

DISCUSSION AND CONCLUSION: The results of this study suggest that high frequency of rTMS on left DLPFC with post stroke headache reduce headache during the intervention period. But there was no lasting effect after the rTMS. Overall, there is a need for large-scale, well-designed, prospective studies in order to determine the short- and long-term effects of rTMS on post stroke headache.

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Individual Hydrotherapy for Subacute Stroke Patients

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BACKGROUND: Stroke is one of the most common reasons of disability in the world (1). Patients start with neurorehabilitation already in acute phase and later they can also have hydrotherapy (1,2). In 2021 Veldema and Jansen, and in 2019 Saquetto and colleagues made a systematic review and meta-analysis of studies about influence of water-based exercise on functioning and quality of life in poststroke persons (1, 2). In comparison with land-based interventions, aquatic therapy showed superior effectiveness on balance, walking, muscular strength, proprioception, health-related quality of life, physiological indicators, and cardiorespiratory fitness (1). Especially ischemic stroke patients nowadys start with aquatic therapy as soon as 2 weeks after stroke (3-5).

AIM: The aim of study was to find out reports of safety and effects of hydrotherapy on motibility, spasticity, pain and quality of life of subacute stroke patients.

METHOD: In Pub Med, Cochrane and UpToDate on 4th October 2023 key words hydrotherapy and subacute stroke were used.

RESULTS: Four articles were found, where, patients at least two weeks after the onset of stroke, started with water rehabilitation (3, 4, 6). In a randomized controlled trial Zhang and colleagues found out, that aquatic therapy improved outcomes for subacute stroke patients by enhancing muscular strength of paretic lower limbs without increasing spasticty (5). In 2014 Tripp and Krakow made a randomized controlled trial and reported that, compared to the control group, significantly more subjects in the Halliwick-Therapy group (83.3% versus 46.7%) attained significant improvement of the Berg Balance Scale ((P < 0.05), 6). Improvement of the functional gait ability was significantly higher in the Halliwick-Therapy group (mean (SD) 1.25(0.86)) than in the control group (mean (SD) 0.73 (0.70)) (P < 0.1) (6). The mean differences of improvements in functional reach and basic functional mobility were not statistically significant between groups (6).

DISCUSSION AND CONCLUSION: Results of studies indicate that especially individual hydrotherapy for subacute stroke patients is safe, well tolerated, has positive effects on mobility and balance. Future researches with more patients should be done.

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Advances in the rehabilitation approach of Chronic Stroke: Virtual Reality as an Ally to Enhance Function and Social Participation: A Case Study

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BACKGROUND: A 50-year-old patient with right hemiparesis and imbalance following a chronic vertebrobasilar stroke, experiencing deterioration in Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) resulting in limited participation according to the International Classification of Functioning, Disability and Health (ICF)[1]. The patient underwent 35 sessions of occupational therapy and 5 sessions of physiotherapy (30 minutes each). The treatment was intensified using a non-immersive Virtual Reality (VR) device MindMotion® GO[2] (38 sessions, twice a week). This device uses serious gaming[3] to facilitate adding high-dose training through engaging activities for the upper and lower limb. In our patient specific case, we used several games which targeted: shoulder flexion-extension, shoulder adduction and abduction, lateral trunk flexion-extension, horizontal reaching with the arm, combined flexion of the trunk, free steps, elbow flexion-extension and prono-supination, hand flexion-extension and its radial and ulnar deviation. Finally, games that targeted finger flexion and extension were also used. The non-immersive Virtual Reality device allowed the addiction of a total therapy time of 30 hours and 51 minutes, and 120191.18 Standardized Movement Units (SMUs) with an intensity of 64.90 SMUs/minute.

AIM: To improve function: Balance, upper limb usage, transfers, proprioception, fine hand motor skills, and equilibrium. Improvement in activities: Walking, handling utensils, and dressing. Increased social participation: Engaging in social activities, walking both short and long distances with and without obstacles, and walking outside the home.

METHOD: Baseline and post-treatment assessments included Berg Balance Scale, Dash (upper limb), Barthel Index, EQ-5D, and the S-PGI scale (Patient Global Improvement Scale).

RESULTS: Baseline scores for the scales were as follows: Berg 9, Dash 80% disability, Barthel Index 65, and EQ-5D 3.5. After treatment: Berg 38, Dash 20% disability, Barthel Index 100, EQ-5D 7.5, and S-PGI 10.

DISCUSSION AND CONCLUSION: Intensifying chronic stroke treatment using a non-immersive VR platform could lead to functional improvement, resulting in increased participation and reintegration of these patients into their pre-disease roles. Further studies are needed to assess the impact of intensified therapy using VR on the participation of patients with chronic stroke.

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Stroke Rehabilitation in Estonia: Multidisciplinary Approach and Constant Development

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BACKGROUND: Stroke is the second leading cause of death and one of the leading causes of disability. There are approximately 4,000 new strokes every year in Estonia. Stroke rehabilitation has changed and improved enormously during the last 10 years. In recent years, Estonian stroke treatment guidelines have been regularly updated. Additionally, a treatment pathway for stroke patients has been launched to enable comprehensive care of the stroke patient, including rehabilitation.

AIM: The aim of this study was to find out how the referral to rehabilitation has changed. How fast is the referral to rehabilitation after an acute stroke? Do the patients receive comprehensive and stroke-guideline-compliant rehabilitation? How has the length of rehabilitation and the intensity of therapies changed?

METHOD: We analyzed the data of stroke patients in Estonia, specifically at Tartu University Hospital, Sports Medicine and Rehabilitation Clinic, and the stationary rehabilitation department. The study involved 328 retrospective medical cases (142 cases in 2010 and 186 cases in 2020).

RESULTS: The duration of inpatient rehabilitation has clearly changed over the last 10 years. In 2010, stroke patients, on average, spent 16 days in a rehabilitation center (min 2 days; max 36 days). In 2020, stroke patients, on average, spent 19 days in a rehabilitation center (min 1 day; max 109 days). In our study, functional deficits of stroke patients (dysphagia, speech impairment, psychoemotional changes, problems with hand and motor function) receiving inpatient rehabilitation were assessed. Motor problems were present in over 90% of patients in both 2010 and 2020 case histories (93.7% vs. 95.7%). In the last 10 years, the prevalence of dysphagia in stroke patients has significantly increased (12.7% in 2010 vs. 31.2% in 2020). In 2010, patients received physiotherapy based on their functional problems for 1.3 hours per day, for 5 consecutive days a week. In 2020, patients received 2.8 hours of physiotherapy per day for 5 consecutive days a week. When comparing 2010 and 2020, there was a significant increase in physiotherapy, occupational therapy, and psychotherapy provided per patient. Physiotherapy per patient increased by 69% (14.9 on average per patient in 2010 vs. 48.8 in 2020). Occupational therapy increased by 77.2% (2.6 on average in 2010 and 11.4 per patient in 2020). Psychotherapy increased by 86.2% (0.4 on average per patient in 2010 and 2.9 in 2020). The amount of speech therapy did not change significantly.

DISCUSSION AND CONCLUSION: Stroke causes a remarkable economic burden on society, but we can alleviate it by implementing evidence-based treatment strategies, including well-directed rehabilitation, which is available at Tartu University Hospital.

REFERENCES:

Electric Field Simulation and Appropriate Electrode Positioning for Optimized Transcranial Direct Current Stimulation of Stroke Patients: An In Silico Model

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BACKGROUND: Transcranial direct current stimulation (tDCS) noninvasively modulates cortical excitability through electrodes on the scalp that exchange weak direct currents. tDCS has benefits for motor rehabilitation in stroke patients (1), but its clinical application is limited due to inter-individual heterogeneous effects (2). Recently, optimized tDCS that considers individual brain structure has been proposed (3), but the utility thereof has not been studied in detail.

AIM: This study aimed to explore whether optimized tDCS provides unique electrode positions for each patient and creates a higher target electric field than the conventional approach.

METHOD: We generated individualized MRI-based head models of 21 stroke subjects and simulated tDCS using the 'Neurophet tES LAB 3.0' software. In the conventional tDCS, electrodes were placed on C3/C4 of the 10-20 EEG system. For optimized tDCS, a stimulation target was designated as motor hand knob on MRI, and electrode positions that maximize the electric field in the target area were chosen through a software algorithm. A comparison of electrode positions between conventional tDCS and optimized tDCS was quantified by calculation of the inter-electrode distances D, thus the Euclidean distances between conventional and optimized tDCS electrodes. The electric field intensity of the hand motor region was extracted from each tDCS simulation.

RESULTS: Optimized tDCS produced a higher median [IQR] electric field in the hand motor region than did conventional tDCS, affording, on average, a 20% improvement, thus 0.36 [0.29–0.41] V/m compared to the 0.30 [0.26–0.33] V/m of conventional tDCS. The electrode positions of the optimized tDCS were personalized and showed a great variety of configurations. Low initial Fugl-Meyer Assessment scores and cortical brain lesions were associated with large Euclidean distances between the conventional tDCS electrode and the optimized tDCS electrode.

DISCUSSION AND CONCLUSION: Optimized tDCS afforded a higher electric field in the target of a stroke patient compared to conventional tDCS, which was made possible by appropriately positioning the electrodes. Our findings may encourage further trials on optimized tDCS for motor rehabilitation after stroke.

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Protocol for Early Screening Post Stroke Anxiety and Depression

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BACKGROUND: Anxiety and depression are common psychiatric complications of cerebrovascular stroke affecting about one-third of stroke survivors. Individuals with severe impairment, history of anxiety or depression predating stroke, cognitive impairment and/ or social isolation are at greater risk at any stage of recovery. Post stroke anxiety and depression (PSAD) have inevitable impact on functional outcome and quality of life (QOL) in stroke survivors.

AIM: The aim of this study was to develop a protocol for early screening PSAD among hemiplegic patients due to cerebrovascular stroke in our rehabilitation department.

METHOD: Data will be collected by patients'/ caregivers' interviews and medical history of stroke patients within the first days of their admission. Moreover, validated questionnaires will be utilized for severity of stroke [National Institute Health Stroke Scale (NIHSS)] and mental status [Montreal Cognitive Assessment (MoCA)]. Additionally, for people who do not experience severe communication deficits following stroke, PSAD assessment will be done with the Hospital Anxiety and Depression Scale (HADS). On the other hand, regarding participants with aphasia, the Stroke Aphasic Depression Questionnaire-Hospital (SADQ-H) will be completed by caregivers for depression's evaluation.

RESULTS: Anxiety and depression are scored separately within HADS (from 0-21) and specific cut-off scores are available for quantification of their severity. For both mood disorders, scores of less than 7, indicate non-cases. Scores range from 0-63 on the SADQ-H, with a cut-off score of 17/18 detecting the presence of depression and with higher scores indicating higher levels of depression.

DISCUSSION AND CONCLUSION: All individuals who have experienced a stroke should be considered at risk for PSAD, which can occur at any phase throughout the continuum of care. Therefore, it is highly recommended to be screened using specific validated tools particularly at transition points including upon transition from an inpatient acute setting to an inpatient rehabilitation setting, before return to the community, periodically following discharge into the community at follow-up appointments. People who have experienced a stroke and their families should be given information and education about the potential impact of stroke on their mood and all health professionals should be alert with recognizing PSAD symptoms.

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Use of Bioelectrical Impedance Analysis to Explore the Effectiveness of Stellate Ganglion Block in Patients with Post-Stroke Complex Regional Pain Syndrome: A Retrospective Pilot Study

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BACKGROUND: Sympathetic blockade (SB) is widely used to treat CRPS type I because sympathetic nervous system dysfunction has been implicated in the pathogenesis of this condition, leading to improvements in pain, swelling, range of motion, and functional activity.
When evaluating effects, pain is the principal indicator. However, this is subjective. In contrast, swelling is both objective and grossly evident. Bioelectrical impedance analysis (BIA) very sensitively measure volumes in post-stroke CRPS patients with edema or swelling of the upper extremities.

AIM: To explore whether Bioelectrical impedance analysis (BIA) is a useful assessment tool after stellate ganglion block (SGB), as well as whether BIA reveal the effects and time courses of a single SGB on the bodily composition of patients with post-stroke complex regional pain syndrome (CRPS).

METHOD: This was a retrospective, observational pilot study for seven patients with post-stroke CRPS. Post-stroke CRPS was defined by the presence of suspect signs and symptoms in the hemiplegic, unilateral upper extremity using the Budapest criteria recommended by the International Association for the Study of Pain, combined with three-phase bone scan data. An SGB was performed in each patient using ultrasound guidance. A 24-gauge 6-cm needle was inserted 1 cm from the probe using the in-plane technique. 5 mL of liquid, consisting of 4 mL of 0.25% bupivacaine hydrochloride and 40 mg of triamcinolone, were injected into the prevertebral muscle space. BIA measures included segmental body water (SBW), phase angle (PhA), extracellular water (ECW) ratio, and single-frequency bioelectrical impedance analysis (SFBIA) of the upper extremities. The difference in segmental body water (ΔSBW), as well as the ratios of SBW, PhA, segmental ECW, and SFBIA, were calculated between the affected arm and unaffected arm. BIA was assessed before SGB; on days 1 and 3 after injection; and at weeks 1, 2, and 3 after injection.

RESULTS: The affected arm showed significantly higher SBW and ECW ratios compared to the unaffected arm before SGB (P = 0.028 and P = 0.018, respectively). The PhA, 1- and, 5-kHz SFBIAs before SGB, were also significantly higher in the unaffected arm (all P = 0.018). The SBW of the affected arm, the SBW ratio, and the 1- and 5-kHz SFBIA ratios improved over time (P = 0.025, 0.008, 0.001, and 0.005). There were no significant differences between pre-injection and post-injection values. However, the parameters showed rapid improvement around 3 days after each injection. The maximum effects were achieved within approximately 1 week and persisted thereafter. Although the ECW ratios nor PhA values exhibited consistent patterns during follow-up, all BIA parameters improved from baseline by 3 weeks after injection.

DISCUSSION AND CONCLUSION: SGB effectively reduced edema in patients with post-stroke CRPS. BIA proved to be a valuable assessment tool for follow-up, aiding in determining the optimal timing for additional injections.

REFERENCES:

Presenation of Language and Speech Rehabilitation Program in a Patient With Haemorragic Stroke Presenting With Wernicke's Aphasia

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BACKGROUND: Wenicke's aphasia is a common clinical manifestation of stroke, and the rehabilitaton of the deficits it correlates with poses a challenge in the clinical setting.

AIM: To present the rehabilitation approach in a patient with Wernicke's aphasia in subacute stage after a stroke.

METHOD: A 62 year old woman was referred to our rehabilitation department from the neurosurgery department where she was surgically treated due to to an aneurysm of the left middle cerebral artery. Ten days after her surgery, during the admission to our rehabilitation department, she was assessed with the Aphasia screening test. In reading comprehension, she showed mild deficits in in letter/word verification, and large deficits in written word/image verification, written sentence/image verification, as well as performance of simple and complex written tasks. In acoustic comprehension, mild deficits were found in the image, number and letter selection, while serius deficits included selection of words and sentences. Finally, she was unable to perform complex written commands. In speech production, there was significant loss in the capability to repeat letters and words, as well as to fill in days of the week and months. The patient did not produce speech if not stimulated. A highly intensive speech therapy program was administered daily for 30 minutes, with tasks of performing audio and written commands, naming objects, exercises in sequences and categorization, and formation of simple sentences.

RESULTS: In the two month assessment the patient showed no deficits in reading comprehension. In acoustic comprehension, moderate deficits in performing complex vocal tasks were noted. In speech production, moderate deficits were recorded in repetition of sentences, and serious deficits in repetition of groups (letters and words). During speech production, prominent was the difficulty in describing complex images, and mild deficits were found in naming objects, body parts, and activities.

DISCUSSION AND CONCLUSION: An intensive and personalized rehabilitation programme can significantly enhance the outcome of a patient with stroke in the subacute phase with Wernicke's aphasia.

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Functional Improvement of Post-stroke Patient With Dysphagia After McNeill Dysphagia Therapy Program (MDTP): A Case Study

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BACKGROUND: Dysphagia is a common post-stroke symptom in acute stage. It improves for vast majority of stroke patients. However, some face chronic swallowing difficulties that present a long-lasting health and quality-of-life burden (1). Dysphagia interventions aim to improve swallowing safety and effectiveness. To rehabilitate swallowing mechanism, the exercise-based approach needs to be applied. The general aim of exercise-based approach is to improve skills, increase the strength and endurance of muscles involved in swallowing and airway protection (2). The McNeill Dysphagia Therapy Program (MDTP) is a systematic therapy framework that aims to diminish dysphagic consequences on swallowing function. Results from a study by Lan, et. al. demonstrated improved temporal oral and pharyngeal components of swallowing function after a completed MDTP in a dysphagic sample of diverse aetiology. The most significant improvement was seen on swallowing of thin liquids (3).

AIM: To investigate functional changes on swallowing function in a post-stroke dysphagic patient after an exercise-based dysphagia approach.

METHOD: A 61-year-old patient 11 months post-stroke admitted to inpatient rehabilitation hospital and referred to speech-language and swallowing therapy because of chronic dysphagia, drooling and dysarthria. Functional Oral Intake Scale (FOIS) and Mann Assessment of Swallowing Ability (MASA) was used at the initial assessment. Upon admission Videofluoroscopic Swallowing Study (VFSS) was conducted and scored by using the Penetration-Aspiration Scale (PAS). Patient underwent MDTP 1 hour per day, 5 days per week for 3 weeks. At the end the initial assessment was repeated (FOIS, MASA).

RESULTS: After the MDTP therapy, a functional improvement was demonstrated in all of the monitored outcome measurements. Swallowing ability improved from moderate dysphagia (160/200) with aspiration events on thin liquids (PAS 7) to no dysphagia present (190/200) with no risk for aspiration events. Oral intake for solid food improved from FOIS level 4 to level 7. Additionally, initial VFSS assessment demonstrated less efficient swallow with 2 or more swallows needed to ingest thicker consistencies. At the end only one swallow per bolus was needed.

DISCUSSION AND CONCLUSION: MDTP is an exercise-based approach that combines skill and strength training (2) which in the case study presented demonstrated a great improvement in swallowing function. On the contrary to a study by Lan, et. al. a comparable improvement was seen in liquid and solid food consistency (3). Post MDTP the patient's swallowing function normalised and was more efficient and safe which allowed a various food and liquid intake.
MDTP demonstrated a great improvement in swallowing function of post-stroke patient with moderate dysphagia and aspiration events. Further studies with greater sample size are needed to research an impact of MDTP on saliva management and dietary intake.

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Early Virtual Rehabilitation Opportunities for Stroke Patients

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BACKGROUND: Every year, around 1,1 million people suffer from stroke in Europe and experts predict that in the coming years, the incidence of stroke could increase dramatically. (1) A growing body of research highlights the effectiveness of high intensity trainings and virtual reality (VR) therapies in stroke rehabilitation, but only a few studies have examined the effectiveness of high intensity VR therapy in early stages of stroke.

AIM: To determine and compare the effects of high intensity VR therapy and standard physiotherapy after stroke in early stages.

METHOD: Patients with first-time ischaemic stroke in subacute stage were randomized into two groups: VR (n=20) high intensity agility + VR training (1 session/day), CON (n=20) standard physiotherapy (1 session/day). 1 hour/session, 5 days/week over 5 weeks. We measured the following outcomes at the baseline and post-interventions: modified Rankin Scale (mRS), Barthel Index (BI), EuroQoL 5 dimension questionnaire 5 level version (EQ-5D-5L), Berg Balance Scale (BBS), 6 minute walking test (6mWT), Beck Depression Inventory (BDI), posturograpic examination in 4 position (WEO: wide stance, eyes open, WEC: wide stance, eyes closed, NEO: narrow stance, eyes open, NEC: narrow stance, eyes closed)..

RESULTS: Both group improved the most of the results. On the results of EQ-5D-VAS [CON: 0,8 (± 5,20), p>0,05), VR: 6,8 (±10,92), p<0,05] and posturographic examination [CON: WEO: -1,0 (±5,04), WEC: -1,6 (±6,03), NEO: -1,8 (±7,68), NEC: -0,1 (±7,48), all p>0,05; VR: WEO: -3,5 (±4,58), WEC: -6,8 (±4,91), NEO: -7,1 (±6,80), NEC: -9,8 (±5,70), all p<0,05] only the VR group showed significant improvements. The results of mRS [CON: -0,4 (±0,68), VR: -1,2 (±1,3)], BI [CON: 10,3 (±5,50), VR: 14,8 (±10,70)], EQ-5D-5L [CON: -0,9 (±2,07), VR: -3,0 (±2,33)], 6mWT [CON: 45,5 (±42,31), VR: 106,1 (±86,52)], BDI [CON: -1,4 (±2,19), VR: -3,2 (±2,28)], and 2 positions of the posturographic examination [WEC: CON: -1,6 (±6,03), VR: -6,8 (±4,91); NEC: CON: -0,1 (±7,48), VR: -9,8 (±5,70)] showed significantly greater extent in the VR group than CON group (all p<0,05).

DISCUSSION AND CONCLUSION: Our results shows that the high intensity VR training could be especially suitable in the rehabilitation of ischaemic stroke in early stages, which is coincides with earlier reported results, that high intensity and VR therapy may be effective in treating stroke patients. (1-6)

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Factors Affecting the Effectiveness of Hybrid Assistive Limb in Patients With Subacute Stroke

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BACKGROUND: In recent years, the effectiveness of robot assisted gait training (RAGT) for patients after stroke has been reported; RAGT has been shown to significantly improve gait independence 1). Hybrid Assistive Limb (HAL, Cyberdyne Inc., Japan) is one of the devices included. However, there is no clear consensus on the effectiveness of HAL, as there are wide individual differences in patients' symptoms. The factors that affect prognosis after stroke include characteristics such as age, motor paralysis, balance ability and independence in daily living 2-3). Therefore, it is necessary to identify the target population that would benefit from gait practice with HAL based on these factors.

AIM: This study aimed to examine the clinical characteristics of patients who achieved walking independence after HAL training.

METHOD: Fourteen patients after stroke were included in this study. Participants performed the gait training with HAL for 4 weeks (30 minutes/session, three to four times/week).
Patients were classified into "independent", and "non-independent" groups based on whether they were above or below Functional Ambulation Categories (FAC) 4 (indoor independence) after the intervention. The assessment items were the SIAS (Stroke Injury Assessment Set) before HAL training, FMA (Fugl-Meyer assessment for lower extremity) and BBS (Berg balance scale) as measures of function, FIM (functional independence measure) as a measure of patient independence in daily living, and HDS-R (Hasegawa dementia scale-revised) as a measure of cognitive function. These items were compared in two groups by the χ-square test.
This study was conducted by Matterhorn Rehabilitation hospital ethical committee (MRH22001).

RESULTS: Patients were classified into two groups: 8 in the independent group (73.0 ± 12.6 years old) and 8 in the non-independent group (82.6 ± 6.2 years old), with no significant difference in age between the groups. Pre-intervention clinical characteristics were SIAS total score and subscale (hip motion, abdominal strength, verticality, and nonparalytic lateral function), FMA, and BBS, FIM-motor and HDS-R score were significantly different between the two groups ($P<0.05$).

DISCUSSION AND CONCLUSION: We consider that the characteristics of patients who may benefit from HAL are higher ADL ability, a mild impairment after stroke and higher cognitive function. Because RAGT often provides feedback as well as device-assisted lower limb movements, having better cognitive function may be an important factor in promoting the effectiveness of HAL. In addition, patients with higher trunk function and nonparalytic side function before intervention were more likely to be ambulatory independent after 4 weeks. When conducting HAL training, incorporating functional assessment scores (FIM and SIAS), including peripheral items, may be useful to predict the suitability of HAL.

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After stroke you are not alone: Results of Programa Abric

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BACKGROUND: Every year there are 12.2 million new cases of stroke in the world and 1.5 million in Europe1. In Catalonia, there are more than 13,000 new hospital admissions per year2. Of them, 5,800 will have disabling consequences. Therefore, with an estimated population in 2023 of more than 7 million inhabitants, according to Idescat data, it is estimated that around 54,000 people live with a disability acquired by stroke.
In 2007, the Ictus Foundation was created to make stroke known to the population, promote research into the disease and provide support to people who have experienced a stroke and their family members or caregivers. In 2021, the Programa Abric was launched, which offers free, timely and finite advice, information and training to people affected by stroke, family members or caregivers, at any evolutionary time.

AIM: The objective was to evaluate the characteristics of the cases treated by the multidisciplinary team in 2021-2022, as well as detect the most in-demand areas of care and know the overall assessment of the program by users.

METHOD: Observational, descriptive and retrospective study of cases treated between January 2021 and June 2023.
The cases treated by the multidisciplinary team made up of nursing (N), physiatrist (P), neuropsychologist (NP) and social worker (SW) were analyzed. In the reception interview, the needs of each case were detected and were referred to multidisciplinary group or individual interviews depending on the field of experience. The results are presented in absolute values and percentages.

RESULTS: 1001 cases were attended to, 577 affected (57.5% men, average age 63.9 years) and 424 caregivers (71.2% women, average age 49.5 years). 59.4% ischemic strokes, 18% hemorrhagic. 90% belonged to the Barcelona metropolitan area.
The time elapsed from the stroke to the consultation with the Programa Abric was: <7 days in 4.4% of cases; 7-90d in 34.7%; 90-180d in 15.8% and >180d in 45.1%.
With regard to interventions, 548 reception interviews, 167 group meetings and 101 individual meetings were carried out. Interventions by professional profile: N 21.7%, P 26.1% of cases, NP 29.4% and SW 22.8%.
Users' evaluation of the Program was excellent in 78% of cases.

DISCUSSION AND CONCLUSION: In our environment, many public resources are invested for care in the acute phase and for rehabilitation needs in the initial phases of the disease. Despite this, the number of users attended by the Programa Abric shows that those affected and caregivers have doubts about their process during all phases of the disease, mainly in the chronic phase, when they leave the more specialized circuits. The high percentage of care provided by neuropsychology may be due to the lack of public resources to address cognitive sequela.
Conclusion: The users served are mainly male patients and female caregivers. The majority of cases were treated in the chronic phase. The most in-demand area of care is neuropsychology. The program has an excellent rating from users.

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Implication of “Executive” Functions in Unilateral Spatial Neglect

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BACKGROUND: Unilateral spatial neglect (USN) is a common consequence of right hemisphere lesions. Neglect patients fail to detect objects located on the left side of space (1). Beyond a lateralized attention deficit, non-lateralized executive function difficulties (2,3) may contribute to this syndrome. However, the links between these deficits are still relatively unexplored.

AIM: To provide a tailored assessment of executive functions in patients with USN and to explore the links between these deficits and USN.

METHOD: 57 patients with right hemisphere damage and 16 healthy subjects were included. Executive function tests with auditory input were proposed: an inhibition task (Hayling (4), a flexibility task (Plus-Minus (5), and an updating task (N-Back-2 (6). All patients underwent tests assessing visuospatial deficits (drawing copying, A and bells cancellation, reading, line bisection). Two groups were formed: one group of 29 patients showing signs of NSU (N+), and another group of 28 patients not exhibiting this syndrome (N-). We conducted statistical comparisons among the three groups on the number of errors in each executive test and then correlations between USN and executive performances.

RESULTS: Significant differences were found between the patients and control subjects on all tasks ($p<0.01$). No significant differences emerged between the N+ and N- groups for the inhibition (Hayling) and flexibility (Plus-Minus) tasks. In contrast, N+ patients specifically exhibited more difficulty with the updating (N-Back) test ($p<0.01$).
We calculated a severity score for USN based on the various visuospatial tests administered, which appeared to be correlated with the N-Back updating score ($p<0.001$).

DISCUSSION AND CONCLUSION: N+ patients exhibit a non-lateralized deficit in updating processes more than N- patients and control subjects. These scores appeared to be correlated with the severity of neglect symptoms. These results may suggest an involvement of updating processes in USN and common brain localization (3).
Beyond the interest in a better understanding of the cerebral mechanisms involved in USN, these findings have clinical implications for patient therapy. Rehabilitation strategies (7) are likely to show differences in effectiveness among patients suffering from distinct deficits. Unfortunately, the methods used so far to assess these different processes do not allow for distinguishing the relative contribution of these deficits to the USN syndrome. The rehabilitation of patients with USN could prove to be more effective through better consideration of executive diffiuclties hoghlighted by a more approproate and systematic assessement.

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Effectiveness and Efficiency in Stroke Rehabilitation: The sooner, the better?

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BACKGROUND: Stroke survivors greatly benefit from rehabilitation, prompting extensive research into various exercise regimens and treatment approaches. Understanding the optimal timing and nature of rehabilitation remains crucial. Standardized outcome measures play a key role in comparing rehabilitation centers and monitoring trends in stroke care. Metrics like rehabilitation effectiveness (REs), measuring potential functional recovery, and rehabilitation efficiency (Rey), gauging the rate of functional improvement, are suggested for assessing the impact of rehabilitation programs.
Traditional practice categorizes rehabilitation into early (within or shortly after the first 3 months) and late subacute (after 6 months). However, this study challenges this categorization by focusing on patients treated in the hyperacute phase, just days after the stroke, and transferred to specialized intensive rehabilitation units aimed at comprehensive stroke care.

AIM: This study aims to assess the enhancement of functional parameters, including Barthel scores, rehabilitation effectiveness, and efficiency, from an intensive rehabilitation program started within weeks of the stroke's onset.

METHOD: A total of 254 stroke patients were included between January 2021 and June 2023, all transferred for intensive treatment to the NeuroRehabilitation Unit at the Department of Physical Medicine and Rehabilitation, Hospital del Mar-Centre Esperança. Analyzing Barthel Index scores, intervention efficiency (measured by Barthel point improvement per day), and overall rehabilitation effectiveness formed the core of this comprehensive analysis. The study made diverse comparisons across the sample, stratified by the timing of rehabilitation initiation from the first to the fourth week after stroke onset, continuing until hospital discharge. Statistical analysis was performed using SPSS version 26.0.

RESULTS: A total of 254 patients were studied. Mean age of 64.65 years (SD 12.71), 54.1% male, 72.4% experiencing ischemic stroke. At admission, mean time from stroke onset was 14.29 days, with an average length of stay of 16.57 days (SD 10.92). Categorizing the sample by weeks of admission (1-w, 2-w, 3-w, and 4-w), longer lengths of stay decreased, and functional parameters as well as REs/Rey showed clear improvement with earlier admission, all statistically significant. All patients showed improved functional parameters following intensive rehabilitation.

DISCUSSION AND CONCLUSION: The effectiveness of stroke rehabilitation (REs) measures the potential functional improvement achieved, emphasizing greater potential with earlier admission. The efficiency of stroke rehabilitation (Rey) indicates a higher rate of functional improvement associated with earlier admission. Longer delays from stroke onset to rehabilitation lead to increased length of stay, highlighting the importance of timely intervention for better outcomes.
In conclusion, expediting stroke patients' admission to specialized rehabilitation units is crucial. Timelier admission leads to greater potential for functional improvement in these patients.

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Does Location and Etiology of Stroke Condition the Functional Results of an Intensive Rehabilitation Program?

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BACKGROUND: Stroke is the third cause of disability in the world and an increase of 30% is expected in the coming years. Some studies associate the location of the stroke with greater severity in selective affections: for example in respiratory muscles1. In dysphagia there is a non-linear size/location-severity relationship. Despite this, there are few studies published in the literature on the relationship between the location and etiology of stroke and functional results after an intensive rehabilitation program.

AIM: To evaluate whether the etiology or location of the stroke determines a better response to an intensive rehabilitation program in patients hospitalized in a specialized unit.

METHOD: Observational, descriptive, retrospective study.
205 patients underwent an intensive rehabilitation program of at least 3 hours of occupational therapy, speech therapy, and physiotherapy were evaluated between 01/2021 and 12/2022. Functional variables at admission and discharge (Barthel, FIM, and Rankin) were analyzed and evaluated by etiology (TOAST) and location (OXFORD). Analysis of variance (ANOVA) was performed with the statistical software SPSS v25.

RESULTS: Significant improvement was found in all the variables analyzed in the sample: Rankin 0.60 (95%CI 0.49 to 0.71, p<0.001), Barthel 25.187 (95%CI 22.85 to 27.52, p<0.001), FIM 20.18 (95%CI 18.44 to 21.93 p<0.001). When analyzing by location, no significant differences were found: Rankin difference mean -0.6 [SD 0.78], Barthel difference mean 25.19 [SD 16.86], FIM difference mean 19.05 [SD 11.79], nor by etiology: Rankin difference mean -0.57 [SD 0.79], Barthel difference mean 25.62 [SD 17.58], FIM difference mean 19.05 [SD 11.79]

DISCUSSION AND CONCLUSION: Intensity of therapy is related to functional recovery (1), There is little literature that relates the location and etiology to the functional recovery of patients who have suffered a stroke. In our sample we found a tendency to present better functional results in posterior territory stroke, although the difference reached statistical significance. In conclusión, an intensive rehabilitation program favors the functional improvement of the patients analyzed. However, neither the location nor the etiology is a determining factor in response to treatment.

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Quantitative Assessment of Motor Neglect

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BACKGROUND: Unilateral Spatial Neglect (USN) is a common consequence of right hemisphere damage. Neglect patients do not detect objects on the left side of space. Motor Neglect (MN) is characterised by an underutilisation of one side, without defects of strength, reflexes or sensibility and it's a clinical condition whereby patients mimic hemiplegia even in the absence of sensorimotor deficits.

AIM: We used differential actigraphy as a novel, objective method to quantify MN, whose diagnosis is at present highly subjective, based on the clinical observation of patients' spontaneous motor behavior.

METHOD: 6 patients with unilateral stroke, all mens, mean age 63.8 years; range38-86 years underwent :
- wristwatch-like accelerometers, which record spontaneous motor activity of their upper limbs during 72 hours. Asymmetries of motor behavior are then automatically computed offline. On the basis of normal participants' performance, we calculated cut-off scores of left/right motor asymmetry;
- neuropsychological assessments, for the assessment ofvisual and personal neglect, of anosognosia and of patients' preferential gaze orientation ;
- assessment of MN, by clinical scales and video-recording tea preparation task ;
- neuroimaging study of lesion location, brain MRI

RESULTS: Differential actigraphy showed contralesional motor neglect in 2 of 6 patients with unilateral strokes, consistent with clinical assessment. Lesion location in brain MRI was highly variable, suggesting that motor neglect is a heterogenous condition.

DISCUSSION AND CONCLUSION: Differential actigraphy provides an ecological measure of spontaneous motor behavior, and can assess upper limb motricity in an objective and quantitative manner. It thus offers a convenient, cost-effective and relatively automatized procedure for following-up motor behavior in neurological patients and to assess the effects of rehabilitation:
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Influence of Functional Status of the Patient in Severity of Hemiplegic Shoulder Pain During Rehabilitation

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BACKGROUND: Stroke is one of the most common conditions resulting in disability in today's society. [1] To properely treat its consequences such as hemiplegic shoulder pain , we need to thoroughly understand the causes of their formation.

AIM: Assessment if the severity of post-stroke neurological deficit staus of the patient is corelated with occurance of pain in the hemiplegic shoulder or its intensity.

METHOD: Eligibility criteria: patients of the Rehabilitation Clinic currently undergoing neurological rehabilitation after stroke of any etiology.
Intervention: physical examination with muscle strength assessment according to MRC scale [2], muscle tension of the affected limb according to MAS scale [4], passive range of motion of the shoulder joint on the affected side (ROM), Barthel Index assessment [5], assessment of the occurrence of pain in the shoulder joint on the affected side, possibility of verticalization on admission and on discharge from the Clinic, ultrasonography of the shoulder on the affected side for the tendon pathologies.

RESULTS: Results: Thirty-seven patients were included in the study.
There was no influence of muscle strength (MRC), muscle tension level (MAS), the presence of limited mobility in the shoulder joint or the degree of disability at admission, and the presence of pain in the shoulder joint on the paretic side. No relationship was found with the possibility of standing upright upon admission or discharge, or with the presence of pain on the affected side
However, a relationship was confirmed between the degree of increased muscle tension on the MAS scale and the intensity of pain - the stronger the muscle tension, the greater the pain, as well as between the degrees of disability and the intensity of pain - the greater the disability both at admission and discharge, the greater the shoulder pain, the higher the intensity. pain was also found in people with greater paresis upon admission to hospital. There was no correlation between the intensity of pain and the level of muscle strength as demonstrated by patients undergoing rehabilitation

DISCUSSION AND CONCLUSION: Functional status does not affect the presence of pain, but its intensity. So patients with greater disability and muscle tension must be subject to more intensive supervision and care in this area.

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The Impact of the Metabolic Syndrome and its Components in Post-stroke Hemiparetic Individuals undergoing Medical Rehabilitation

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BACKGROUND: Individuals with a history of stroke are still vulnerable to future vascular events, but vascular risk assessment is often overlooked in this population. Multiple health organisations such as NCEP ATP III, WHO and IDF have defined the metabolic syndrome(MetS), but they all agree that it consists in a cluster of risk factors: dyslipidemia, diabetes mellitus (DM), high blood pressure (HTN) and obesity specific for cardiovascular and cerebrovascular diseases. Each of the components of this syndrome can affect the neuro-functional recovery process: a diabetic patient can have a hypoglycemic episode during kinesiotherapy, uncontrolled, high or fluctuating blood pressure might be a contraindication for electrotherapy and kinesiotherapy and obesity can cause negative effects on functional independence and care requirements.

AIM: MetS may be a useful construct for risk assessment, having the predictive quality of being able to distinguish patients who are at high risk of future morbidity and by doing so it may offer a better understanding of how to manage its components in order to facilitate the rehabilitation programme.

METHOD: We collected data from a group of 185 patients, who suffered at least one ischemic or hemorrhagic stroke, admitted in the last 2 years in our clinic (Clinic III,INRMFB). We used the following WHO metabolic syndrome criteria: BMI>30 kg/m2, TGL>150 mg/dL, HTN and DM. We calculated the prevalence of the metabolic syndrome and additional risk factors for cerebrovascular disease (atrial fibrillation and atherosclerosis). The group was composed of 112 men and 73 women, with a mean age of 65 years, of whom 8.10% had at least 2 strokes, with a mean duration since the first stroke of 5 years.

RESULTS: In the studied group, the most prevalent element is HTN (92.43%), followed by dyslipidemia (68.1%), DM (41.62%) and obesity (28.64%). The prevalence of the metabolic syndrome is 27%.

DISCUSSION AND CONCLUSION: Both the BP level, the blood sugar level and excess weight are vital criteria that require continuous monitoring, dictating the particularities of the kinesiotherapy program, as an active component of the rehabilitation programme.
Although 27% of patients met all the metabolic syndrome criteria, the results emphasize the importance of patient education regarding the management of this syndrome and becoming active participants in the treatment plan in order to facilitate the process of functional rehabilitation and increase the quality of life.

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The Relationship Between MCO and Energy Cost of Walking: The Over Activity Could Be a Friend…

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BACKGROUND: In stroke patients, muscular coactivation (MCO) appears excessive and abnormal during walking, on both the paretic and non-paretic sides (1). But today, there is no consensus on MCO schemes for walking (1). The higher energy cost of walking (CW) in this population could be due an excessive MCO, which requires additional metabolic cost (2,3).

AIM: The aim of this review is to assess the level of MCO in the lower limbs during walking, depending on the limb, joint and phase of the gait cycle studied, in individuals with stroke and the link with CW.

METHOD: This systematic review of the literature and meta-analysis included studies reporting the duration of muscular coactivation expressed as a percentage of the gait cycle or phase of the gait cycle in individuals with stroke during walking on flat ground. The Scopus, Meldine and Embase databases were searched over the period January 1990 to January 2023. The Scopus, Meldine and Embase databases were consulted over the period from January 1990 to January 2023. The CW was estimated using the speed of walking according to the method developed by Compagnat et al (2022) (4).

RESULTS: 11 studies were included, involving 298 participants. The average MCO of the ankle in the stance phase was 48.8% and in the swing phase 24.8%. For the knee, the average MCO was 51.8% in the stance phase and 37.7% in the swing phase. Significant differences were found between the acute and chronic phases on both the paretic and non-paretic sides and compared with the control group for the chronic phase. A high level of heterogeneity was found in each subgroup analysis (I2 >70%). The relationship between MCO and CW showed a non-significant negative correlation ($r = -0.3$; $p = 0.069$) but was significant for the sub-acute phase ($r = -0.6$; $p = 0.007$).

DISCUSSION AND CONCLUSION: This review is the first meta-analysis to describe the level of lower limb MCO during walking and its relationship with energy cost, which is the opposite of current thoughts. In the sub-acute phase, individuals with higher MCO values have a reduced CW, which is not the case in the chronic phase. This suggests that MCO may be a factor in the return of motor control allowing efficient walking in the sub-acute phase.

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Influence of Botulinum Toxin Type a on the Functional Independence of People With Post-stroke Spastic Hemiparesis

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BACKGROUND: Cerebral Vascular Injuries results in temporary and/or permanent neurological deficits responsible for a set of signs and symptoms inherent to post-stroke patients. The therapeutic application of botulinum toxin A (TBA) is a clinical strategy used to reduce functional limitations and disabilities resulting from neurological damage caused by brain injuries 1,2.

AIM: To identify the effects of TBA on the functional independence of post-stroke spastic hemiparetic individuals.

METHOD: Cross-sectional study, carried out with a non-probabilistic sample of nine spastic hemiparetic participants. Participants underwent a previously structured assessment with sociodemographic data and physical-functional anamnesis. Functional Independence Measurement (MIF) and Muscular Ashworth Scale (MAS) were used to measure functional outcomes before the application of TBA and after 45 days. The application of TBA was carried out by a physiatrist, on the flexor digitorum superficialis and flexor pollicis longus muscles, flexor carpi radialis and ulnaris, opponens pollicis and biceps brachii muscles. The sample effect size was calculated from the pre- and post-application values of TBA using the Cohen method. A significance level of < 0.05 (5%) was adopted. The present study was approved by the Ethics and Research Committee with Human Beings of Universidade Paulista(UNIP), Brazil (No. 3,425,071).

RESULTS: Five female participants completed the study, with an average injury time of 7.1 ± 5.48 years. A reduction in functional restrictions was observed in the FIM with significant scores, directly reflecting on the measure of functional independence (p=0.019), pre-TBA (93 ± 18.3) and post-TBA (95.8 ± 19). There was also a significant improvement in aspects of muscle tone, using the modified Ashworth scale, with evidence for the elbow flexor muscle groups (p=0.016): grade 2.2±0.7 and 1.4±0.4, pre and post TBA respectively. And wrist flexors (p=0.003): grade 0.6 ± 2.3 and 0.8 ± 1.3, pre and post TBA, respectively.

DISCUSSION AND CONCLUSION: The results of the present study were assertive in relation to our null hypothesis, in which the effects of TBA on the muscle, in the short term, influence functional performance during the execution of daily activities. Such clinical improvement can be evidenced through the increase in the final FIM scores and muscle tone improvement. The mechanisms of action of short-term TBA used in clinical practice enabled a decrease in muscle tone with improved functionality, reducing functional disabilities and movement synergies resulting from neurological damage.

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The Efficiency and Long-Term Benefit of Botulinum Toxin in Post-Stroke Spasticity Treatment; a Case Report

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BACKGROUND: Spasticity is a leading cause of long-term post-stroke disability (1). Early treatment of spasticity with botulinum toxin (BoNT-A) combined with neurorehabilitation aims to reduce muscle tone, prevent contracture, and improve function (1-3). This case study illustrates the importance and benefits of early treatment of spasticity.

AIM: The case study aimed to illustrate BoNT-A's efficiency and long-term benefit in early-onset post-stroke spasticity treatment in daily clinical care.

CASE REPORT: A 66-year-old patient suffered an intracerebral haemorrhage in the right brain hemisphere four months ago, resulting in left-sided hemiparesis. Initially, she was admitted to the Neurological Department of the University Medical Centre Maribor and received early neurorehabilitation.
During the Institute of PRM examination, we observed signs of severe left-sided hemiparesis with greater upper limb involvement.There was no active movement in the left upper limb. Passive mobility in the left upper limb was limited in all ranges of motion (ROM). Muscle tone in the elbow flexors, wrist dorsiflexion, and in finger flexor was increased, measured by the Modified Ashworth Scale (MAS 3). The shoulder was painful during passive movements. We presented treatment options and applied BoNT-A to the elbow, wrist, and finger flexors. She was enrolled in an outpatient neurorehabilitation ten days after the application. BoNT-A was applied at four-month intervals.

METHOD: The Functional Independence Measure (FIM) assessed the patient's functional status, a visual analogue scale (VAS) pain intensity, the modified Ashworth scale (MAS) muscle tone. We used a goniometer to measure joint mobility (1).

RESULTS: Within three weeks after each BoNT-A application, the patient's muscle tone decreased. After the second BoNT-A treatment, there was a significant improvement in movement, muscle tone reduction, shoulder pain, and improved function of the left upper limb. The patient was able to grasp and hold objects with her left hand. In the first ten months, the passive ROM in the upper limb increased. The muscle tone in the wrist and finger flexors decreased from MAS 3 to MAS 2. Shoulder pain decreased from 6/10 to 2/10 after additional applications.

DISCUSSION AND CONCLUSION: Clinical guidelines describe that early administration of BoNT-A (2-12 weeks after a stroke) in combination with neurorehabilitation reduces spasticity and improves upper limb function (1,3). Early treatment is often a challenge, because many outpatients do not come early enough on spasticity treatment. This case study illustrates that early onset and repeated applications of BoNT-A result in a lasting reduction of muscle tone (3).

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Brain-Computer Interface Treatment for Lower Extremity Rehabilitation in Stroke Patients

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BACKGROUND: Neurorehabilitation based on Brain-Computer Interfaces (BCIs) show important rehabilitation effects for patients after stroke. This is especially true for upper extremity motor rehabilitation with previous studies showing improvements for patients that are in the chronic stage and/or have severe hemiparesis, which are particularly challenging for conventional rehabilitation techniques. However, less is known about the efficacy of BCI interventions for lower extremity rehabilitation after stroke.

AIM: The current study investigates the efficacy and safety of a BCI technology in facilitating lower extremity motor function improvements after stroke.

METHOD: Seven stroke patients in their chronic phase with lower extremity hemiparesis were recruited. All of them participated in 25 BCI-sessions about three times per week. The BCI-system was based on the Motor Imagery (MI) of the paretic-ankle dorsiflexion and healthy-wrist dorsiflexion with Functional Electrical Stimulation (FES) and avatar feedback. Assessments were conducted to assess the changes before and after the therapy. The clinical scales used were: 10-meters walking test (10MWT), Range of Motion (ROM) of the ankle dorsiflexion and Timed Up and Go (TUG).

RESULTS: Results show a significant increase in the gait speed in the primary outcome measure 10MWT fast-velocity of 0.18 m/s [0.12 to 0.2], P = 0.016. TUG performance also significantly increased by 0.1 m/s [0.09 to 0.11], P = 0.031. The active range of motion of the ankle dorsiflexion movement also was increased after the therapy by 4.7° [1.7 to 7.4], P = 0.039.

DISCUSSION AND CONCLUSION: These outcomes show the feasibility of the BCI approach, and further support the growing consensus that these types of tools might develop into a new paradigm for gait rehabilitation tool for stroke patients. Importantly, the improvement in gait speed in the primary outcome measure reflect a clinically meaningful change. Nonetheless, the authors believe that this approach should be further validated in broader studies involving more patients.

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Outcomes in Stroke Patients' Gait Patterns Following Overground Exoskeletal Robotic Walking Sessions

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BACKGROUND: People with disabilities after stroke, can complete high-intensity repetitions of the gait cycle thanks to overground robotic-exoskeleton training (ORE), with less therapist effort. ORE post-stroke increases the chance of regaining independent walking in addition to standard rehabilitation.

AIM: Twenty-two stroke patients participated in walking sessions using a robotic exoskeleton. Records were the effects on gait pattern, stability, balance, and affected limb perception.

METHOD: Patients with stroke (1-3 months after) were selected for initial evaluation. During the first phase, the patient's age, height, weight and a short medical history were recorded. The range of motion (ROM) and muscle strength for upper and lower extremities also examined and recorded. Assessment of spasticity took place for the lower extremities. We examined both the lower extremity's length for any discrepancies. We also examined pathological situations that can prevent standing or walking with the exoskeleton, like pressure sores, postural hypotension, lower limb fracture, high blood pressure, cognitive problems etc. Those who met the inclusion criteria proceeded to the second stage of evaluation, the application of the robot and the first exercises (weight shifts, steps, etc).

RESULTS: After ORE training, improvements were seen in feeling on the hemiplegic side, walking pattern, balance in standing position, coordination, and proprioception. Spasticity decreased for up to 24 hours following the treatment. Patients were able to perceive their body position more accurately when looking in the mirror and paying attention to the therapist's instructions. They could use their hemiplegic lower extremities more effectively, as it appears from of the progressive decrease in machine assistance during the swing phase. Meanwhile, there was an improvement in bodily awareness and cognitive function.

DISCUSSIONS AND CONCLUSIONS: Our first limitation is the power of our statistical analyses that will be hampered by the small number of subjects. Secondly, each patient's participation in sessions varied in the number of sessions. To summarize in addition to standard rehabilitation, walking ability, stability, balance and perception of the affected limb may benefit from ORE training. Additional extensive, long-term, high-quality trials should be done to confirm the sustainability of ORE training.

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The Impact of Early Rehabilitation Treatment on the Recovery of Stroke Patients in the Acute Phase

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BACKGROUND: Early rehabilitation of patients with acute stroke has become a key part of post-stroke treatment. Numerous studies have shown that timely applied rehabilitation stimulates neuroplasticity, contributing to a more rapid recovery of motor functions (1, 2). In addition, early rehabilitation leads to a reduction in various complications associated with inactivity, which play a significant role in mortality in stroke patients (3).

AIM: Our goal was to assess the effects of early rehabilitation treatment on neurological recovery, and functional independence in the activities of daily living in acute stroke patients.

METHOD: This retrospective controlled trial included 45 patients (23 women and 22 men; mean age 69.6±14.54 years) with acute stroke admitted to the Neurology Department Clinical Centre of Vojvodina. Patients were divided into two comparable groups, the experimental group (n = 25) and the control group (n = 20). Experimental group underwent individually tailored intensive early rehabilitation treatment twice a day, 6 days a week. Control group was not included in rehabilitation treatment. The groups had similar mean National Institutes of Health Stroke Scale (NIHSS) scores on admission. We used Barthel index (BI) and NIHSS as outcome measures. Aschwort scale was used to assess spasticity. Patients were assessed on admission and 21 days after stroke onset.

RESULTS: Our results show that there were no significant differences in neurological outcomes between experimental and control group (mean NIHSS 12.3 ± 5.78 vs. 11.2 ± 5.25, $p>0.05$), while experimental group had higher functional outcome measured by Barthel index (BI) (mean BI 58.3 ± 18.56 vs. 42.2 ± 15.86, $p <0.05$). Spasticity measured by Aschwort scale was significantly lower in experimental group (mean 1.4 ± 1.46 vs. 2.6 ± 1.57) ($p < 0.05$)

DISCUSSION AND CONCLUSION: Early intensive rehabilitation treatment plays a key role in obtaining functional independence in patients after stroke. Passive training can be the first step in the early rehabilitation of patients with acute stroke (2). It prepares patients for further rehabilitation programs and inhibits the development of spasticity and contractures (3). Our results indicate that early rehabilitation treatment in patients with acute stroke is safe and feasible and has a significant impact on functional outcome.

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Comparison of Transcutaneous Electrical Stimulation and Acupuncture for the Treatment of Hemiplegic Shoulder Pain

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BACKGROUND: Hemiplegic shoulder pain (HSP) is a common complication of stroke that interferes with the function of the upper extremities.Different treatment modalities can be used for limiting the possible side effects.

AIM: The aim of this study is to compare and evaluate the effects of acupuncture and transcutaneous electrical
stimulation for shoulder pain after stroke.

METHOD: Fourty patients with HSP who participated in a conventional rehabilitation program were randomized into TENS or acupuncture treatment groups in this clinical study. A 100 mm visual analogue scale was used to assess the severity of pain Passive range of motion (ROM) of the shoulder was measured. The Modified Ashworth Scale (MAS) was used to evaluate spasticity of the upper extremities, and the Modified Barthel Scale was used to assess activities of daily living (ADL). The Modified Rankin Scale (mRS) is used to measure the degree of disability. Measurements were recorded at the beginning, first week and the end of 3 weeks. Ethic approval and written informed consent were obtained.The Statistical Package for the Social Sciences (SPSS) software was used in the analysis.

RESULTS: No significant difference was noted between the groups regarding the age, sex, BMI, hemiplegic side, and time of stroke at the baseline evaluation ($p > 0.05$). Pain intensity measured by VAS, Passive range of motion, showed significant ($p < 0.05$) within-group difference in both groups. The outcome measurement of pain intensity measured by VAS between-group difference appeared no difference ($p > 0.05$), while Passive range of motion, showed significant different than TENS group in acupuncture group ($p < 0.05$). MAS scores, Barthel scores and mRS scores after treatment did not differ significantly between the groups.

DISCUSSION AND CONCLUSION: Even Zhang et al. showed that pain by VAS was significantly lower in the electroacupuncture group than in the TENS group (1). Acupuncture is found an effective treatment for stroke patients with shoulder pain (2-4). And TENS was used and found effective for stroke patients with shoulder pain (5). Acupuncture can be considered as an adjuvant therapy in combination with conventional rehabilitation of the stroke patients who are suffering from shoulder pain.

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Kinesiotaping Improves Upper Extremity Function of Stroke Survivors: A Randomized Control Study

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BACKGROUND: Impaired upper limb function in stroke survivors is characterized by muscle weakness, increased muscle tone, contracture, joint instability, or impaired motor control. Nowadays, many new equipment options have emerged in modern post-stroke training programs, including robot-assisted technology, virtual reality, and repetitive transcranial magnetic stimulation (rTMS), among others. Nevertheless, these options may not be financially accessible for all stroke survivors, making Kinesiotaping (KT) an attractive alternative treatment option.

AIM: We aimed to evaluate the effectiveness for functional recorvery of KT application on the proximal and distal parts of the affected upper extremity during rehabilitation.

METHOD: This was a randomized controlled study. Stroke survivors were randomly assigned to either the KT group, receiving KT intervention and conventional therapy, or control group, receiving sham KT intervention and conventional therapy. Fugl-Meyer assessment of the upper extremity (FMA-UE), Brunnstrom stage of the affected upper extremity, Barthel Index (BI), the Stroke Impact Scale (SIS), modified Ashworth scale, and modified Tardieu scale were measured at three time points: baseline, post-treatment (three weeks), and follow-up (six weeks).

RESULTS: Forty-one patients eligible for this study were randomized into two groups: the KT group (n = 21) and the control group (n = 20). The baseline median FMA-UE scores for the KT group and the control group were as follows: (Upper extremity, wrist, hand) = (7, 1, 1) and (13.5, 2, 2), respectively. There were no significant differences in all the general characteristics. In the KT group, there were significant differences in the wrist part of the Brunnstrom stage (p=0.002). Proximal part (p=0.003), wrist (p=0.000) and hand (p=0.000) of the FMA-UE also showed significant improvement between the three assessment times. On the other hand, the Barthel Index showed significant differences in both groups, with a much lower p value (p=0.000 vs. 0.011) in the KT group.

DISCUSSION AND CONCLUSION: Combining conventional rehabilitation with KT intervention may improve functional motor performance of both the proximal and distal parts of the hemiparetic upper extremity in subacute and chronic stroke survivors, with potential benefits for ADL performance.

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Monitoring of Arm Activity in Stroke Patients in Daily Rehabilitation Care

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BACKGROUND: Upper limb dysfunction limiting the performance of self-care and other activities is presented in up to 80% of stroke patients (1). Accelerometers and the Actigraph system wristbands provide reliable information about spontaneous upper limb activity (2,3). Using smart low-cost wristbands, it is also possible to detect activity of upper limbs during the daily activities and sleep time. However, it is necessary to determine their accuracy and usability for the clinical practice.

AIM: To describe the use of a paretic upper limb during daily activities, leisure time and sleep and to compare the measurement results from a smart wristband, which is not obtrusive for the patient to wear, with a reliable Actigraph system.

METHODS: The observational study describes performance and daily use of upper limbs in thirty stroke patients in subacute phase during a rehabilitation inpatient stay over a 24-hour period. Subjects wear a smart wristband for experimental measurement and Actigraph GT9X Link wristband as a reference on both wrists. Upper limb activity is assessed based on the activity recorded and evaluated as a total activity time in hours with use ratio, and compared with the activity performed in daily schedule during measured time. Clinical assessment of upper limb function was performed using the Action Research Arm Test and Motor Activity Log.

RESULTS: Preliminary results showed significantly lower involvement of paretic upper limb during measured time depending on paresis severity. Within daily activities and rehabilitation exercise the activity of paretic upper limb increases but does not reach the required level of intensity compared to a healthy upper limb. Study outcomes also provide comparison of accelerometry data between experimental and referential wristbands.

DISCUSSION AND CONCLUSION: Based on obtained results, it is possible to objectify upper limb activity. It can be expected that the use of a smaller and lighter wristband will lead to a higher wearing adherence. The method used does not inform about the quality of the movement and may be biased by the ratio of walking to sedentary activity (2,3). In case of successful verification of the measurement accuracy of the cheaper smart wristbands, this could be an accessible measurement, and with the use of a feedback, also support for functional training of the upper limb and its use in daily activities.

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Effectiveness of Using Virtual Reality Rehabilitation Training for Upper Limb Motor Rehabilitation in Acute Post-stroke Patients

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BACKGROUND: Stroke-induced upper limb motor impairments require effective rehabilitation. Conventional therapies (CT), such as physical and occupational therapy, have historically improved upper limb motor function in stroke survivors. However, emerging technologies like virtual reality (VR) hold great promise for enhancing functional recovery (1,2). This study investigates the potential of the Bimeo PRO VR-based system enhance motor function in acute post-stroke patients.

AIM: To evaluate the effectiveness of combining VR with CT in improving upper limb function among individuals in the acute post-stroke phase. The study focuses on assessing specific parameters related to upper limb mobility and their correlation with motor ability improvements.

METHOD: Thirteen stroke patients admitted to the Neurological Department of UKC Maribor participated in a two-week daily CT program.Each patient also underwent ten sessions using the Bimeo PRO upper extremities rehabilitation system.These sessions included Reaching, Tracking, and Labyrinth exercises.Distinct assessment parameters were utilised to evaluate various aspects of upper limb mobility for each exercise; Optimality: The ratio of the actual movement path length to the ideal shortest distance; Velocity: The speed at which the patient's arm moved; Deviation: The degree of deviation from the perfect path, indicating trajectory straightness; Smoothness: The smoothness of the patient's movement; Movement time: The time taken from when the target appeared to when it was successfully covered. Except for movement time, assessment parameters were normalised on a scale ranging from 0 (indicating poor motor ability) to 10 (representing excellent motor ability).Outcome measures included Fugl-Meyer Assessment-Upper Extremity (FMA-UE),),Wolf Motor Function Test (WMFT) scores and NIH Stroke Scale (NIHSS).

RESULTS: The results revealed significant enhancements across all assessment parameters. Specifically, the Reaching exercise demonstrated notable average improvements: 49% in Performance, 19% in Optimality, 36% in Velocity, 6% in Deviation, and 38% in Smoothness. The average movement time decreased from 4.4 seconds to 2.2 seconds. The average Movement Quality Index increased by 27%. Significantly greater improvements were noted in FMA-UE motor function (p= 0,03), FMA-UE sensation (p=0,003) and dynamometry (p= 0,000).

DISCUSSION AND CONCLUSION: The study's findings indicate a strong correlation between the Bimeo PRO rehabilitation system's assessment parameters and improved upper limb motor function in acute post-stroke patients. This comprehensive assessment encompasses various aspects of motor abilities and provides valuable insights into patients' progress during rehabilitation.
An upcoming study will include a larger cohort of subjects to validate further and extend these promising initial results. This expanded research will enable a more robust analysis, confirming the effectiveness of the Bimeo PRO system in upper limb motor rehabilitation. Continued investigation is anticipated to yield valuable insights, contributing to ongoing advancements in stroke rehabilitation strategies and ultimately enhancing the quality of life for individuals recovering from stroke (2).

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Improving Arm Functions of Stroke Patients by Electromechanical-Assisted Therapy: Determining the Optimal Distribution of Therapy

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BACKGROUND: According to the guidelines it is recommended to integrate electromechanical-assisted therapy into the rehabilitation of stroke patients in order to support the recovery of upper extremity functions. However, there is a lack of consistent recommendations for the optimal distribution and intensity of this therapy (1).

AIM: The authors of this ongoing research are investigating, if there is a more effective way to distribute electromechanical-assisted therapy with the Armeo®Spring (hereafter „device") during the comprehensive rehabilitation program of stroke patients.

METHODS: 50 patients with arm impairment were selected from those, who were treated within 6 months after their first supratentorial stroke in the National Institute for Medical Rehabilitation in Budapest (Hungary). They were separated randomly into 2 study groups: „group1" (N=25, after drop-out N=22) and „group2" (N=25, after drop-out N=20). The average age was 59.36(±8.74) and 53.10(±14.92) years. The average number of days passed since their stroke was 69.05(±41.27) and 68.05(±42.37) days. In addition to 4 weeks of conventional therapy, „group1" received 10 times 30 minutes of treatment with the device during the first 2 weeks (5 times/week). „Group2" got the same amount of this therapy (10x30 minutes), but it was distributed for 4 weeks (2-3 times/week). Measurements were carried out directly before the beginning of the therapy, then at the end of the 2nd and the 4th weeks. Measured variables were the active range of motions of the affected arm (A-ROM), and the magnitude of area (A-MOVE, cm^3) that was available with active arm movements (both measured with the assessment system of the device). Fugl-Meyer Assessment for Upper Extremity (FMA-UE), Modified Ashworth Scale (MAS), Functional Independence Measure (FIM), and Barthel Index (BI) were also reported. The statistical analysis was performed with Statistical Product and Service Solutions (SPSS). The significance level was determined as α=0.05.

RESULTS: Within 4 weeks the measured variables changed according to the followings: A-ROM: the range of shoulder flexion increased on average with 11.00°(±11.86°) in „group1"; and with 13.15°(±24.69°) in „group2" (p=0.465). There were also no significant differences between the groups in the range of other movements. A-MOVE changed with 52785.02(±57571.56) cm^3 in „group1" and with 50126.52(±45112.16) cm^3 in „group2" (p=0.869). FMA-UE values increased with 12.68(±6.02) points in „group1"; and with 12.30(±5.75) in „group2" (p=0.835). MAS points changed with -0.05(±0.79) in „group1"; and with 0.05(±0.39) in „group2" (p=0.543). The results of FIM increased in „group1" with 17.82(±11.54); and in „group2" with 18.70(±12.06) points (p=0.840). BI values changed with 18.41(±12.57) points in „group1"; and with 23.00(±15.08) points in „group2" (p=0.320). Overall, the differences between the groups were statistically not significant for any of the variables.

DISCUSSION AND CONCLUSION: Based on the results of 42 patients, within 4 weeks there seem to be no remarkable differences in the effectiveness of the electromechanical-assisted therapy with the device if 10x30 minutes therapy is distributed in two different ways.

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Correlation of Clinical and Demographic Parameters on Functional Outcomes After Robotic and Conventional Poststroke Upper Limb Rehabilitation

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BACKGROUND: Despite the rehabilitation, the motor function of the upper limbs recovers at only 5-20% poststroke patients. The main principle of modern neurorehabilitation required task-oriented training with a large number of repetitions and greater intensity of practice. The assisted antigravitation kinesiotherapy with ArmAssist (AA) robotic device is used to develop arm training and designed to facilitate arm movements in antigravity environment, with minimal assistance of therapist.

AIM: Correlation of basic demographic, social and clinical characteristics on functional outcomes within two groups treated with AA robotic device added to conventional rehabilitation against matched conventional arm training.

METHOD: We included 30 subacute after stroke patients which were on inpatient rehabilitation care at rehabilitation clinic “dr Miroslav Zotovic” in Belgrade. General demographic, social and clinical parameters were determined for all of them: sex, age, level of education, marital status, type of lesion (ischemic or hemorrhagic cortical or subcortical type of stroke), side and site of the lesion after stroke, presence of comorbidities, previous application of thrombolytic therapy. Group A (experimental group, n=15) was treated with assisted antigravitation kinesiotherapy using AA robotic device added to conventional rehabilitation. Group B (control group, n=15), was treated with matched conventional rehabilitation. Daily duration of treatmen of both groups were 120 minutes. All patients were evaluated at baseline and after 3 weeks of intervention. The primary outcome measure was the Wolf Motor Function Test-Functional Ability Scale (WMFT-FAS). The secondary outcomes were the Fugl-Meyer Assessment-Upper Extremity motor score (FMA-UE motor) and Barthel index (BI). Quantile regression analysis was used to model the relationship between dependent variables and potential predictors.

RESULTS: In univariate regression models, patients in the experimental group whith subcortical ischemic stroke, showed statistically significant decrease score in WMFT FAS (p=0,039) (95% CI (-31,063) – (-0,937)). Patients in control group, showed statistically significant increase in FMA-UE motor score in category family status (single) (p=0,044) (95% CI 0,64 – 37,360). In other regression models, we found no significant differences in outcomes as well as demographic and clinical characteristics of patients in both groups.

DISCUSSION AND CONCLUSION: In the literature, has been shown that stroke of ischemic etiology involving subcortical regions was correlated with a lower degree of functional independence, which coincides with the results of our study.
Subjects with moderate to severe arm impairment with subcortical type of ischemic stroke, treated with conventional rehabilitation with robotic device therapy, had a lower degree of functional recovery of upper limbs. Understanding the impact of topography and other clinical and descriptive characteristics of subjects on rehabilitation outcomes is important for a better methodological approach in clinical trial design, patient selection, sample size and selection of clinical parameters of rehabilitation outcomes.

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Mixed-Reality for Upper-Limb Stroke Rehabilitation

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BACKGROUND: Paretic upper limb is one of main causes of stroke survivor's disability. Cognitive deficits, and more precisely attention deficits, are also common after stroke. Mixed-reality (MR) allows patients to use real world objects while interacting with virtual images, which recreates an ecological setting. As such, MR has been posited as a promising rehabilitation tool [1].

AIM: Here we propose a rehabilitation protocols based on cutting-edge MR interfaces to tackle upper limb disability, while also studying the impact of such rehabilitation program on attention.
We also addressed the question of whether an MR rehabilitation program is more motivating than a standard one (physiotherapy and occupational therapy)[2].

METHOD: 15 Chronic stroke patients (>6 months) participated in a standard rehabilitation program and 15 others in a standard rehab program + an MR intervention, consisting of a cooking game where patients had to prepare different recipes. Objects such as plastic vegetables and cutlery were needed.

RESULTS: We found that an MR rehabilitation program in combination with a standard upper limb rehabilitation improved upper limb function of chronic stroke patients as measured by the Wolf Motor Function Test, the Box and Blocks Test, and the Fugl-Meyer assessment test. Regarding attention, the Continuous Performance Test (reaction time) showed an improvement in the control group. No differences were found in motivation, as measured by the Intrinsic Motivation Inventory test.

DISCUSSION AND CONCLUSION: This pilot study adds to the growing literature on the benefits of MR intervention for stroke rehabilitation. Given the small sample size and other limitations, results should be taken with caution until replication.

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Young Patient With Spastic Hemiparesis and Claw Hand Deformity Post Embolic Stroke Following Infective Endocarditis During Pregnancy

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BACKGROUND: Stroke during pregnancy is a relatively rare occurrence (~30 per 100.000 pregnancies), but it could be a serious and stressful event for mothers, infants, and also their families. Maternal physiological alterations occur during pregnancy as a consequence of the variations of the hormonal status, involving the haemostatic and hemodynamic systems. Whether this adaptation could affect the risk of an ischemic stroke is still unclear and the relationship is likely complex. Prophylaxy after cardiologic interventions is of major importance, especially in the presence of pregnancy as an additional risk factor for infection and cardiovascular events.

AIM: This case report aims to highlight the particularities of the rehabilitation programme in a young female patient with spastic hemiparesis post-stroke and multiple neurovascular comorbidities.

METHOD: We present a patient, aged 25, right handed, non-adherent to treatment, who underwent surgery for aortic valve stenosis in 2006. After postponing its replacement in 2019, in the beginning of 2020, during week 26 of her second pregnancy she was admitted to a general hospital with acute febrile syndrome that lead to the diagnosis of COVID-19, endocarditis with a negative set of blood cultures and right fronto-temporal cerebral abscess. Antibiotic treatment was initiated with fever remission, but suffered an embolic stroke complication of the middle cerebral artery that resulted in left hemiplegia. During week 32 a cesarean section was performed. In October 2020 she underwent a mechanical valve replacement and in November 2020 she suffered a generalised seizure and got diagnosed with structural epilepsy.
She was admitted in our clinic late, in August 2023, with left spastic hemiparesis and left central facial palsy. Further evaluation of the left hemibody revealed: scapulo-humeral luxation with moderate shoulder pain (VAS=6/10), the arm postured in adduction and internal rotation, proximal spasticity 4/5 Ashworth, claw hand deformity with loss of motor control, hyperreflexia, positive Babinski sign, knee instability with a tendency to genu recurvatum, gait and coordination impairment, requiring a simple cane for short distance walking (50 m). Background medication: Acenocumarol 4 mg/day, Levetiracetam 500 mg x 2/day, Sertraline 50 mg once/ day.
Pharmacological analgesic treatment was administered (paracetamol), and physical kinetic procedures with analgesic and trophic electrotherapy appliances: TENS, Ultrasound, Therapeutical massage, KT with elements of occupational therapy, as well as regular psychological therapy sessions.

RESULTS: The evolution has been slowly favorable, subjectively and objectively, by reducing the pain (VAS=3/10), increasing the scapulo-humeral range of motion, left knee stability and the independent walking distance (from 50 m to 150 m) and also a better management of transfer movements and fear of falling.

DISCUSSION AND CONCLUSION: Young patients with multiple neurovascular comorbidities and anticoagulant medication have limited options for pain management. The focus is primarily on increasing the level of independence, quality of life and educating the patient regarding the long-term management of these comorbidities and giving regular feedback of the home-rehabilitation programme.

REFERENCES:

Implementation of a Physical Activity Program in a Digital Day Hospital for Patients With Chronic Neurological Conditions

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BACKGROUND: Literature confirmed the positive effects of physical activity for patients with chronic neurological conditions (1-2). Our PMR day hospital practices telerehabilitation since February 2020. Then we developed a program of physical activity and self-exercises exclusively in tele-care, to encourage practice by chronic neurological patients.

AIM: The aim of this work is to report the preliminary results of this experiment.

METHOD: Participants are patients with neurological pathology. The digital solution used for tele-care and self-exercises is Axomove®. The program started in March 2023 for a period of 2 years. It consists of two successive phases of 3 months each. The first includes weekly 2 tele-care sessions of physical activity and 2 self-exercise sessions. The second phase consists only of self-exercise sessions. Participants are grouped according to their walking ability (with or without assistance and not walking). Assessments are carried out in T0 (inclusion), T1 (end of the first phase), at T2 (end of the second phase) and at T3, one year after inclusion. Outcomes are primarily the number of tele-care sessions done and secondary the Goal Attainment Scaling (GAS) and the EQ-5D-5L Quality of Life Scale.

RESULTS: In November 2023, 32 patients have been enrolled of which 20 have completed the first phase of the program and 9 the second phase. The average age of participants was 52.8 years, 63% male, and 37% female. The main neurological pathologies were multiple sclerosis, then stroke. Walkers, walkers with assistance and no walkers were respectively 31%, 52% and 17%. At T1, the average number of telerehabilitation sessions per participant was 20.7 and the average number of self-exercises was 14.3 sessions. Respectively 89% at T1 and 50% at T2 completed more than 50% of program of tele-rehabilitation and self-exercices. At T1, the GAS results showed that 14 out of 20 patients (65%) met or exceeded their primary goal and as many met or exceeded their secondary goal. At T2, The GAS results showed that 7 out of 9 patients met or exceeded their primary and secondary goal. Analysis of the EQ-5D-5L Index Value showed that EQ-5D-5L decreased at T1 in 30%, increased in 50% and remained the same in 20%. At T2, index value decreased in 22, 2%, increased in 55, 6% patients and remained the same in 22, 2% patients. Pace of physical activity has changed for 44% of participants - more sessions, longer. 75% say they intend to continue physical activity after theses experiment.

DISCUSSION AND CONCLUSION: The preliminary results of this program show the feasibility of carrying out physical activity sessions in telerehabilitation in patients with chronic neurological disease particularly when supervised by therapist. The inclusion of new patients and the analysis at T3 will allow more conclusions to be drawn that will confirm the benefits of the program in terms of physical activity

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When Necessary To Perform Brain MRI During Rehabilitation? Late-Onset Neurological Deteriorations Caused by Hypertrophic Olivary Degeneration.

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BACKGROUND: After acut stroke, improvement of neurological deficits are observed in most of the patients. It is also known, that relatively frequently late-onset neurological deteriorations occur such as seizures, cognitive decline, depression, spasticity. Treatment of most of these complications is solved and so rehabilitation process could be continued. However, there are some delayed neurological worsening such as palatal tremor, Holmes tremor, ataxia, able to stop rehabilitation process or cause other complications (1).

AIM: Our aim is to highlight important of follow-up, rehabilitation team work and proper diagnostic tool.

METHODS: In our 2 cases, patients and members of the rehabilitation team noticed worsening of functional activities during active rehabilitation period. In every cases, neurological examination showed worsening of limb ataxia, speech, or onset of palatal tremor and Holmes tremor. Performed brain MRI (T2-weighted, FLAIR sequences) revealed new hyper-intensity and/or hypertrophy of inferior olivary nucleus (ION).

RESULTS: MRI is the best modality to detect both hypertrophic olivary degeneration (HOD) and underlying cause (1). The 3 stages of HOD visualized on MRI are as follows: high signal changes on T2-weighted imaging without enlargement of the ION, high signal changes on T2-weighted imaging with enlargement of the ION, typically occurring after 4-6 months, and recovery of the normal ION volume or its atrophy after 3-4 years, with sustainded T2-weighted hyperintensitiy. Hypertrophic olivary degeneration is a rare condition that referred to the Guillain-Mollaret triangle. Guillain-Mollaret triangle comprises connections among the inferior olivary nucleus (ION), the red nucleus and the contralateral dentate nucleus. Treatment options for HOD are limited, but there is some evidence for gabapentin, topiramate, levetiracetam, clonazepam, levodopa, memantine, botulinum toxin injection, and as second line therapy of deep brain stimulation according to what symptom dominate clinical picture (2).

DISCUSSION AND CONCLUSION: In the follow-up of patients with previously identified cerebellar or brainstem pathology, regardless of etiology, clinicians (including physiatrists) should pay careful attention to clinical picture and perform brain MRI to identify this delayed development of HOD. HOD may be easily mistaken for new infarct or a neoplasm. Precise presentation of clinical symptoms, patient history is helpful for radiologist in correct interpratation of MRI abnormalities (2). The other hand delayed findings may mislead physiatrists as well, because they are not so familiar with the details of MRI, anatomy of the Guillain-Mollaret triangle, and HOD phenomenon.

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Poster Session B

The Interrelationship Between Disability and Psychological Distress in Chronic Nonspecific Low Back Pain Among Adults of Working Age Population

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BACKGROUND:: Chronic nonspecific low back pain (CNLBP) is conceptualized on the biopsychosocial model and is generally accepted that the experience of CNLBP could significantly contribute to psychological distress. The BDI-II (Beck Depression Inventory-II) is well-known for its reliability and validity in assessing symptoms of depression in various clinical and non-clinical populations. As it can reliably discriminate between chronic pain patients with and without symptoms of clinical depression it is used to assess depression in chronic pain. RMDQ (Roland Morris Disability Questionnaire) has content and construct validity and reflects the concepts of mobility in activities of daily living.

AIM: To investigate the interrelationship between the result of the BDI-II and the overall result of functional disability measured with RMDQ among adults of the working-age population with CNLBP regarding age, sex, BMI, length of work and its duration.

METHOD: In this cross sectional study patients with CNLBP completed 24-item RMDQ and 21-item BDI-II. Conducting this study was approved by the Ethical Committee of University Hospital Center "Sestre milosrdnice" in February 2023 identified by code number 003-06/23-03/003. Written informed consent was obtained from patients who fulfilled the criteria to participate in the study.

RESULTS: We analyzed 64 patients' data (10 men and 54 women). Men were older than women (49.55 vs 44.80 years; P=0.01). The influence of age (mean 48.81 ± 5.47), length of working expectancy (mean 25.64 ± 7.73), body mass index (mean 26.52 ± 4.55), duration of CNLBP in months (mean 96 [26-180]), and the interrelationship between the total score of RMDQ (without disability, mild, moderate, and severe disability), as non-dependent variables, and the total score of BDI-II, was analyzed by logistic regression. The interrelationship between depression (assessed with BDI-II) and disability (assessed with RMDQ) was stronger for women than for men (p=0.08). There is a tendency that higher results in RMDQ will assume higher results in BDI-II (p<0,115). No significant interrelationship was indicated among other variables and perceived depression and disability due to CNLBP. Overall, the reported strength of the interrelationship between measures of psychosocial distress and measures of self-reported disability cannot precisely predict which group within BDI-II a patient with a disability would match.

DISCUSSION AND CONCLUSION: : In our sample, there was a tendency that higher results in total RMDQ score will assume higher results in total BDI-II score, especially in women, although overall the significance wasn't demonstrated. A bigger sample size and more detailed analysis among constituents in both questionnaires are needed, which could lead to different treatment approaches in patients with CNLBP.

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Complete Management in Patients With Lumbar Radiculopathy

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BACKGROUND: Lumbar radiculopathy (LR), a painful conditions involving lumbar spine, caused by a pinched nerve root, is one of the leading causes of year lost to disability worldwide. Intervertebral disc herniation, and narrowing of the spinal canal cause the majority of cases, and have an important negative impact on quality of life.

AIM: In our study we investigated if complete management (ProHumano-SpineDinamic daily, 1 tablet, 2 months and rehabilitation program – educational measures, TENS, laser therapy, aerobic and proprioceptive exercises, daily, 12 sessions) influence pain and functional status and improve quality of life in LR.

METHOD: We performed a prospective randomized double-blind, controlled trial in outpatient medicine clinic. 156 LR patients (aged 35 – 78 years, 96 females, 60 males) were complete evaluated before rehabilitation program, to exclude the potential confounding comorbidities for lumbar pain, and were randomly divided into the experimental group (EG - underwent complete program) and control group (CG - received only rehabilitation program, without SpineDinamic therapy). Improvement in pain (Visual Analog Scale – VAS, McGill questionnaire), finger-to-floor distance (FFD) and quality of life (Short Form – 36 Survey) were compared. These outcomes were measured at baseline and post rehabilitation. We used SPSS Statistics 22.0 for the data analysis.

RESULTS: Parameters in both groups had an improving trend. The FFD improved ≥2 cm in almost patients, without significant difference between groups. The VAS and McGill scores decreased significantly in the EG compared to the CG ($p < 0.001$ and $p = 0,003$, respectively). The SF-36 score were significantly improved in EG. Between-group differences were statistically significant post rehabilitation ($p < 0.05$).

DISCUSSION AND CONCLUSION: Our results sustained the well-known benefit of TENS, laser therapy and exercise program for clinical manifestations and functional status in LR. Combining SpineDinamic therapy with rehabilitation program might enhance both the altered pain perception and quality of life in LR patients, due to the SpineDinamic effects on the normal functioning of the peripheral nervous system and on the musculoskeletal system health. Pain level and quality of life in LR patients are deeply interconditioned and require both careful assessment and complete management.

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Non-surgical Spinal Decompression Therapy in the Management of Chronic Low Back Pain: Our Experiences

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BACKGROUND: Non-surgical spinal decompression therapy (NSDT) has recently been used as a conservative treatment in management of chronic low back pain (CLBP) (1). There is a lack of evidence supporting NSDT as being efficacious compared with other physical modalities used in physiotherapy.

AIM: The aim of this study was to determine effects of NSDT compared with core stabilization exercise (CSE) and electrotherapy in patients with CLBP.

METHOD: A clinical prospective randomized study was conducted at Clinic for Physical Medicine and Rehabilitation of the Clinical Center University of Sarajevo and included 70 patients with CLBP with or without radiating symptoms. We studied all examinees prospectively and by computerized randomization. Patients were divided in two groups: experimental group who received NSDT (n=35) and control group who received CSE and electrotherapy (n=35). Both groups received therapy 10 times for 3-week follow-up period. Lower back pain intensities and functional improvements were measured by the Visual Analogue Scale (VAS) and Oswestry Disability Index (ODI) at start and at the end of the study.

RESULTS: Most of the patients in the experimental and the control group were females (54.3% vs. 65.7%, respectively, p=0.329). There was not statistically significant difference in the mean of age between experimental and control groups (52.2±13.2y vs. 56.1±12.2y; p=0.208). In a within-group comparison, the median of VAS and ODI were significantly decreased in the both groups (p<0.001). There was a statistically significant difference in the median of change in VAS after 3 weeks between experimental (−44.5%; IQR=28.6 to 55.6) and control group (−66.7%; IQR=50.0 to 80.0) (p=0.001). Approximately two thirds of the patients in control group (68.6%) had over 50% reduction in VAS, compared with one third patients (28.6%) in experimental group (p<0.001). There was not a statistically significant difference in the median of change in ODI after 3 weeks between experimental (−44.0%; IQR=16.7 to 56.0) and control group (−50.0%; IQR=35.3 to 70.0) (p=0.198). Approximately one half of the patients in control group (45.7%) had over 50% reduction in ODI, compared with one third patients (35.3%) in experimental group (p=0.378).

DISCUSSION AND CONCLUSION: A clinical randomized study was conducted to determine whether NSDT compared with CSE and electrotherapy had better effects on decreasing pain and increasing functional outcome in patients with CLBP. Our results represented that both modalities had similar effects. Results in experimental group are due to the effect of decreasing intradiscal pressure in lumbar region. A limitation of our study is that it is done at single center, thus, results may not be applicable to other populations. There is no a guideline how much session of traction therapy and force during traction should be applied (1). Therefore, further research is needed about methodology and therapeutic effects of NSDT. NSDT may be a suitable treatment option in management of CLBP.

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Comparative Study of Quality of Life in Chronic Low Back Pain Patients After Isocinetic Rehabilitation vs Conventional Rehabilitation

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BACKGROUND: Chronic low back pain (CLBP) is the cause of severe disability and altered quality of life (QoL). Many treatments are used in its management, including functional rehabilitation using both conventional techniques and isokinetic therapy.

AIM: To compare the evolution of QoL in CLBP patients after isokinetic rehabilitation and conventional rehabilitation.

METHOD: This was an observational and descriptive study conducted at the Military Hospital of Tunis between March and September 2013.
Patients aged between 20 and 60 years were included, with CLBP for whom a surgical indication had not been selected.
Patients were randomly divided into two groups: the first (G1) received an isokinetic rehabilitation protocol and the second (G2) received conventional active physiotherapy. Each patient had an assessment of QoL using the Dallas self-assessment questionnaire validated in French [1].

RESULTS: We included 50 patients divided into two groups of 25.
The mean age in the general population was 42±8.6 years, with a mean age in G1 of 40.8±8.7 and in G2 of 43.3±8.5, with no significant difference between the two groups (p=0.3).
We found a male predominance with a male/female gender ratio of 2.57 in G1 and 3.16 in G2.
We observed a significant improvement in QoL for the 4 items in both groups, with a greater improvement in G2 for professional activities (p=0.04).

DISCUSSION AND CONCLUSION: Assessing the QoL of CLBP sufferers is of paramount importance. It allows to evaluate their ability to carry out activities of daily living, and to assess the efficiency of treatment.
In our study, analysis of the results showed that at the start of both programs, scores on the different parts of the Dallas scale were significant.
This confirms the impact of CLBP on the different facets of patients' lives, from the physical to the psychological and social.
After rehabilitation, we found a significant improvement in the Dallas score in the various domains in all patients, with a significant improvement (p=0.04) in professional activities in G2. These results are in line with the literature, showing that CLBP sufferers have a better psychological experience after rehabilitation[2].

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Adherence to Home Exercise Program in Patients With Chronic Low Back Pain

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BACKGROUND: Among the treatments proposed for chronic low back pain, exercise may be the most effective in decreasing pain and improving function. Individually designed exercise programs appear to be effective in healthcare settings and are recommended to patients with low back pain in addition to regular physical activity.
However, the adherence of the persons with chronic low back pain according to the physiotherapist recommended home exercise program in 50-70% is insufficient (1). Poor adherence can compromise treatment outcome and cause recurrence of symptoms, so its determinants must be better understood, and strategies proposed to encourage long-term exercise practice.

AIM: to find out the factors influencing exercise adherence of the persons with chronic low back pain according to the physiotherapist recommended home exercise program.

METHOD: Seven persons who applied to the in-patient rehabilitation due to chronic low back pain received individual physiotherapy sessions for 14 days, followed by a four-week home exercise program developed and recommended by a physiotherapist. After four weeks of home exercise, study participants were evaluated using a semi-structured open-ended interview. All interviews were recorded on audio media. The interviews recorded in audio format were then transcribed in text format with the numbering of each line. The method of inductive content analysis was used for data processing, which allowed to group the obtained information from detailed to more extensive. Further, in the process of data analysis, subcodes were obtained, which were grouped into categories of main topics.

RESULTS: By analyzing transcripts of the interviews 56 codes, eight categories and seven topics were identified - adherence for home exercise, adherence factors, home exercise program, exercise effectiveness, physiotherapist competencies, participants' expectations, communication opportunities. The study participants - persons with chronic back pain - performed a home exercise program designed by a physiotherapist. Those study participants who stopped exercising after inpatient rehabilitation eventually resumed exercising and continued to exercise regularly at home. Research participants believe that peer support in the home exercise program, the desire to maintain their functional status, fear of functional status deterioration, self-efficacy, symptom relief experience, physical therapist supervision, opportunities to exercise with someone and the ability to plan exercise time are factors that promote home exercise. implementation of exercise programs and recommendations. Research participants believe that exercise program at home is made difficult by exercising alone, lack of understanding of regular exercise, lack of motivation and equipment, physical work every day, unsuitable environment, financial aspects.

DISCUSSION AND CONCLUSION: Patients with low back pain reported barriers to adherence to the home exercise program, such as patient representation - illness and exercise perception, despondency, depression, and lack of motivation, environment – attitudes, difficulties in planning exercise practice. The feeling of being supported by care providers, relatives and other patients are factors which enhance exercise adherence of the persons with chronic low back pain according to the physiotherapist recommended home exercise program.

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Physical Agents in the Treatment of Patients With Lumbosacral Radiculopathy

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BACKGROUND:Lumbosacral radiculopathy is a pathological process that refers to the dysfunction of one or more spinal nerve roots in the lumbosacral region of the spine.
AIM:The aim of this research is to evaluate and compare the therapeutic effects of low level laser (LLLT) and transcutaneous electrical nerve stimulation (TENS) in patients with lumbosacral radiculopathy of discogenic origin.
METHOD:The research included 75 outpatients with lumbosacral radiculopathy that were treated at the Clinic for Physical Medicine and Rehabilitation of the Clinical Center Nis (Serbia). Low-level laser therapy was applied in group A (n=30), whereas group B (n=30) was treated with TENS. Both examined groups, as well as the patients of the control group (group C; n= 15) were treated with individually adjusted program of lumbar stabilization exercises. All patients had a total of 15 therapeutic treatments. The following parameters were evaluated: a) pain intensity by the use of visual analogue scale; b) mobility of the lumbar spine by the use of the Schober test and the finger-floor test (1). The data obtained were analyzed using the Statistical Package for the Social Sciences (SPSS 17.0).
RESULTS: There was no statistically significant difference between the groups before the therapy. After the therapy, pain was statistically significantly reduced in all three groups ($p<0.05$): in group A from 5.50±1.76 to 3.83±1.29, in group B from 5.80 ±1.88 to 4.70±1.39, in group C from 5.40±2.03 to 4.73±1.58. The value of finger-floor distance after the therapy was statistically significantly reduced in all three groups ($p<0.001$): in group A from 23.87±3.78 to 13.18±3.64, in group B from 25.08±4.82 to 18.98±3.82, and in group C from 25.57±5.81 to 20.50±4.26. After the therapy, the value of the Schober test was statistically significantly increased in all three groups ($p<0.01$): in group A from 3.50 to 5.00, in group B from 3.00 to 4.00, and in group C from 3.50 to 4.50. Comparing the results between the groups, we can notice that we have got the highest reduction in pain and increase in mobility in group A ($p<0.001$).
DISCUSSION AND CONCLUSION: The above results indicate the advantage of LLLT over TENS in the treatment of lumbosacral radiculopathy, which is achieved by the analgesic, anti-inflammatory and biostimulating effect of LLLT (2, 3).
The results of this study show that both physical procedures are effective in the treatment of lumbosacral radiculopathy, but the efficiency of LLLT is statistically significantly higher compared to TENS.
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Efficacy of Intramuscular Glucocorticoid Injection in Patients With Lumbar Radicular Pain

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BACKGROUND: Although glucocorticoid therapy has been used for many years in patients with lumbar radiculopathy, the results of studies in the literature are not consistent.
AIM: The aim of this study was to evaluate the effects of intramuscular betamethasone injection on pain, disability, quality of life and secondarily on electroneuromyography (ENMG) findings in patients with lumbar radicular pain.

METHOD: A total of 98 patients with radicular low back pain were evaluated between July 2022 and June 2023. Sixty patients who met the inclusion criteria were randomized into two groups. In addition to the standard treatment, Glucocorticoid group (GC) received intramuscular injection of betamethasone and Placebo group (PB) received isotonic 0.9% sodium chloride. Visual analog scale (VAS), Oswestry disability index (ODI), Nottingham health profile (NHP) and ENMG were applied to both groups. Patients were evaluated before treatment and after first week, first month and third month of treatment.

RESULTS: Statistically significant improvements were seen in all clinical parameters in GC group. At the end of third month, statistically significant improvements were observed in VAS and NHP-Pain subscale scores in both groups ($p<0.001$). The change of these values over time was statistically significant in favor of GC group ($p=0,015$ and $p=0,044$, respectively). Statistically significant improvements were observed in ODI, NHP-Energy and Physical Mobility subscales and NHP-Total scores in both groups over time ($p<0.05$). However, no statistically significant difference was found between the groups in terms of the change of these values over time. In the NHP-Emotional Reaction, Sleep and Social Isolation subscales, statistically significant improvements were observed in the GC group ($p<0.05$), while the change in the PB group was not significant. The fibrillation potentials initially observed on ENMG disappeared in both groups, however no significant difference was found between the groups.

DISCUSSION AND CONCLUSION: Intramuscular single dose glucocorticoid administration in the treatment of lumbar radicular pain provided improvements on pain, disability and quality of life. Especially the effects on pain scores were superior to placebo. No superiority over placebo on ENMG findings has been demonstrated and further studies are needed in this regard.

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Does Water-Based Rehabilitation Interventions Lead to Superior Effects of Quality of Life and Pain Reduction in Patients With L4-L5, L5-S1 Lumbar Disc Herniation?

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Background: Despite the application of advanced surgical techniques such as percutaneous transforaminal endoscopic discectomy (PTED) in subjects with lumbar disc herniation (LDH), a significant part of them (10–40%) refer to several postoperative functional limitations which reduce the activities of daily living (ADL) and lead to poor quality of life (QoL)1. Nowadays, there is a disproportionately larger number of studies investigating the effectiveness of the exercise-based techniques and protocols applied in subjects underwent PTED, compared to the number of studies focused on the impact of water-based rehabilitation interventions (WBRI) in these subjects2.

Aim: The aim of our single-center randomized controlled trial (RCT) was to assess the impact on QoL and pain reduction of a WBRI in patients with L4-L5, and L5-S1 LDH underwent PTED.

Methods: Our study was carried out in the Department of Physical and Rehabilitation Medicine of "Medica" Ruse during the period January 2023 to December 2023. In total, sixty subjects with L4-L5, L5-S1 LDHs (n=60) of both genders and mean age 64.0 ± 11.0 years, who underwent PTED in the Department of Orthopedics Traumatology and Spinal Surgery of UMBAL "Medica" Ruse were included in our study. Thirty-one (n=31) study participants were randomized to perform a WBRI, as well as twenty-nine (n=29) subjects conducted a standard rehabilitation protocol (SRP) without aquatic exercises (AE)3. Study participants were evaluated at baseline, after 3-d week, and at 1 and 6 months. The Visual Analogue Scale (VAS) for pain, the modified Schober test, and the validated in Bulgaria version of the SF-36-v2 questionnaire were used.

Results: A statistically significant improvement in VAS, modified Schober test, and in all domains of the SF-36-v2 questionnaire was observed in both rehabilitation groups. However, significantly greater improvement was observed in the study group underwent WBRI compared to the participants performed the SRP ($p<0.05$). No statistically significant intergroup differences were found in terms of the modified Schober test. The maximum improvement was observed in the 6th month of the follow-up in the study group rehabilitation intervention with AE ($p<0.05$).

Discussions and Conclusions: The proposed WBRI is an effective and appropriate rehabilitation strategy in subjects with L4-L5, L5-S1 LDHs underwent spinal surgery. The above-mentioned rehabilitation intervention led to significantly greater improvement in QoL and pain reduction compared to the SRP intervention. However, further studies with additional parameters, a larger number of participants, and longer follow-up periods are needed.

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Rehabilitation Protocol for Patients With Adolescent Idiopathic Scoliosis Undergoing Surgery at a Third-Level Hospital

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BACKGROUND: Idiopathic scoliosis is a three-dimensional spine deformity with an unknown etiology. Diagnosis requires a Cobb's angle greater than 10º and presence of vertebral rotational component. Its global prevalence is 2-3%, with 85% of cases being Adolescent Idiopathic Scoliosis (AIS). Major surgery is necessary in severe AIS, approximately 0.1-0.3% of cases.

AIM: To design a rehabilitation protocol for AIS patients who undergo surgery at the Virgen del Rocío University Hospital (HUVR) in order to improve functional capacity, recovery times and quality of life.
The interest is due to the volume of patients undergoing surgery, the absence of a rehabilitation plan, the magnitude of the intervention, and its impact on quality of life.

METHOD: A peer evaluation involving three rehabilitation doctors from HUVR divided in two phases. The first phase involves an individual systematic review following PRISMA guidelines using a PICO question in major databases (CENTRAL, MEDLINE, Embase). The second phase involves selecting interventions for the protocol and development of the final document.

RESULTS: We have not found rehabilitation protocols addressing all phases related to surgery (preoperative, intraoperative, post-surgery).
After research we included eight studies; 1 clinical guideline, 2 randomized clinical trials and 5 cohort studies. We discussed key interventions and we drafted the protocol based on:
- Implementation of supervised specific aerobic exercise program 4 months before surgery. (2)
- Preoperative assessment of respiratory function due to the risk of extrinsic restrictive lung disease. Incorporating preoperative respiratory physiotherapy if FVC is under 80% and/or MIP or MEP is under 30 cmH2O. (3)
- Health education regarding typical recovery process, teaching early mobilization techniques, and incorporation of respiratory physiotherapy. (4,5)
- Follow-up after home discharge to identify patients with secondary pain and functional limitation, candidates for individualized physiotherapy treatment. (1)

DISCUSSION AND CONCLUSION: After our search we detected an absence of rehabilitation protocols addressing all phases related to surgery, because of that we have developed a protocol aimed to improve functional prognosis of AIS patients after surgery, applicable at our center.

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A Case of Advanced Spinal Deformity in Goldenhar Syndrome: the Crucial Role of Frequent and Comprehensive Follow-Up in Shaping a Better Future

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BACKGROUND: Goldenhar syndrome, a rare congenital disorder, involves malformations in multiple organs and systems, affecting 1 in 3,500 to 5,600 live births. It presents with classic features such as mandibular hypoplasia, ocular and auricular malformations, and vertebral anomalies, but can also affect other systems (1).
While its etiology remains unclear, significant embryological development of the spine and skull occurs during the first 6 weeks of intrauterine life, suggesting a shared pathogenetic mechanism during embryological development of craniofacial and vertebral anomalies (2).

AIM: This case report aims to emphasize early diagnosis and intervention for patients with Goldenhar syndrome to prevent and manage advanced spinal deformities, particularly severe scoliosis.

METHOD: A 51-year-old male patient complained of long-standing back and chest pain. In his medical history, he was the first child of a non-consanguineous family with no specific history and had undergone spinal surgery at the age of 17, but the surgery was reported to be unsuccessful, and implants were removed shortly after. He had no follow-up thereafter. Physical examination revealed underdevelopment of right external ear canal and auricle, periauricular skin tags, limbal dermoid and micrognathia. Thoracic and lumbar movements were limited but painless. The patient had a significant right thoracic hump and a very rigid spine. He experienced exertional dyspnea, which was consistent with severe restrictive lung disease, as revealed by pulmonary function tests: FVC: 30% of predicted value, FEV1: 34% of predicted value and FEV1/FVC ratio: 95%. Echocardiography showed a dilated ascending aorta, bicuspid aorta, mild aortic insufficiency, and mild tricuspid insufficiency. Other system examinations and radiological studies were unremarkable.

RESULTS: Severe scoliosis had led to advanced restrictive lung disease in this patient.

DISCUSSION AND CONCLUSION:A systematic review of 31 articles reported that vertebral anomalies in Goldenhar syndrome were most frequently located in the cervical and thoracic spine, with lumbar anomalies being less common. The predominant anomalies included hemivertebrae, block vertebrae, scoliosis/kyphoscoliosis, and spina bifida, with the additional observation of cervical atlas occipitalization and cervical ribs in many cases (3).
The severity of spinal deformities cannot be predicted based on the severity of craniofacial deformities, making early and careful monitoring essential to prevent potential complications, including death. While spinal deformities in these patients can be managed surgically or nonsurgically, early surgical intervention is often required to promote balanced spinal growth and prevent progressive deformities (4).
We wanted to present this case to increase awareness about the possible development of severe spinal deformities in individuals diagnosed with Goldenhar syndrome. These patients should undergo comprehensive physical and neurological examinations. Early intervention and frequent follow-up are crucial to prevent the development of severe scoliosis.

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The Effect of Physical Modalities in the Treatment of a Patient With a Non-operatively Treated Clay-Shoveler Fracture of the Neck: A Case Report

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BACKGROUND:Clay-shoveler is an avulsion stress fracture of the processus spinous of the distal cervical or proximal thoracic vertebrae. Treatment depends on the mechanical stability of the fracture. Long-term immobilization in non-operatively treated Clay-shoveler fractures very often leads to pain and limited mobility in the neck. The treatment by a traumatologist and physiatrists are necessary for these patients.

AIM:To evaluate the effectiveness of physical modalities and exercises in a patient with a non-operatively treated Clay-shoveler fracture.

METHOD:A 48-year-old man, without comorbidities, who plays recreational sport, suffered a C6 fracture in a motorcycle accident. Diagnosed by X-ray. An indication for conservative treatment was established, due to the classification of the fracture as stable, treated with a cervical neck collar in hiding for 6 weeks, at the last control referred to our institution for physical therapy. The patient complained of neck pain when moving in the frontal plane. Physical therapy was carried out 8 weeks after the fracture
It consisted of electrotherapy: transcutaneous electrical stimulation (TENS) and kinesitherapy (active exercises to strengthen and tighten the muscles of the neck and upper extremities). Outcome measures were visual analog pain scale (VAS) and neck range of motion (ROM). Measurements were made at two time points, before the start and one month after the end of the treatment.

RESULTS:The results showed an increase in the range of mobility (anteflexion from 30 to 50o, lateroflexion from 40 to 50 o, lateroflexion from 10 to 20 o, left and right rotation from 60 to 70 o). VAS scale showed a value at the beginning of 7 at the end of therapy 2.

DISCUSSION AND CONCLUSION:: In a conservatively treated Clay-shoveler fracture, electrotherapy procedures led to analgesia. The application of an appropriate protocol of exercises for the neck and upper limbs plays a major role in reducing pain and increasing the range of mobility.The application of physical modalities and knesitherapy reduced pain and improved functionality in a patient with a non-operatively treated Clay-shoveler fracture of the neck.
Key words: Clay-shoveler, kinesitherapy, electrotherapy

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Individually Designed Exercises, Aquatic Therapy and Relaxation in the Treatment of Chronic Neck Pain – Case Report

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BACKGROUND: A certain number of patients with chronic pain do not respond adequately to standard physical and medical therapy. The belief that any physical activity can worsen the patients` condition by reactivation of the initial injury often turns into a feeling of fear, which interferes with the rehabilitation process (1,2).

AIM: The aim of this study was to present the effect of individually designed and aquatic exercises with relaxation techniques on pain and fear avoidance behaviour in patient with chronic neck pain due to the old posterior arch of the atlas fracture.

METHOD: The therapy lasted three weeks in-hospital and continued for another three weeks on an outpatient basis. Individually designed exercises, swimming and aquatic execises along with relaxation techniques were applied. Tampa scale of kinesiophobia (TSK) and Fear-avoidance Beliefs Questionnaire (FABQ) were completed before and after therapy. Pain was graded with NRS: grade 0 for “no pain” and 10 meaning “the worst pain imaginable”.

RESULTS: At the last check-up, the patient was moving more naturally. She could sit and stand longer. Movements in the cervical part of the spine were increased and tension of the paravertebral muscles alleviated. The pain was significantly lower: NRS: from 9 to 6 points. TSK improved by 19 points (51/32); FABQ: fear of exercises 23/work activities 38 before therapy; 15/31 after.

DISCUSSION AND CONCLUSION: Individually designed exercises, progressive in duration and number of repetition, along with a program of relaxation techniques contributed to a significant reduction of pain in patient suffering from chronic neck pain and fear of movement.

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Among Different Aspects of Health, Physical Functioning Measured With the Neck Disability Index Relates Best With Recovery After a Whiplash Injury

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BACKGROUND: Whiplash injury after a car accident can cause chronic neck pain in up to 30-50% of people. The value of different diagnostic procedures to assess the injury is still under research. Functional indices such as the Neck Disability Index (NDI) showed the best correlation with recovery and can be used as a prognostic method. NDI is a Patient Reported Outcome Measure (PROM) and, as such, subjective and susceptible to malingering. It remains to be seen if other composite measures, such as psychological functioning or quality of life (QoL), can replace NDI and better correspond to recovery from whiplash injury.

AIM: To compare the correlation between physical functioning (NDI), psychological functioning (Pain Catastrophizing Scale-PCS), and quality of life (Short Form-12-SF-12) with patient-perceived recovery (PPR) after a whiplash injury.

METHOD: A prospective study analyzing how the change in NDI, PCS, and SF-12 scores from baseline to 6 months after whiplash injury correlate with PPR (no, partial or full recovery).

RESULTS: Nineteen patients were analyzed (11 women, 8 men). The median age was 36 (IQR 25 to 54). ΔNDI showed a good correlation with PPR (r=0,546, p=0,016), while ΔPCS and ΔSF-12 did not correlate with the recovery after the injury (r= 0,295, p=0.235; r=-0.241, p=0.320). ΔSF-12 and age showed a significant correlation above the age of 45 (r2=0,21; p=0,048), while there was no correlation between age and ΔNDI (r=0,312, p=0,150), or age and ΔPCS (r=0,164, p=0,189).

DISCUSSION AND CONCLUSION: Imaging methods (radiographs, CTs, MRIs of the cervical spine) showed to be unhelpful in detecting patients at risk of developing chronic neck pain after the injury. Shear wave elastography showed higher trapezius muscle stiffness after injury, but it is not valid for follow-up after six months. Therefore, experts in the field suggest using PROMs to measure different aspects of patient's health. Although psychological functioning and QoL are important variables to assess patients after a whiplash injury, this study showed that only composite functional index (physical function) correlated with PPR (NDI).

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Cervical Spondylosis as a Cause of Symptoms of Vertebrobasilar Insufficiency Verified by Color Doppler Ultrasound

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BACKGROUND:Cervical spondylosis is a chronic, mildly progressive rheumatic disease, which affects the vertebral dynamic segment of the cervical spine with possible affection of all structures. Cervical spondylosis is often cited in practice as the cause of symptoms of vertebrobasilar insufficiency. When passing through the neck, the vertebral arteries are in direct contact with the cervical spinal vertebrae and partly pass through the narrow bony channel of the transverse processes. Due to their close topographic relationship, direct external compression of the vertebral arteries by osteophytes of the uncovertebral or intervertebral joints is possible, which directly compromises the circulation in the vertebrobasilar basin. Compromised circulation in the vertebrobasilar basin can be verified by Color Doppler ultrasound.

AIM:To prove the influence of cervical spondylosis on the appearance of symptoms of vertebrobasilar insufficiency (vertigo) by means of color doppler ultrasound analysis of morphological and hemodynamic parameters of the vertebral arteries.

METHOD: the prospective study included 120 patients, of both genders, who underwent balneophysical treatment from 1/1/2014-1/1/2022. The subjects were divided into two groups, the first with only cervical spondylosis and the second with cervical spondylosis with symptoms of vertebrobasilar insufficiency. Color Doppler of the vertebral arteries was performed on all subjects in neutral and test positions. T-test, Chi square test, Mann-Whitney U test, Wilcoxon Signed Ranks test were used for statistical data processing.

RESULTS: There is no statistically significant difference between the groups according to gender, age, risk factors for atherosclerosis. Radiographic changes in the first group are more pronounced at the level of C5-80%, C6 and C7 100%, while in the second, the frequency of degenerative changes at the level of C4 is 55%, C5-98%, C6-96.7%. A progressive decrease in the width of the lumen of the vertebral arteries from the V1 to the V2 segment was observed in both groups. Statistically significant ($p < 0.001$) was the presence of tortuosity of the vertebral arteries in the V2 segment in the second group, as well as changes in the blood flow velocity values measured in the V1 and V2 segments. In the second group, a statistically significant ($p<0.001$) decrease in flow volume and an increase in the values of the pulsatility index and the resistance index measured in the neutral and test positions were observed.

DISCUSSION AND CONCLUSION: Cervical spondylosis may be the cause of symptoms of vertebrobasilar insufficiency. Color Doppler ultrasound confirmed morphological and hemodynamic changes in the vertebral arteries caused by external compression (osteophytes). Numerous studies indicate the influence of cervical spondylosis on the appearance of symptoms of vertebrobasilar insufficiency. Bendict and Jackson indicated that in 82% of all analyzed cases, the increase in systolic flow rate in the vertebral arteries was caused by hemodynamically significant external stenoses (compressions). Sterk P, Reron E et al. conducted a study comprising 130 subjects that shows a decrease in flow through the vertebral arteries, which is related to degenerative changes in the cervical spine

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Improvement in Standing and Motor Functions Due to Epidural Spinal Cord Stimulation in Patients With Complete Spinal Cord Injury

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BACKGROUND: Spinal cord injury often leads to impairment of motor functions and loss of voluntary motor control below the level of the lesion. This not only makes walking and regular movement difficult, but also complicates navigation in everyday environments and reduces the quality of life. One of the most promising methods of the last decade appears to be epidural spinal cord stimulation, which can enable movement of the lower limbs through direct stimulation of nerve pathways by electrical stimulation in direct contact with the spinal cord, without the need for external devices or exoskeletons.

AIM: The goal of our project is to demonstrate the maximum breadth of the effect of epidural spinal cord stimulation in the first three patients. We aim for the restoration of motor functions, exploration of its limits, as well as reducing spasticity and comprehensively assessing its impact on autonomous nervous functions. The objective is to document, through EMG and clinical tests, the duration and ability of standing with support, muscle movement, and evaluate shifts in trunk stability and spasticity.

METHOD: Three participants received an Epidural Spinal Cord Stimulation (ESCS) implant, with the electrode placed at the tip of the spinal cord conus. Stimulation programs were established to aid in the recovery of sensorimotor and autonomic functions. We measured motor response using EMG before, during, and after implantation. Additionally, we conducted a questionnaire-based assessment of trunk stability using trunk control test, assessed spasticity using SCI-SET, and recorded the duration of standing with support. All patients underwent intensive mapping two weeks after the operation, followed by daily home training, and weekly physiotherapy sessions. Follow-up evaluations were then conducted after three months.

RESULTS: In all patients, clinically observable movement occurred, along with an improvement in the duration of standing in a high walker or a verticalization stand (from several seconds to over 4 minutes) already during examination after 3 months. Using the same settings observed intraoperatively, patients exhibit significantly better muscle response (3-4mA, 20Hz, 210 µm). Unfortunately, we did not observe significant changes in spasticity. In terms of spasticity measurement, we achieved better results both with the stimulator turned on and when it was turned off.

DISCUSSION AND CONCLUSION: We were surprised by the speed at which all patients were able to stand with assistance. The current state is, in our view, a positive step towards further understanding the potential for locomotion recovery after injury. All three patients greatly appreciate the progress, which, although not yet significantly utilized clinically, has already shown improved values in densitometric examinations and swelling reduction. In the future, we may be able to restore at least partial mobility to patients after devastating spinal cord injuries.

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Analysis of the Influence of Selected Factors on the Parameters of the Coagulation and Fibrinolysis System in Patients With Traumatic Spinal Cord Injury (TSCI) Rehabilitated Up to 12 Months After the Injury

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BACKGROUND:Venous thromboembolism, especially deep vein thrombosis (DVT) and pulmonary embolism (PE), is a serious complication of spinal cord injury (SCI) that can be potentially life-threatening.

AIM:Analysis of lenght of the period time from the injury, severity of the injury measured in the ASIA scale, the level of the damage, the occurrence of pressure ulcers, infections , heterotopic ossifications, BMI, cigarette smoking on selected parameters of the coagulation and fibrinolysis system.

METHOD:The inclusion criterion was traumatic spinal cord injury up to 12 months after the injury; patients with non-traumatic injury were excluded from the study. The study included 58 patients with TSCI: 6 women and 52 men, with an average age of 30.2, who were undergoing inpatient rehabilitation at the Rehabilitation Department of the University Hospital No. 1 in Bydgoszcz, Poland. Levels of Tissue factor (TF), Tissue factor pathway inhibitor (TFPI), Thrombin-Antithrombin complex (TAT), D-dimer levels, Antithrombin activity (AT), and Platelet count (PLT) were analyzed in all patients.

RESULTS:The average values of the tested parameters were; TF 468(±161), TFPI 83.8 (±93); TAT 14.9 (±18.4), D-dimers 2518.7 (±3654); PLT 295.5 (±107,8), AT 103 (±13.7). The values of D-dimer, TF, TFPI and TAT significantly exceeded the laboratory norms and values of the non-SCI group determined in our previous study . Deep vein thrombosis of the lower limbs was diagnosed in 6 patients, which constituted 10.3% of patients. No statistical significance was found between the examined parameters and the height of the damage (cervical, thoracic, lumbar), the presence of heterotopic ossifications, BMI and cigarette smoking. Significant differences were found between the TFPI value and the ASIA scale. There were significant differences in TFPI values between the ASIA A and ASIA C groups (p 0.0191) and the ASIA B and ASIA C groups (p 0.0099). Moreover, a significant relationship was found between urinary tract infection and D-dimer values p 0.0145. There was also a significant difference in TAT values in patients with pressure ulcer p 0.042. There is a significant linear relationship between the time from event to testing and D-dimer values and PLT. These are negative correlations (-0.6594 and -0.3574, respectively), which means that the more time passed from the injury to the examination, the lower the D-dimer and PLT were in the TSCI group.

DISCUSSION AND CONCLUSION:In patients with TSCI, up to a year after the event, i.e. in the subacute period, increased values of parameters of the coagulation and fibrinolysis systems are observed. The severity of the injury on the ASIA scale (A and B), the presence of urinary tract infections, pressure ulcers and a shorter time since the event affect the hemostasis system increase prothrombotic and fibrinolytic properties.

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Brown-Sequard Asia a Syndrome After Cervical Chemonucleolysis

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BACKGROUND: Cervical chemonucleolysis is a non-invasive procedure to treat herniated discs. Common postoperative complications are muscle spasms, allergic reactions and discitis. Its use has been decreasing compared to the open surgical procedure.

AIM: describe the essential aspects and considerations in the approach to patients with atypical cervical spinal cord injury.

METHOD: We analyze the clinical case of a patient with a history of stroke with complete recovery and C4-C5 disc herniation. After the procedure of cervical chemonucleolysis C4-C7, in the left hemibody appears a complete loss of strength. On the MRI: C4-C6 myelopathy.
The informative searches have been carried out in the data sources of Pubmed.

We used scales: ASIA, Norton, SCIM 3, modified Ashworth, WUSPI, body control and muscle balance to point out the progress achieved.

Descriptors: chemonucleolysis, ASIA A, spasticity, bladder reeducation

RESULTS: The patient was hospitalized to spinal cord injury ward with a Norton scale: 20, SCIM 3: 29. In ASIA we observed left hemiplegia and paresis in the right lower limb (psoas and hip flexors at 2/5, dorsiflexors at 3/5), analgesia with hypoesthesia in right hemibody from C5. Sacral sensitivity with deep anal pressure abolished. We observed Ashworth 4 spasticity at the level of the left upper limb. He has been undergoing rehabilitation treatment for 4 months (Mobilization with muscle strengthening, trunk control, upper limb electrostimulation, left hand positioning splint) with improvement at the MSI level: biceps 3/5, overall right hemibody balance 4/5, he achieves control of the trunk. With bladder reeducation, the patient goes from a permanent catheter to 2 intermittent catheterizations. With tizanidine 8 mg and baclofen 60 mg every 24 hours, improvement in spasticity was observed, moving to Ashworth 3 on left upper limb. Improvement is observed in SCIM 3, reaching 42/100.

DISCUSSION AND CONCLUSION: An early rehabilitation approach is essential to improve functionality, through bladder reeducation, toning of supralesional muscles and strengthening the infralesional ones. Early treatment should be instituted to control the pain and spasticity in order to improve the patient's independence.

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The Relative Aerobic Load of Walking in Ambulatory People with Spinal Cord Injury

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BACKGROUND: The number of ambulatory people with spinal cord injury (SCI) is increasing (DeVivo & Chen, 2011; Post et al., 2017). Recent research showed low physical activity levels in this group (Postma et al., 2020; Ginis et al., 2010). The relative aerobic load of walking may play an important role in this unfavorable behavior.

AIM: This study aimed to objectively determine the relative aerobic load of walking in ambulatory people with SCI.

METHOD: Ongoing cross-sectional study. Strain of walking was defined as oxygen consumption during walking (VO2walk), expressed as percentage of peak oxygen uptake (VO2peak). VO2walk was measured by indirect calorimetry during walking at comfortable speed. Participants performed a cardiopulmonary exercise test to determine VO2peak.

RESULTS: Twenty-two participants were included. Age was 52.9 (14.9) years, 77% were male. All participants had incomplete injuries classified as AIS-D, 41% had tetraplegia. The mean VO2walk and VO2peak were 15.5 (2.6) and 29.6 (6.9) ml/kg/min, respectively. The strain of walking was 54 (14)%.

DISCUSSION AND CONCLUSION: These preliminary results suggest that the strain of walking in people with SCI is high compared to strain in able-bodied people (36 [7.6]%) (Blokzijl et al, 2021). More research is needed to evaluate how this affects PA.

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Electroacupuncture as a method of Electrostimulation for Pressure Injuries management in patients with Spinal Cord Injury

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BACKGROUND: Pressure Injury (PI) is a common complication in patients with spinal cord injury (SCI). Study findings indicate that more than 1 in 3 individuals with SCI will develop a PI and remain at high risk throughout their lifetimes. Research has demonstrated high costs and negative impact on Quality of Life including body image, socialization and level of independence, due to PI. Several studies suggest that Electrostimulation promotes the healing of pressure ulcers to different degrees. Electrostimulation affects all four phases of healing: inflammatory, proliferative, epithelialization and remodeling phases.

AIM: To present that electrostimulation via electroacupuncture can be an effective supplementary treatment option for patients with SCI and PI.

METHOD: CASE REPORT: After a prolonged stay in Neurosurgery Department and Intensive Care Unit a 31-year-old man with traumatic SCI: C7, AIS-A, due to a vehicle accident was transferred to Rehabilitation Department with multiple PIs : sacrum (stage IV, 7.5x5cm-maxdepth 2cm, with tunneling/pocket 3cm), left gluteal region (stage IV- 3x3cm maxdepth 5cm, without tunneling) and both heels (stage III). Following rehabilitation team assessment, a prevention and treatment plan were conducted. Patient's anemia (Hb:9g/dL) and malnutrition (Alb:2g/dl, tProt:5.4g/dL) were under treatment, daily standard wound care for heels PI and a VAC(Vacuum-Assisted Closure) system application, which was initially provided in the Neurosurgery department, continued on sacrum and gluteal PIs. Healing process was satisfactory, although VAC system was applied only for the bedridden period and was terminated due to autonomic dysreflexia episodes. ElectroStimulation using electroacupuncture was applied providing better application of electrodes and hygienic conditions (single use of acupuncture needles). At each wound: four acupuncture needles were inserted into the normal skin 0.5cm around the wound at 12(positive pole)-3(positive)-6(negative pole)-9(negative) o'clock. Two more needles, were inserted, in the gluteal muscle bilaterally, for muscle contraction. The needles were applied without lifting, thrusting, or rotating 3 times/week in conjunction with daily standard wound care. ES (500μA, 0,5Hz) 30 minutes/session, for 8 weeks. Patient was relieved of AD episodes and rehabilitation program continued without interruption. Significant improvement of the PI was observed in 8 weeks: sacrum PI of stage II- (5x3.5cm, maxdepth 0.5cm,without tunneling/pocket) and gluteal region PI of stage III- (3x3cm maxdepth 3cm). Heels PI were healed. Patient continued his treatment at an other PMR department.

RESULTS

DISCUSSION AND CONCLUSION: Although there are controversies in literature concerning the effectiveness of ES in PI, this case report demonstrates that electroacupuncture as an electrostimulation method with easy application can be an effective supplementary treatment option for PwSCI and PI, but further evidence Is needed to support the widespread use of it.

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Spasticity Worsening in Person With Chronic Traumatic Spinal Cord Injury

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BACKGROUND: Spasticity is one of the most common secondary conditions following spinal cord injury (SCI). During the chronic phase of SCI significant alteration of spasticity, either increase or decrease, may be the symptom of a variety of underlying complications. (syringomyelia, urinary tract infection, low force fractures, ingrown toenails, pressure injuries, deep vein thrombosis, etc.)

AIM: To demonstrate the need of detailed investigation of an acute increase of spasticity in a patient with chronic SCI.

METHOD: CASE REPORT: Male 42 years old with incomplete tetraplegia, AIS C neurological level C6, neurogenic bowel and bladder dysfunction, due to traumatic SCI. He was on an intermittent self-catheterization program for emptying his bladder. Intrathecal baclofen pump was implanted for spasticity control 14 months post SCI. Three years post SCI, he reports having increased spasticity, discomfort, pain, and sometimes difficulty in passing the catheter. Patient was admitted to the hospital for further investigation.

RESULTS: Blood tests revealed elevated inflammatory markers. Physical examination didn't reveal any abnormality but significant increase of spasticity. The mAshworth scale increased from 2 to 3 or 4 to the majority of lower limbs muscles. Urinary tract infection and respiratory infection were excluded. The proper functioning of intrathecal baclofen pump was assessed with x-rays, pump emptying and refilling, culture of the removed drug. MRI of cervical spine with a stabe.
The CT scan and MRI of the pelvis showed an abscess 14x13 cm nearby the prostate gland. Urethroscopy was negative for urethral injury. Ortho-sigmoidoscopy was negative for injury or other pathology. The abscess was treated with surgical debridement and intravenous antibiotics, resulting in the resolution of patient's symptoms.

DISCUSSION AND CONCLUSION: In the patient's history there was a testicular biopsy in the context of IVF 6 months ago followed by an episode of epididymitis which was successfully treated.
Spasticity during the chronic phase of SCI is often a symptom, rather than a secondary condition that needs treatment. A significant alteration of spasticity in chronic phase of SCI needs further investigation and detailed history to reveal a possible underlying pathology before any other therapeutic intervention for spasticity.

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Bone Disorders in Patients With Spinal Cord Injury (Sci): The Importance of the Early Assessment, a Preliminary Study

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BACKGROUND: Bone loss following SCI is a well defined pathological condition, described in more than 10% of patients with SCI, similar but well differentiated from osteoporosis as the bone density remains normal above the level of the injury. The early diagnosis may prevent further complications and it contributes to the effective rehabilitation of the patients. However, its management remains a point of debate.

AIM: We present a series of patients with SCI in our department during the early phase of rehabilitation in order to investigate as early as possible the bone disorder that occurs, including biochemical bone indices and a dual-energy X-ray absorptiometry (DXA) at the lumbar area of the spine and at the hip.

METHOD: During the last 2 years, 25 patients (19 men and 6 women, mean age=33,8 years) with SCI were enrolled in the study. Their lesion was maily complete (64%) and of traumatic etiology (88%). No history of bone metabolic disorders was recorded to any of the participants. Also, 68% of them presented without spasticity (0 in Ashworth scale). The following parameters of bone turnover were studied: serum calcium, magnesium and phosphorus and corresponding 24-hour urine values, vitamin 25(OH) D, Osteocalcin, PTH, CTx, albumin, P1NP, TSH, and fT4. Spinal and hip BMD Z-scores were measured.
The patients were examined as soon as they were enrolled to our inpatient rehabilitation department, after acute phase of SCI (mean time 62 days post injury).

RESULTS: The DEXA results of the spine showed that 5 patients had a pathological Z score, corresponding to 23,8% (4 of them testable at the lumbar area due to the surgical procedure) and 7 patients (28%) had a pathological hip Z score. Another 10 patients had low PTH values and 8 had low albumin values. Four out of them had low CTx values. The serum calcium and magnesium values were within normal range in 24 patients (96%). Also, all of the patients had a normal renal function with normal creatinine values. Interestingly, the vast majority of th sample (17 patients or 68%) demonstrated Vitamin D deficiency (<20ng/mL). Furthermore, TSH and fT4 hormone values were within normal range in all of our patients. We also found a great range of P1NP and osteocalcin values within our sample. However, normal values for those two parameters have not been established yet.

DISCUSSION AND CONCLUSION: Early diagnosis of bone loss among patients with SCI in the subacute phase could play an important role in fracture prevention and reduction of illness burden, while new efficient therapeutic approaches need to be established.

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Significance of Rehabilitation Nutrition on Body Composition and Function in Quadriplegic Patients

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BACKGROUND: Sarcopenia and cachexia in motor complete tetraplegia are associated with poor outcome. However, anthropometric, body composition, and nutritional indices reflecting such complications are seldom reported.

AIM: This study is to document changes in these indices in motor complete tetraplegia during subacute and chronic phase. Also, this study aims to confirm the effect of comprehensive rehabilitation nutrition program on functional outcome and alteration of weight and body composition in this population.

METHOD: Motor complete tetraplegia (AIS grade A and B) patients were selected for retrospective review. They had been provided with comprehensive rehabilitation nutrition program for 8-9 weeks in addition to conventional rehabilitation treatment. Data on malnutrition risk, anthropometric and body composition assessments, and laboratory studies were collected for analysis at admission and at discharge. The BMI cut-off value for Korean obese motor complete SCI (BMI > 20.2kg/m2) was used to define obesity for group comparison.

RESULTS: Most patients were at risk of cachexia (70.6%) and malnutrition (50.0%) at admission. Despite of significant weight and BMI reduction compared to premorbid state, 76.5% of patients were classified as obese at initial assessment. Compared to the premorbid state, the non-obese group showed more significant weight and BMI reduction than the obese group ($p < 0.05$), with significantly higher prevalence of sarcopenia (75.0%).
After rehabilitation, the sarcopenia of the non-obese group decreased from 75.0% to 50.0%. The risk of malnutrition improved in both groups, especially in obese patients. Laboratory results including haemoglobin, haematocrit, protein, and albumin levels showed modest improvements in all patients ($P<0.05$).
The changes of muscle mass, skeletal mass, and Appendicular Lean Mass Index tended to be greater in the non-obese group and the difference between groups were significant over time. Muscle mass was maintained in all patients while fat components increased significantly. Functional improvements showed significant negative correlation with the fat component increase and positive correlation with the amount of weight and BMI gain ($P<0.05$).

DISCUSSION AND CONCLUSION: The motor complete tetraplegia patients were at high risk of sarcopenia, obesity, malnutrition, and cachexia, especially in premorbid non-obese patients. However, conventional rehabilitation therapy with personalized rehabilitation nutrition intervention resulted in significant improvement of the nutritional status, body composition, as well as functional outcome. This is the first study to demonstrate the significance of rehabilitation nutrition based on the body composition change in association with functional outcome. Further study to document the appropriate individualized protocol of rehabilitation nutrition is needed for reducing fatty change and muscle mass maintenance which may enable further improvement challenging in motor complete tetraplegia.

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Characteristics of Rehabilitation in a Patient With Spastic Tetraparesis and Complete Bilateral Claw-Hand Deformity After Cervical Spinal Cord Injury

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BACKGROUND: Spinal cord injury (SCI) is a neurological condition that can result in significant and long-term disability. The most frequent causes of SCI are motor vehicle accidents, falls, sports injuries, violence and work-related accidents. It occurs more commonly in males, the most common area of injury being the region of C5. Spasticity is a common symptom of the upper motor neuron syndrome in SCI patients, that can severely impact (along with the neurogenic bladder and bowel dysfunctions) the rehabilitation program, altering the functional independence outcomes.

AIM: This case report aims to present the characteristics of the rehabilitation program in a patient with spastic tetraparesis, neurogenic bladder and bowel dysfunction, and complete claw-hands due to increased spasticity after a traumatic (car accident) C5 incomplete SCI associated with cervical spinal canal stenosis.

METHOD: The case report refers to a 67-year-old patient, male, who suffered from a traumatic C5 incomplete SCI in 2018. During the acute event, the patient received specific medical treatment, but in the sub-acute and early chronic phase there were complications due to increased superior limbs spasticity, which deformed the patient hands in complete proximal and distal interphalangeal joints flexion and metacarpophalangeal joints in extension. These sequelae appear due to poor spasticity management in the post-acute phases, in this case because the patient did not wear specific wrist-fingers orthoses that could prevent the shortening of flexor muscles tendons and intrinsic hand muscles atrophy. He was admitted into our rehabilitation clinic in 2021 based on the following symptoms: tetramelic motor deficit, bilateral complete claw-hand deformity, polyarthralgia, neurogenic bladder and bowel dysfunctions and severe locomotion and self-care disability. Since then, the patient had followed a 2 weeks biannual specific rehabilitation cycle consisting in electrotherapy and kinesiotherapy.

RESULTS: During the rehabilitation program we observed a progressive improvement in the upper and lower limbs motor control and coordination, gait reacquisition from dependent wheelchair use to independent ambulation with no assistive walking mean, a general decrease in pain, and a slight overall increase in quality of life.

DISCUSSION AND CONCLUSION: Although the rehabilitation program has improved the pain, proximal and intermediate segments of the upper limbs motor control, and the patient regained the independent gait, the neurogenic bowel and bladder dysfunctions and the bilateral definitive claw-hand deformity remain important long-term issues, given the irreversible structural pathological changes and the impact they have on the overall functional independence and quality of life. This case report emphasizes the role of keeping the hands in functional position and early splinting, in order to maximize the rehabilitation process outcomes in patients with spastic tetraparesis after incomplete cervical SCI.

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The Influence of Functional Magnetic Stimulation on Urination Disorders and Quality of Life in Women With Stress Urinary Incontinence – A Pilot Study

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BACKGROUND: Stress urinary incontinence (SUI) is a common health problem in woman with negative impact on quality of life (QoL) (1). Functional magnetic stimulation (FMS) is a new therapeutic option within conservative treatments for SUI (2), but exact protocols are yet to be defined (3).

AIM: To evaluate the effectiveness of the FMS on urinary disorders and quality of life in women with stress urinary incontinence (SUI) if applied 5 days weekly.

METHOD: This randomized, double-blind pilot-study was performed on a sample of 30 women aged 30-65 with SUI diagnosed by urogynecologist. Subjects were randomly assigned in 2 groups (G1 and G2). Both groups were exposed to a frequency of 10 Hz for 10 minutes and a frequency of 50 Hz during the next 10 minutes after a break of 2 minutes. Subjects in G1 received treatment every day in 3 weeks. Subjects in G2 received treatment 2 days in week for 3 weeks. The symptoms of SUI were assessed with Urogenital Distress Inventory questionnaire (UDI 6), and their impact on QoL with The King's Health Questionnaire (KHQ). Both tests were performed 1 week before, and 3 weeks after the treatment.

RESULTS: in both groups tested with UDI-6 FMS showed significant improvement in reducing urination disorders. In the G1 there was a decrease of 20.69%, while in the G2 the decrease was 18.54%. There was no statistically significant difference between G1 and G2. In both groups tested with KHQ FMS treatment had a significant improvement on the QoL (for all domains), but without a statistically significant difference between G1 and G2 (decrease was 29.16% and 29.30%, respectfully). In both groups FMS had the strongest effect on the domains "Social limitations" and "Personal relationships", while it has the weakest effect on the domain "Severity measures". If applied 5 times a week, the most favourable effect was achieved in the "Social limitations", while the weakest effect in the "Severity measures". If applied twice a week, the most favourable effect was achieved in the "Emotions", while the weakest effect in the "Sleep/energy". In a mutual comparison, G2 was significantly effective than G1 in the domains "Role limitations", "Emotions" and "Severity measures", while G1 was more effective in "Social limitations" and Sleep/energy".

DISCUSSION AND CONCLUSION: Our pilot-study indicates that FMS treatment is an effective therapeutic modality for women with SUI. Both treatment protocols had a statistically significant decrease on urination disorders and improvement in quality of life, but none showed to be superior.

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Comprehensive Pelvic Floor Rehabilitation Program for Men With Chronic Pelvic Pain: Case Study

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BACKGROUND:Chronic pelvic pain syndrome (CPPS) causes significant consequences on quality of life and is often difficult to treat. Current theories suggest a multifactorial etiology of CPPS, including urinary pathologies, psychosocial factors, central sensitization of the nervous system, and muscular issues.

AIM:Since a multimodal approach is recommended, this aim of this study was to present the effectiveness of a holistic conservative therapy treatment program including pharmacotherapy, pelvic floor muscle stretching and training, acupuncture and behavioral therapy.

METHOD:Male patient 40 years old, suffering from constant pelvic pain for almost a year, had undergone several tests [including ultrasound of kidneys, bladder and prostate, triplex of scrotum, computed tomography (CT) of retroperitoneum, CT and magnetic resonance imaging (MRI) of lumbar spine, MRI of penis and scrotum, recto/ sigmoidoscopy and cystoscopy] free from pathological findings. He was already taking oral medication for depression (Duloxetine 60mg) and neuropathic pain (Pregabalin 75mg) and was referred to our pelvic floor unit for further management. After evaluating and examining the patient, suggested treatment stragedy included: (i) therapeutic stretching exercises to improve range of motion and flexibility (ii) pelvic floor muscle training (PFMT) using biofeedback to facilitate relaxation and strengthening of PFM (iii) acupuncture of PF musculature and (iv) stress management program.
Validated questionnaires [including Visual Analogue Scale (VAS), Genitourinary Pain Index (GUPI), Hospital Anxiety and Depression Scale (HADS)] were collected at initial evaluation and after the completion of the therapeutic program to measure outcomes.

RESULTS:Our patient's rehabilitation program lasted almost 3 months, mentioning a great improvement of his symptoms at his 15th, last visit to our unit. VAS score decreased from 7 to 2, whereas GUPI score showed a robust response to therapy with a reduction of 15 points (from 27 to 12). Significant reductions were presented in HADS scores as well, indicating melioration of his mood disorders.

DISCUSSION AND CONCLUSION:Male CPPS is challenging to manage and often requires a comprehensive, multimodal therapeutic approach. Based on scientific data, pelvic floor rehabilitation is recommended as an effective treatment option in combination with medication and other complementary/ alternative therapeutic options.Our patient with CPPS presented a satisfactory response to the suggested treatment strategy, but due to lack of definite scientific data, large, well designed studies are needed to validate the effectiveness of comprehensive pelvic floor rehabilitation program in men with CPPS.

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Urinary Incontinence After Stroke – Assessment of the Functional Impact on Patients in a Neurological Rehabilitation Unit

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BACKGROUND: Urinary incontinence (UI), defined as any involuntary loss of urine, affects approximately 15 million people worldwide each year. It is estimated that up to 44% of patients may develop UI in the first year after a stroke and up to 15% will persist with symptoms afterwards, negatively affecting their quality of life.

AIM: To assess whether UI is associated with worse functional outcomes, longer hospital stays, and increased institutionalization, as well as its impact on the quality of life of patients who have experienced a stroke.

METHOD: Retrospective observational study of a cohort of patients admitted to a Neurological rehabilitation unit with a diagnosis of stroke from January 2021 to January 2022. Statistical analysis was conducted using Stata 15.1 software. Quantitative variables were described as mean and standard deviation (SD), and categorical variables as absolute numbers and percentages.

RESULTS: Out of the 97 stroke patients, 27 had UI, obtaining worse results with statistically significant differences $p<0.05$, in terms of mean and standard deviation (SD) for the following parameters: Barthel index at admission: 40.59 (11.89), Barthel at discharge: 68.19 (20.68), length of hospital stay 22.81 (14.16). Higher institutionalization rates were also observed, with 55% compared to 17.1% of patients without incontinence, with an ICIQ score of 13 (5.22).

DISCUSSION AND CONCLUSION: Current evidence suggests that factors such as advanced age, prior presence of UI, and stroke severity are associated with a higher risk of developing UI at 12 months. These findings align with the results of our study, emphasizing the significance of systematic assessment and management of UI in this patient group. While this measure could prove beneficial, it also underscores the necessity for conducting high-quality research to enhance patient care and treatment.

Therefore we can conclude that urinary incontinence following a stroke may serve as an additional factor for poor functional prognosis as it is associated with longer hospital stays and increased institutionalization.

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Management of Lower Urinary Tract System Function, in Stroke Patients at the Early Stage

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BACKGROUND: Management of lower urinary tract system function, in stroke patients at the early stage

AIM: Many stroke patients have urinary problems in the emptying and storage of urine with uninhibited urination, incontinence, urinary urgency and frequency
Neglecting to evaluate and treat neurogenic bladder leads to serious complications such as: urinary tract infections, thickening and pathological morphology of the detrusor wall, urolithiasis, and vesicoureteral reflux
The study aims to show the value of early management of the urinary tract function, with immediate removal of the indwelling urinary catheter, the normal functioning of the bladder-sphincter unit and the positive effect on the entire Rehabilitation program

METHOD: We studied 47 patients with stroke, 17 women and 30 men, who were hospitalized in our rehabilitation center during the last two months.
Before the removal of the indwelling urinary catheter, a clinical evaluation of the lower urinary tract system function was performed with a recording of mental function, sensation and reflexes of the perineum, urine culture and bladder ultrasound
Before removal of the indwelling urinary catheter, mild anticholinergic treatment was maintained while α-blockers were given to the men.

RESULTS: In 25/47 patients, the indwelling urinary catheter was removed 7-15 days after their admission. The urination chart is recorded, the residual is measured morning and evening for three days with intermittent catheterization, while in patients who did not have voluntary urination, the intermittent catheterization was done every four hours. The impossibility of early removal of the indwelling urinary catheter was due to: severe clinical status, urinary tract infection, prostatic hypertrophy, severe pressure ulcer, patient refusal

DISCUSSION AND CONCLUSION: Early removal of the indwelling urinary catheter ensures the proper functioning of the urinary tract, while the patient comfortably participates in the Rehabilitation and hydrotherapy program. The bladder control gives positive afferent impulses in the brain and help in the neuroplasticity process.

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Application to Exercise Protocol in Postmenopausal Osteoporosis: A Pilot Study

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BACKGROUND: Osteoporosis is a multifactorial progressive skeletal disease characterized by a decrease in bone density and disruption of bone microarchitecture, predisposing the bone to fracture. These fractures are very often associated with increased morbidity, mortality, loss of function, and high economic cost.

AIM: To assess the effectiveness of exercises protocol in patients with postmenopausal osteoporosis.

METHOD: Randomized controlled research included 92 patients diagnosed with osteoporosis who signed an informed consent to participate in the study.
Exercises protocol consisted of : exercises for strengthening and stretching the paravertebral muscles, muscles of the upper and lower extremities, exercises for strengthening the abdominal muscles and exercises for balance.
Bone mineral density was determined by dual energy X-ray absorptiometry, ad quality of life was determined by Qualeffo-41, specific for osteoporosis the beginnig and after twelve months. The patients were followed for one year.

RESULTS: The results showed that 83.69% of respondents have deformity, ie 58.69% have kyphosis. After one year, the results in the average vitamin D in the blood ($p<0.001$) were diferrent. BMD showed a significant difference after one year from treman ($p=0.001$) on lumbar spine and femur ($p=0.001$). Total Qualeffo scor show a significant statistics difference, a reduction in values, which means a better quality of life.

DISCUSSION AND CONCLUSION: Studies in a number of countries have shown, as well as our study, that exercise has an impact on BMD and quality of life in POMP. Exercises protocol have a significant role in improving bone mineral density and quality of life in patients with osteoporosis.

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Complete Spinal Cord Injury due to Acute Non-Traumatic Cervical Disc Herniation: A Case Report

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BACKGROUND: Acute spinal cord injury (SCI) caused by acute non-traumatic disc herniation is a very rare medical condition, and only a few cases have been reported in the literature.

AIM: We report the case of a patient exhibiting an acute non-traumatic cervical disc herniation resulting in a subsequent complete SCI.

METHOD: A healthy 40-year-old woman without any neurological deficit, previous trauma, or surgical interventions sought emergency medical attention due to sudden onset of interscapular pain followed by paraplegia. The patient woke up in the morning with abrupt interscapular pain, subsequently experiencing weakness and sensory loss in her lower limbs. As a result, she could not stand or walk, prompting her to contact emergency services. In the hospital, neurological examination revealed a complete SCI (neurological level C8, AIS A), with hypoesthesia below T7 level, along with anaesthesia and analgesia in the lower limbs, hyperreflexia in the upper limbs, weakness in finger flexors and interosseus musculature (3/5) and complete absence of muscle strength in lower limbs muscles (0/5). MRI revealed a large transligamentous spinal disc herniation at the C6/C7 level, resulting in spinal cord compression, and an associated epidural hematoma was suspected. She underwent emergency surgery with discectomy and anterior cervical arthrodesis (C6-C7) with implantation of a Simplicity plate and autologous bone graft extracted from the iliac crest. Postoperatively, the patient received prophylactic antibiotics and corticosteroids. Following the intervention, she regained tactile sensation in her thighs and legs and deep anal pressure, indicative of a sensory incomplete SCI (C8 level, AIS B).

RESULTS: The patient was admitted to our neurorehabilitation hospital nine days after the symptoms began. During an intensive rehabilitation programme, she presented progressive improvement in sensibility on the right side of the trunk and ipsilateral lower limb, motor function in the left lower limb up to 2/5 (except for persistent hip flexion at 0/5) and enhanced functional independence (increase in SCIM3 score from 25 to 63 points). Eight months after admission to rehabilitation, she presented an incomplete sensorimotor SCI (C8 level, AIS C) and regained the ability to walk with a walker.

DISCUSSION AND CONCLUSION: Non-traumatic cervical disc herniation resulting in SCI is a rare phenomenon, and complete sensorimotor SCI is not reported. This case illustrates a sudden onset and rapid progression of disc herniation from the initial presentation to a complete lesion in a patient without a clinical history of intervertebral disc herniation or spinal canal stenosis. Its recognition is imperative since rapid diagnostic and therapeutic interventions hold the potential to yield a more favourable prognosis.

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Poster Session C

Ambient Echolalia Associated With Multiple Antibiotic Use on the Background of Vasculitis

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BACKGROUND: Echolalia is defined as the automatic repetition of vocalisations made by another person. Ambient echolalia is a rare phenomenon and was first described in a patient with dementia and is observed in adults.

AIM: We made this presentation to raise awareness that multiple antibiotic use in the background of vasculitis may cause many neurotoxic side effects such as ambient echolalia.

METHOD: In our 67-year-old patient, elevated acute phase reactants were detected during investigations for nystagmus, speech and balance disorders. Ambient echolalia developed after multiple antibiotic use which was thought to be of infectious origin.

RESULTS: The patient was diagnosed as cerebellar ischaemia and referred to our physical medicine and rehabilitation clinic for neurological rehabilitation. As a result of the investigations performed in our clinic, it was determined that cerebellar ischaemia developed due to large vessel vasculitis. In addition, it was determined that the elevated acute phase reactant was due to vasculitis

DISCUSSION AND CONCLUSION: The neurotoxic effects of moxifloxacin and cephalosporin group antibiotics given empirically until the diagnosis was made caused ambient echolalia.

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Comparison of Integral Units With Standard Rehabilitation in Non-Glenohumeral Rheumatic Diseases in the Shoulder Area

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BACKGROUND: Physiotherapy can be divided into a fragmentary and an integral model(1), taking into account the spatial and personnel organization. The fragmentary model is the standard form in which rehabilitation is provided in several spatially separated work units with multiple physical therapists. The integral model involves a single room where the patient undergoes complete rehabilitation, with a physical therapist involved from beginning to end of the process. To date, no studies have been conducted with patients in precisely separated organizational units, but previous research suggests that individualized therapy does not show significant differences compared to standard protocols(2).

AIM: The aim of this study is to investigate whether the rehabilitation outcomes of patients with nonglenohumeral rheumatism of the shoulder differ between those rehabilitated in integral units and those with the same diagnosis who received normal physical therapy.

METHOD: This prospective randomized study involved 30 patients treated five times a week for three weeks in the specialized hospital "Daruvarske toplice". 15 patients were rehabilitated in integral units, while the other half received standard rehabilitation. Both groups performed daily medical gymnastics for 20 minutes, 10 minutes of therapeutic ultrasound applications and static laser treatments. The comparison of these two forms was performed on a sample of patients diagnosed with non-glenohumeral rheumatism of the shoulder (periarthritis humeroscapularis) which includes diagnoses such as calcific tendonitis, and adhesive capsulitis. Validated questionnaires EQ -5D-5L (6 categories), SPADI (Shoulder Pain and Disability Index), and DAS21 were completed on the first and last day of rehabilitation to assess health status, shoulder joint disability index, depression, and stress. In addition, shoulder range of motion was measured for forward flexion, backward extension, abduction, external, and internal rotation on the first and last day. An independent-sample t-test was used for the difference between groups for variables measured on a ratio scale and a Mann-Whitney U test for variables measured on an ordinal scale. The alpha error was set at 5%.

RESULTS: Seventeen women and thirteen men participated in the study, with an average age of 56.7 years. Rehabilitation in the integral unit resulted in a significant increase in range of motion for shoulder abduction ($p < 0.001$), forward flexion ($p=0.002$), and external rotation ($p=0.007$), a change in the "current health status" category in the EQ -5D-5L questionnaire ($p < 0.001$), and in the SPADI questionnaire ($p < 0.001$). No significant changes were found in the questionnaire DAS 21 ($p=0.22$) and in the 5 EQ-5D-5L categories ("mobility" ($p=0.75$), "self-care" ($p=0.73$), "habitual activities" ($p=0.45$), "pain/discomfort" ($p=0.19$), "anxiety/depression" ($p=0.91$)).

DISCUSSION AND CONCLUSION: Considering the statistically significant increase in range of motion, and improvement in health status and activities, it is recommended that the implementation of rehabilitation in integral units be considered in facilities where such organization is possible. For a more objective comparison of the two aforementioned organizational models of rehabilitation, further studies with a larger sample of patients and other diagnoses are needed.

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Severe Disability in a Patient With Systemic Primary Hyperoxaluria Due to Advanced Accumulation of Oxalate in the Skin, Subcutaneous Tissue, and Bones

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BACKGROUND: Primary hyperoxaluria (PH) is a rare autosomal recessive inherited disorder caused by a deficiency of the liver enzyme glyoxylate aminotransferase resulting in the overproduction of oxalate, its excretion through the kidney and accumulation of calcium oxalate, primarily in the kidney, and in other organs and tissues, such as skin, bones, joints, retina, myocardium, blood vessels, and the nervous system.

AIM: We present a case of a 26-year-old female patient with PH who underwent combined liver-kidney transplantation.

METHOD: The patient has been suffering from kidney stones since she was four. She was treated with lithotripsy and urinary tract surgery. At the age of 23 (March 2020) she started a chronic haemodialysis (HD) programme. Since then, she developed progressive flexion contractures of fingers and toes. At the age of 25 (March 2022) she had an unplanned pregnancy. At 37th week of gestation, she had a c-section and gave birth to a healthy male baby (December 2022). After the delivery, her clinical state worsened quickly. She lost weight significantly, her skin hardened and became sensitive to touch and strain (she developed allodynia and paresthesias), all leading to the loss of the ability to close her hands into a fist, skin ulcers, muscle weakness, and very difficult ambulation. The diagnostic assessment identified nephrocalcinosis and nephrolithiasis in atrophic kidneys with consequential end-stage renal disease. Laboratory analysis detected elevated plasma levels of oxalate (up to 108.5 µmol/L; normal value <5 µmol/L) and high urinary oxalate levels (up to 193 mmol/mol creatinine in 24-hour urine collection, normal value 15-32 mmol/mol creatinine). Oxalate accumulation was identified in retina, heart, in bones in the form of diffuse osteosclerosis, in the skin, and in subcutaneous tissue as diffuse and scattered rough linear calcifications with consequential flexion contracture of fingers and skin ulcers, without signs of arthropathy. Genetic testing confirmed PH type 1 (homozygote for autosomal recessive mutation of AGXT gene). At the age of 26 (August 2023) she underwent a successful simultaneous liver and kidney transplantation and continued intensive HD (5 times a week) to eliminate previously accumulated oxalate in the body as well as to preserve the function of the transplanted kidney.

RESULTS: A month after the transplantation the plasma levels of oxalate dropped significantly (20.2 µmol/L), while urinary oxalate levels remained high (396.7 mmol/mol creatinine in 24-hour urine collection).

DISCUSSION AND CONCLUSION: Early diagnosis and preemptive liver transplantation remain the only cure for PH1. Late diagnosis results in systemic accumulation of oxalate and progressive renal failure, thus with the need for combined liver-kidney transplantation. Our patient presented with chronic pain, skin stiffness, ulcers, joint contractures and muscle weakness which resulted in severe functional disability.
The rationale for HD after liver and renal transplantation in patients with advanced systemic PH is elimination of accumulated oxalate in various tissues and protection of transplanted kidney. Oxalate deposits in bones and soft tissue were the major cause of severe functional disability in presented patient.

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Influence of Naphtalanotherapy (Nt) Combined With Individually Tailored Physiotherapy in Patients With Psoriatic Disease: A Study Based on the Psoriatic Arthritis Cohort of Special Hospital for Medical Rehabilitation – Naftalan, Croatia

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BACKGROUND: Kinesitherapy, electrotherapy, and hydrotherapy are recommended for non-pharmacological management of psoriatic arthritis (PsA). (1) Naphtalanotherapy (NT) represents the use of mineral oil derived from petroleum in the treatment of PsA and psoriasis (PsO).

AIM: The aim of the study was to investigate the efficacy of NT combined with individually tailored physiotherapy on rehabilitation outcomes in patients with psoriatic disease.

METHOD: The study cohort was the psoriatic arthritis cohort of the Special hospital “Naftalan”, Ivanić-Grad, Croatia (PsASHNIC) which included all patients with PsA and PsO who were admitted for inpatient rehabilitation from January 2019 to January 2020 at the Special hospital “Naftalan”. (2) All participants with PsA met the CASPAR classification criteria. Psoriasis (PsO) was diagnosed by a dermatologist.
A total of 119 patients, mean age of 59.2 years, with a female-to-male ratio of 1:1 were enrolled in the study. The mean duration of the rehabilitation program was 17.6 days. It consisted of strengthening and range of motion exercises, exercises in a thermal water pool, naphthalene baths, and electrotherapy. We assessed objective parameters of disease activity for PsA and severity of PsO, as well as patient-reported outcomes related to pain, fatigue, function, and quality of life at the admission and at the patient's discharge.

RESULTS: There was statistically significant improvement recorded in all measured parameters ($p<0.001$, the Wilcoxon test); pain intensity (VAS pain), duration of morning stiffness, number of painful and swollen joints, number of painful enthesis (MASES), patient-reported disease activity (BASDAI), chest mobility (breathing index), sagittal mobility of lumbar spine (Schober index), functional performance (HAQ and BASFI indices), fatigue (FACIT-F), PsO severity (PASI) and Quality of life related to PsO (DLQI).

DISCUSSION AND CONCLUSION: Although The Group for Research and Assessment of Psoriasis and Psoriatic Arthritis (GRAPA) recommends physiotherapy for peripheral arthritis, enthesitis, dactylitis, and axial disease there is a need for high-quality evidence on nonpharmacologic interventions for PsA specifically. (1,3)
A 2 to 3-week course of combined spa-exercise therapy, in addition to naphtalanotherapy and electrotherapy, provides beneficial effects on pain, fatigue, disease activity, chest and spine mobility, functional ability, and quality of life in patients with psoriatic disease (PsO+PsA).

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ICF Based Functional Problems Reported by Estonian Patients With Rheumatic Diseases

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BACKGROUND: Chronic autoimmune disease causing inflammation, stiffness, and pain in the joints affects also quality of life due to fatigue and sleep disturbances (1,2). There is prevalence of fatigue found in at least 40% of patients with rheumatoid arthritis in the Netherlands study (1) and insomnia 32.3% of the participants in UK study (2). Pain is the predominant symptom in most of the people with inflammatory arthritis (3). Pain and exercise tolerance are symptoms, which are usually well documented. More attention should be paid to insomnia and low energy which also could affect quality of life.

AIM: Aim was to analyse the ICF based general symptoms and their role for patients with rheumatic diseases.

METHOD: Sixty patients with rheumatic diseases filled an electronic questionnaire based on ICF categories in 2022 October and November. There were 18 categories from the component body functions in the ICF comprehensive core set for rheumatoid arthritis (4). Four general symptoms were analysed in the subgroup of Estonian patients: energy and drive functions (b130), sleep functions (b134), exercise tolerance functions (b455) and sensation of pain (b280).

RESULTS: Women were 93,3% of the respondents. 20% aged 18-39 y, 56,7% 40-64 y and 21,7 % were 65-79 y. 51,7% had a history of rheumatic disease over 10 y, 31,7% 4-10 y and 16,7 % less than 3 years. 71,7% were working. The answers were distributed as following : 1) Energy and drive functions (b130) were reported: no problem 5 (8%), mild problem- 11 (18%), moderate problem- 30 (49%), severe problem- 9 (15%), complete problem- 6 (10%); 2) In sleep functions (b134): no problem 8 (13%), mild problem 10 (17%), moderate problem 19 (31%), severe problem 11 (18%), complete problem 13 (21%); 3) Exercise tolerance functions (b455): no problem 3 (5%), mild problem 7 (11%), moderate problem 15 (25%), severe problem 18 (29%), complete problem 18 (30%); 4) Sensation of pain (b280): no problem 3 (5%), mild problem 3 (5%), moderate problem 19 (31%), severe problem 20 (33%), complete problem 16 (26%).

DISCUSSION AND CONCLUSION: The target group questionnaire is very valuable information to understand the general health functional problems of patients with rheumatic diseases. All of the general health problems which are very common in the subgroup of musculoskeletal patients with inflammatory diseases are all reported as moderate to complete problems in more than 50% of respondents in Estonia: pain by 55 respondents, exercise tolerance 51, energy and drive in 45 and sleep in 43 respondents out of 60. Rheumatic patients should be asked actively about these functional problems.

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The Impact of Rehabilitation Treatment on Pain and Life Quality in Patients With Hip Osteoarthritis

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BACKGROUND: Osteoarthritis (OA) is the most frequent form of arthritis, and the hip is the second most frequently affected joint. The effects of osteoarthritis on the hip joint often lead to marked physical impairment that can contribute to increased disability and dependency in everyday activities. Treatment of hip osteoarthritis includes drug therapy and rehabilitation treatment which includes individualized exercise programme and physical agents.

AIM: Our objective was to determine the impact of rehabilitation treatment on pain and life quality in patients with hip osteoarthritis.

METHOD: This prospective controlled trial included 64 patients (34 women and 30 men; mean age 62.1±14.34 years). Participants were recruited from the Medical Rehabilitation Clinic, Clinical Centre of Vojvodina. All participants had moderate or severe restrictions in mobility, debilitating pain, and difficulties in walking. OA was diagnosed following the American College of Rheumatology clinical and radiographic criteria for hip OA. Patients were divided into two groups: the study group (32 subjects who received both rehabilitation treatment and drug therapy) and the control group (32 subjects who received only drug therapy). Rehabilitation treatment included 5 sessions per week of individualized exercise programme under the supervision of a physiotherapist and lasted for 4 weeks. The exercises consisted of active and active-resistance mobilizations of hips and lower limbs. Outcome measures were: the pain subscale on the Western Ontario and McMaster University Osteoarthritis Index (WOMAC), total score of WOMAC Index for overall disability and for SF-36 for life quality. Outcome measures were assessed at baseline and at 12 weeks follow up.

RESULTS: Compared to the evolution of control group, improvements were observed in study group, as follows: in the pain subscale of WOMAC index study group ($p = 0.032$) vs. control group ($p = 0.430$); in total WOMAC index study group ($p = 0.011$) vs. control group ($p < 0.081$); in SF-36 physical function control group A ($p = 0.023$) vs. control group ($p = 0.051$). Evaluating control group, the most significant improvements of the studied parameters were observed in the age group 41–50 years.

DISCUSSION AND CONCLUSION: The significant 30% reduction found in pain is large enough to be considered clinically relevant. Thus, the results of our study (mean reduction in the WOMAC pain score 37%) support the further development of the specific exercise program for the rehabilitation of hip OA. Benefits from individualized exercise programme were also detectable in regards to improved total WOMAC index and SF-36 physical function subscale. Rehabilitation treatment was found to be feasible and safe for patients with hip OA. This study supports the use of physical therapy in reducing hip OA pain. Further controlled studies with larger group sizes are needed to determine the long-term benefits of exercise and its effects on the progression of the disease.

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Atraumatic Hemarthrosis: A Rare Complication of Direct Oral Anticoagulant Use

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BACKGROUND: Hemarthrosis is the presence of intra-articular blood, conditioning pain and increased monoarticular volume, which worsens with active range of motion. The most common cause is trauma, but it can also arise in atraumatic contexts, most often related with hematological pathology associated with a higher risk of hemorrhage. In atraumatic cases, acquired causes are the most frequent and include the use of anticoagulant medication, advanced liver and/or renal disease, neoplasms, septic arthritis, among others.
Direct oral anticoagulants (DOAC) have become preferred when compared to warfarin, not only because of their safety profile but also because of their convenience and efficacy. The leading adverse effect of the use of anticoagulants is the risk of hemorrhage, which seems to be equal to or lower in patients on DOAC.

AIM: We describe the case of a 75-year-old woman with a history of paroxysmal atrial fibrillation, medicated with 60 mg edoxaban once daily, who is followed in Physical nd Rehabilitation Medicine a (PRM) consultation due to knee osteoarthritis. The patient requested an urgent PRM consultation because of acute pain and swelling of the left knee with approximately 1 week of evolution. There was no history of recent trauma.
Objectively, the patient was awake and hemodynamically stable; her left knee was swollen and hot, with no change in the local skin color; there was marked limitation in the passive and active range of motion and a positive patellar tap test on the left knee and limited weight bearing on the same side.

METHOD: Ultrasound was performed on the left knee and abundant intra-articular hyperechoic fluid was found. It was decided to perform an ultrasound guided arthrocentesis of the left knee.

RESULTS: Approximately 50 mL of intra-articular hematic fluid was removed and subsequently sent for cytological and microbiological analysis. An analytical study (with blood count, coagulation tests, liver and kidney function tests and reactive c protein) and x-ray of the left knee and surrounding bones were also performed. After the procedure, the patient reported immediate symptomatic relief.
The analytical study didn't revealed any major alteration (aPTT was increased as expect for a patient medicated with DOAC). In cytological synovial fluid analysis: synovial fluid was blood-red and less viscous than normal synovial fluid; cell count was 690 cells/mm3. Microscopic examination showed mostly polymorphonuclear cells, with a differential count of 66% neutrophils, 18%, lymphocytes and 16% monocytes, and very abundant erythrocytes. In every aspect, both macroscopically and microscopically, this synovial fluid was extremely similar to blood. No microorganisms were isolated in microbiological analysis. From the radiographs performed, there were no visible changes in cortical bone of the left femur, tibia and fibula, excluding fracture or tumor; in the left knee, osteoarthritis was Kellgren-Lawrence grade 3.

DISCUSSION AND CONCLUSION: We conclude that we were in the presence of an atraumatic hemarthrosis, most probable in the context of oral anticoagulation, a rare complication of DOAC. Although these drugs have a significantly lower hemorrhagic risk than warfarin, it cannot be overlooked as it can lead to major bleeding events that can endanger the patient's health and life.

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Postoperative WOMAC Improvement in Obese Osteoarthritis: Associations with Vitamin Status and Body Composition

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BACKGROUND: Osteoarthritis is a chronic degenerative disease that affects the entire joint (1). Obesity stands as a well-established contributor to osteoarthritis, impacting not only the knees but also other joints (2). Continued research investigates vitamins' impact on osteoarthritis progression. Low vitamin D levels correlate with increased joint space loss and higher radiographic scores, potentially elevating OA risk. Vitamin B shows promise in managing OA symptoms by enhancing joint mobility and reducing inflammation (3). Definitive conclusions regarding vitamin status in obese osteoarthritis patients remain elusive, warranting further investigation.

AIM: The aims of this study are to characterize obese patients with osteoarthritis and investigate which factors are associated with larger improvement in Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) after surgery and postoperative physical therapy.

METHOD: After signing informed consents, patients underwent initial perioperative assessments, followed by additional evaluations conducted both before and after the initiation of postoperative physical therapy. These assessments involved a comprehensive analysis, anthropometric measurements, laboratory, and functional tests.

RESULTS: The study included 16 obese participants with osteoarthritis, with a mean age of 70±6 (59-82) years and both genders equally represented. The participants exhibited a mean body mass index of 34.4±5.3 (25.9-42.2) kg/m2. Within the cohort, 10 patients underwent unilateral hip surgery, and 2 underwent bilateral hip surgery. Additionally, 4 patients underwent unilateral knee surgery, while 3 underwent bilateral knee surgery. Interestingly, better WOMAC was associated with higher levels of vitamin D (r=-0.53, p=0.043) and folic acid (r=-0.53, p=0.045), whereas a larger WOMAC improvement was associated with higher vitamin B12 concentration (r=-0.66, p=0.041). Additionally, a lower percentage of fat mass (r=0.55, p=0.035) and a higher percentage of muscle mass (r=-0.56, p=0.031) were associated with better WOMAC scores.

DISCUSSION AND CONCLUSION: Our findings suggest a potential benefit from supplementation with vitamin D, vitamin B12, and folic acid in obese patients with osteoarthritis. Furthermore, resistance training aimed at increasing muscle mass percentage emerged as a valuable strategy in promoting postoperative recovery. In conclusion, while our study provides valuable insights into the associations between patient characteristics, treatment outcomes, and osteoarthritis, further validation through large-scale studies with an interventional design is crucial. Confirming and expanding upon our findings in diverse patient populations will contribute to the development of targeted interventions, ultimately advancing the personalized management of osteoarthritis.

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Evaluation of the Efficiency of Therapy by Comparing the Functional Status of Patients With Knee Osteoarthritis Before and After the Implemented Therapy

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BACKGROUND: Knee osteoarthritis is a chronic degenerative disease with symptoms such as chronic pain, stiffness of the joints in stillness, limited knee flexion, limping walk, difficulties in regards to moving up and down stairs and performing daily activities. Disease mainly occurs in patients older than 60, and mainly in women [1,2].

AIM: The aim was to evaluate the efficiency of therapy, by comparing the patients' functional status before and after the implemented therapy.

METHOD: The examination consisted of 80 patients with knee osteoarthritis, treated in the Clinical Center of Vojvodina, during the period of 2020-2023. The diagnosis was made based upon the ACR criteria [3]. Patients were divided in two groups: Group A- 40 patients who were part of a 8 week physical treatment. Group B- 40 patients with an intraarticular application of a 2% Sodium Hyaluronate in the afflicted knee and who were included in an 8 week physical treatment afterwards.

All the patients were evaluated based on the same survey, and examined by an orthopedist and physiatrist-rheumatologist. The average age was 68.2, and 90% of the patients were women. Radiological modifications were estimated according to the Kellgren-Lawrence classification: 70% of patients were in the III stage, and 30% were in the II stage. The patients' functional status before and after the treatment was estimated according to the Oxford knee score. Pain intensity before and after the treatment was estimated according to the VAS (visual analogue scale).

RESULTS: Group A: Pain intensity determined by the VAS was 8.8, before the treatment and after the treatment it was 6. The average functional status score that was evaluated using the Oxford knee score before the treatment was 22, while it was 30 after the treatment ($p<0.005$); Group B: Pain intensity determined by the VAS before the treatment was 9, and after the treatment pain intensity was 4. The average functional status score determined by the Oxford knee score was 22 before the treatment, and 38 after the treatment.

DISCUSSION AND CONCLUSION: Pain intensity was significantly reduced and there was a significant improvement of the functional status in patients who were treated with an intraarticular application of a 2% Sodium Hyaluronate in the afflicted knee and had physical therapy afterwards when compared to patients that had only done physical therapy.

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Does Radiofrequency Ablation of Genicular Nerves for Knee Osteoarthritis Work?

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BACKGROUND: Recent evidence suggests a benefit in radiofrequency (RF) treatment of genicular nerves for the knee in managing moderate to severe osteoarthritis (OA). There is a reported reduction in pain and improved function. However, there is very little level-one literature available that supports this practice and conclusively proves a benefit. There are only several randomized control trials (RCTs) conducted in North America that are proving its efficacy. This study aimed to look at the outcomes of patients having undergone this treatment to determine if there was any benefit.

AIM: This study aimed to determine if RF treatment of genicular nerves administered in patients with knee OA over three to twelve months demonstrated any benefit.

METHOD: The Western Ontario and McMaster Universities arthritis index (WOMAC) tool was used before RF treatments and one year after the RF treatments in 45 patients. RF ablation was performed on all three branches of the n. genicular in all patients. The outcomes observed were pain, stiffness, and physical function, and the total WOMAC score was calculated.

RESULTS: RF ablation of genicular nerves reduced total WOMAC score, pain, stiffness, and physical function by 79.3%, 86.37%, 61.12%, and 58.03%, respectively, three months after the interventions. What is very important is that these effects were maintained a year after the treatments.

DISCUSSION AND CONCLUSION: Results showed a trend of reduction in the WOMAC score. However, further studies are needed to explore whether the grade of OA and patients' weight significantly impact the results and when it is time to repeat interventions.

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The Dilemma of Rehabilitation Management of a Young Morbidly Obese Patient With Knee Osteoarthritis: A Case Report

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BACKGROUND: Osteoarthritis (OA) has a major impact on mobility and loss of productivity of patients. Obesity is strongly linked to knee OA and is considered a risk factor for both incidence and progression (1). Patients with OA of the knee presents with symptoms that include pain, stiffness, loss of function, and reduced quality of life . It gives impact mostly in young patients as this group of people have a longer life expectancy and have to deal with physical career demands.

AIM: This is to report on our dilemma in providing rehabilitation management in a young morbidly obese patient with knee OA.

METHOD: We report a case of a 35 year old lady with bilateral knee OA and morbid obesity with BMI of 93kg/m2 Premorbid, she was able to ambulate and manage her personal activity of daily living independently until her first admission to the hospital due to pneumonia which resulted in deconditioning and reduce mobility. She had also complaint of bilateral knee pain where her x-rays of the knee showed OA changes with Kellgren Lawrence classification grade III. Orthopedic surgeon unable to offer her any surgical or invasive intervention, as she was morbidly obese and still young. She was then admitted to the rehabilitation ward for conservative management.

RESULTS: Analgesia
Physical Modalities
+ Strengthening , flexibility and Aerobic Exercises + Group Therapy +Psychological strategies :Relaxation and Breathing techniques +Home Exercise Programs (HEP)

After 12 weeks in the ward, she is able to stand and transfer independently to the wheelchair and able to do most of her personal activities of daily livings.

DISCUSSION AND CONCLUSION: Many surgeons are not keen to opt for knee replacement in young osteoarthritis patient due to its high risk of early implant failure and the need for future revision surgery. In obese patient, they are slower to recover postoperatively and have a greater rate of complications (2). Studies have shown that weight loss should be addressed as part of the management of knee osteoarthritis (3). Hurley et al. assess the effects of a combined exercise, self-management and active coping strategies rehabilitation program in their study and found that the rehabilitated participants enjoyed better physical function (4).
Managing a normal young patient with osteoarthritis has proven to be very challenging. It is important to address not only physical but also psychosocial factors in the treatment of OA pain especially in young morbidly obese patient.

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The Isokinetic Test in Meniscal Injuries: Experience of the Physical Medicine and Rehabilitation Department in Morocco

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BACKGROUND: Isokinetic testing is currently the gold standard for the objective evaluation of muscle strength. Its interest is not limited to diagnosis, but has multiple applications, in prevention as well as in follow-up and rehabilitation.

AIM: The objective of this work is to report the experience the physical department in the field of isokinetic evaluation of post meniscectomy athletes.

METHOD: Retrospective, descriptive and analytical study of 40 patients followed in our department for the management of a post meniscectomy rehabilitation, to whom an isokinetic evaluation was performed to guide the management.
Patients completed maximum effort knee extension and flexion at 60°/sec, 180°/sec and 240°/sec using a CYBEX HUMAC dynamometer to assess quadriceps and hamstring strength.

RESULTS: 42 patients underwent isokinetic evaluation, the average age was 24.14 years, and there was a predominance of males (30 males vs. 12 females). 76.19% of the subjects were right-footed, with 66.66% of the injuries on the non-dominant side. The average follow-up time was 5.95 months between the surgery and the test. The isokinetic evaluation showed a deficit of the quadriceps(Q)/hamstring(H) muscles on the injured side with a mean Q deficit of 13.54% and a mean H deficit of 8.24%. All patients underwent conventional functional rehabilitation. We noted the improvement of our patients at the end of the rehabilitative management.

DISCUSSION AND CONCLUSION: The isokinetic test is a reliable and objective ways of evaluating muscular strength. It allows the identification of an imbalance between agonist and antagonist muscles that could be responsible for musculo-ligamentary injuries, and could therefore condition the return to sports competition.

REFERENCES:

Infectious Cervical Spondylodiscitis Diagnosed After Unsuccessful Cervical Traction Procedure Prior to Hospital Admission- Case Report

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BACKGROUND: Infectious spondylodiscitis is a rare, nonetheless serious disease of the intervertebral disc, which can additionally involve peri-vertebral structures and may cause extensive destruction and neurological impairment. Spondylodiscitis due to Candida species has been rarely reported in literature, the involvement of the cervical spine being an even rarer condition.

AIM: This study presents a case of infectious cervical spondylodiscitis that has recently undergone a cervical traction procedure, which has not been recommended by a physician.

METHOD: Case report:
A 64-year-old male presented with chronic cervicalgia exacerbated following a recent cervical traction procedure performed outside of the hospital setting. Additionally, he complained of left shoulder pain, significantly impaired movement of the cervical spine, as well as limited and painful movement of both shoulders.
He had a medical history of Diabetus mellitus type 2 insulin dependent with multiple associated complications, including recent cellulitis of the left lower leg.

RESULTS: He was afebrile. The peripheral white blood cell (WBC) count was 6,850/mm3 and the erythrocyte sedimentation rate (ESR) was 64 mm/hr. The c-reactive protein (CRP) was 10.6 mg/dl and the IgM count was elevated (347 UI/ml). The urine analysis revealed bacteriuria and elevated WBC count. Cultures of the blood were positive for Candida spp.
Initial lateral cervical radiograph revealed erosion, destruction and posterior migration of the C5-C6 vertebral bodies. As such, he underwent a CT scan of the spine which supported the diagnosis of cervical spondylodiscitis with collapse of the C4-C7 vertebrae. An MRI scan could not be performed given the fact that the patient was unable to maintain supine position due to severe pain.
The neurosurgical department advised non-surgical management of the case. Subsequently, the patient was admitted to the infectious diseases unit, where he was administered appropriate antifungal iv treatment, followed by a favourable outcome.

DISCUSSION AND CONCLUSION: In conclusion, procedures pertaining to the physiatry domain should never be done without prior medical advice, since there could be instances where a specific disorder is exponentially exacerbated, rather than alleviated.

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Spondylolisthesis in a Second Kidney Transplant Patient on Long-Term Corticosteroids: Is Physiotherapy a Treatment Option?

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BACKGROUND: In December 2021, a second kidney transplant (Ktx) female patient, age 51, corticosteroid use of 37 years, presented with back pain. Magnetic resonance imaging evidenced spondylolisthesis L3-L4 (Grade 1). Analgesic options are limited in kidney transplantation, and this patient refused painkillers fearing possible resulting kidney damage. A neurosurgeon recommended minimally invasive XLIF (extreme lateral interbody fusion). Little evidence exists related to good outcomes in spinal surgery in Ktx patients. The physiatrist, based on the patient's history and the patient's reported 70% disability using the Oswestry Disability Index (ODQ), and 8 point on the numeric pain rating scale (NPRS), prescribed conservative treatment as physiotherapy.

AIM: To assess the efficacy of a rehabilitation strategy based on physiotherapy as an option when surgery and pharmacological treatment could be contraindicated.

METHOD: From January to September 2022, physiotherapy sessions were carried out by a certified rehabilitation physiotherapist, who instructed and closely monitored the patient during sessions. Treatment included 2 thirty-minute sessions, weekly for 5 weeks, renewed twice for symptoms reappearing. The patient performed trunk and pelvic stability exercises to strengthen the hip abductor, extensor, and gluteal muscles, tailored to the patient’s wellness, as core muscles are generally weak in spondylolisthesis. Therapeutic massage was also done to alleviate pain associated with muscle contractions, in particular, the left leg tensor fascia lata. Patient education included an at-home daily exercise regimen related to stability exercises.

RESULTS: In September 2022, the patient reported an ODQ index of 36%, decreased pain intensity, and NPRS 3. These results have been maintained to date, with the patient following the prescribed stability exercises on a continual basis.

DISCUSSION AND CONCLUSION: Spinal surgery has poor outcomes in Ktx patients, thus alternative conservative treatment options should be considered in patients on long-term corticosteroids. Physiotherapy managed the symptoms successfully. Notably, spondylolisthesis often presents recurring symptoms, therefore, on physiatrist evaluation, repeat physiotherapy cycles may be required. In Ktx patients on chronic corticosteroids with back pain, physiotherapy could be indicated as an alternative to administering pain medications, subsequently improving overall quality of life.

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Thyroid Disorders and Shoulder Tendinopathies: Is There a Link?

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BACKGROUND: In the clinic, we often visit patients with shoulder tendinopathy who have a history of hypothyroidism. We therefore wondered if there could be a correlation if there could be a correlation between tendon and thyroid disorders

AIM: Check whether a correlation between tendinopathy and thyroid disorders has ever been found in the literature

METHOD: We perform a literature review on PUBMED. Our search string was:
("Thyroid Hormones"[Mesh] OR "Thyronines"[Mesh] OR "Triiodothyronine"[Mesh] OR "Diiodothyronines"[Mesh] OR Thyroid Hormones*[tiab] OR Thyronines*[tiab] OR Triiodothyronine*[tiab] OR Diiodothyronines*[tiab] OR Thyroid*[tiab] OR "Thyroid (USP)"[Mesh] OR Diiodotyrosine*[tiab] OR Monoiodotyrosine*[tiab] OR "Diiodotyrosine"[Mesh] OR "Monoiodotyrosine"[Mesh] OR "Hypothyroidism"[Mesh] OR Hypothyroidism*[tiab] OR TSH*[tiab] OR "Hyperthyroidism"[Mesh] OR Hyperthyroidism*[tiab]) AND (tendon*[tiab] OR tendinitis* [tiab] OR "Tendons"[Mesh] OR "Tendinopathy"[Mesh] OR Tendinopath*[tiab] OR tendinos*[tiab] OR tendinitis*[tiab] OR tendonitis*[tiab] OR tendonitides*[tiab])

RESULTS: We found 588 articles. Reading the titles we selected 122 articles. Based on the abstract we excluded 33 articles.

DISCUSSION AND CONCLUSION: From the articles we selected, it seems that there is an influence of thyroid hormones on tendon homeostasis and on the tendon structure they are primarily composed of collagen fibers and it is known that thyroid hormones are known to affect the turnover and the metabolism of collagen.
Thyroid hormones seem also to present an important role in the healing and repair of tendons.
Related to thyroid disorders and rotator cuff tendinopathy is an area of interest, and there is some evidence to suggest a possible connection. Thyroid disorders, including hypothyroidism and hyperthyroidism, can potentially impact the development and management of rotator cuff tendinopathy in many ways.
From our review, we can assume that there is some evidence suggesting a relationship between thyroid disorders and rotator cuff tendinopathy although it is still unclear the mechanism behind it. Further research is needed.

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Pectoralis Minor Syndrome: Case Presentation

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BACKGROUND: We present a case involving a previously healthy female with an axillary vessels compression, caused by the pectoralis minor muscle. Initial clinical findings were characteristic of the frozen shoulder syndrome. After unsuccessful conservative treatment and the development of hand discoloration, our suspicion was on the thoracic outlet syndrome. The diagnosis of vessels compression due to the pectoralis minor was confirmed using a doppler ultrasound in provocative arm positions.

AIM: /

METHOD: The treatment was based on manual therapy – releasing tension in the pectoralis minor, posture correction and teaching stretching exercises for the pectoralis minor. Different physical modalities were added, aimed at managing shoulder pain.

RESULTS:After 15 sessions of physical therapy, full range of shoulder motion was gained, during which normal pulses were detected and normal hand coloration was observed. We are still waiting for the results of magnetic resonance angiography (MRA) to confirm vascular patency.

DISCUSSION AND CONCLUSION: The thoracic outlet syndrome (TOS) is characterized by a nonthrombotic venous obstruction caused by the compression of the neurovascular bundle of the upper extremity located in the scalene triangle bordered by the clavicle, the first rib and the scalene muscles above the clavicle (1).
Literature also describes a mimicking infrequent entity, labeled the pectoralis minor syndrome (PMS). It is characterized by axillary vein obstruction below the clavicle, provoked by compression from the pectoralis minor muscle (2). It is rarely on the physician's differential diagnosis and mostly neglected as an etiology and is considered as a subset of the thoracic outlet syndrome (3).
The PMS consists of a collection of symptoms including pain , paresthesia and weakness in the affected arm (4).
A subclavian and axillary arterial and vein Doppler ultrasound examination is a non-invasive technique showing real-time compression of vascular structures with dynamic maneuvers (5).
Pectoralis minor muscle stretching is the most important technique for treating PMS. It should be performed for three months. If there is no significant improvement after that period, patients can be offered a pectoralis minor tenotomy, which is a simple, minimal-risk outpatient procedure (6).

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Autologous Platelet Lysate in Achilles Tendinopathy treatment

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BACKGROUND&AIM: Achilles tendinopathy is a common musculoskeletal disorder with several therapeutic approaches including exercises, physical therapy, injections, shockwave therapy or surgical intervention. Platelet Rich Plasma (PRP) is a biological treatment that might accelerate healing and recovery of Achilles tendinopathy. A recent systematic review showed promising results with the use of PRP although evidence does not support a significant efficacy. However, preparations / commercial systems were not always comparable. Moreover, after PRP preparation, injection technique and guidance were heterogenous and outcome measures dissimilar. Autologous Platelet Lysate (APL) is a concentrated solution of growth factors obtained from several freeze/thaw cycles, allowing quality control certifying sterility and protein quantification. PRP and APL can be considered similar, however APL has an additional step that makes the growth factors more concentrated in the serum.

METHOD: We present 3 cases of chronic Achilles tendinopathy with previous poor outcome despite different therapies, treated successfully with ultrasound- guided injections of APL.

RESULTS: Case 1: 34-year-old woman with Achilles tendinopathy for 2 years. MRI described an intratendinous partial tear in a thick tendon. After a poor outcome despite different therapies and rehabilitation treatment, she received monthly ultrasound-guided injections of APL for three months. The patient related outcome measures, tendon repair and tendon thickness improved at 3 months follow-up.
Case 2: 63-year-old woman with stiffness and thick right Achilles tendon for 12 months with poor outcome despite different therapies and rehabilitation treatment. She received monthly ultrasound-guided injections of APL for three months. Ultrasound assessment of the tendon thickness and related outcomes measures improved at 3 months follow-up.
Case 3: 49-year-old woman with bilateral Achilles tendinopathy for more than a year. Ultrasound described bilateral chronic Achilles tendinopathy with poor outcome despite different therapies (rehabilitation treatment, shock-wave therapy, etc). She received only one injection of APL in both Achilles with an improvement of related outcome measures and functionality.

DISCUSSION AND CONCLUSION: Despite current evidence demonstrates a lack of efficacy of PRP for Achilles tendinopathy, APL injections should be considered as a promising option to treat chronic Achilles tendinopathy and other musculoskeletal diseases, by restoring normal tissue structure and function. Further clinical randomized controlled trials are expected to be conducted to verify this hypothesis.

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Dynamic Changes of Functional Outcome and Generic Quality of Life After Arthroscopic Rotator Cuff Repair: A Longitudinal Study

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BACKGROUND: Rotator cuff tears lead to shoulder pain and weakness. Although there was one case series discussing quality of life (QoL) after arthroscopic rotator cuff repair using SF-36 (1), there is currently no large-scale longitudinal study that can provide objective data on the degree of postoperative recovery of different severity of rotator cuff tear.

AIM: To record functional outcomes and overall QoL before and after arthroscopic rotator cuff repair to obtain outcome trajectories at different time points.

METHOD: This study included patients with rotator cuff tears pending for surgeries from August 2021 to July 2022. All the included patients underwent postoperative rehabilitation, including range of motion (ROM) exercise, periscapular muscle stretch and strengthening exercise, for 3 months after the operations. Basic characteristics, shoulder strength and range of motion, functional scales and quality of life questionnaires, such as ASES score, WORC index, WHOQOL-BREF, and EQ-5D,were also collected before the operation and 3, 6, 9, and 12 months after the operation.

Linear mixed effects models were used to estimate changes in different scales. Statistically significant was defined as a p-value less than 0.05.

RESULTS: A total of 130 patients with rotator cuff tear were analyzed in this case, including 10 patients with partial-thickness tear, 24 patients with small full-thickness tear, 27 patients with medium full-thickness tear, 14 patients with large full-thickness tear, and 55 patients with massive full-thickness tear.

The active ROM of the shoulder changed over time. In the direction of flexion, abduction and external rotation, most groups (except for partial-thickness tear) recovered significantly. The strength of the shoulder changed over time, no matter in the directions of flexion, extension, abduction, internal rotation, and external rotation, each group had a significant recovery ($p < 0.0001$). In terms of the total score of EQ-5D, it can be found that except for the partial-thickness tear group, the total score of EQ-5D in other groups has improved significantly over time. The total score of WHOQOL-BREF improved statistically significantly over time in partial-thickness tear group ($p < 0.0001$), small full-thickness tear group ($p = 0.020$), large full-thickness tear group ($p < 0.0001$), and massive full-thickness tear group ($p < 0.0001$). For the ASES total score, each group improved significantly over time ($p < 0.0001$). For the total WORC score, each group improved significantly over time ($p < 0.0001$).

DISCUSSION AND CONCLUSION: After one year of follow-up, most patients showed significant improvement in the flexion, abduction, and external rotation directions of the shoulder ROM, and the shoulder strength in each direction also improved, regardless of the size of tear. In the part of QoL, the total score of EQ-5D has improved significantly, while WHOQOL-BREF has significantly improved in physical health, psychological, and environmental domains. As for the shoulder-related specificity questionnaire, both ASES and WORC have made significant progress in all aspects.

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The Influence of Depression on the Outcome of Inpatient Rehabilitation After Total Knee Arthroplasty

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BACKGROUND: Rehabilitation after total knee arthroplasty is critical to achieving effective outcomes and aims primarily to ensure pain-free motion and a satisfactory quality of life for patients, including their physical, social, and mental well-being(1). Previous research has shown that depression contributes to various complications in patients undergoing total knee arthroplasty, and its presence during rehabilitation can significantly affect the occurrence and intensity of pain as well as overall patient dissatisfaction. However, it does not necessarily lead to poor knee mobility outcomes in the postoperative period(2). Furthermore, it has been observed that depressed patients can achieve similar outcomes during rehabilitation than nondepressed patients, largely depending on appropriate preoperative treatment(3).

AIM: The aim of this study is to investigate the influence of a specific level of depression on the outcome of inpatient rehabilitation over 21 days using locomotor parameters in patients undergoing total knee arthroplasty.

METHOD: Thirty-one patients of both sexes participated in this prospective, randomized study. The level of depression was measured using the validated Beck questionnaire, which patients completed on the first day of rehabilitation. The outcome of rehabilitation was determined using measurements of knee joint circumference (swelling), thigh circumference 15 cm above the upper edge of the patella, and knee joint range of motion (flexion-extension) on the first and last day of rehabilitation. According to the protocol, rehabilitation consisted of 30 minutes of medical gymnastics, 20 minutes of hydrotherapy, 20 minutes of electrical stimulation of the quadriceps, and 10 minutes of magnetotherapy. The Wilcoxon signed-rank test and dependent-samples t test were used to compare differences in measurements before and after the intervention for variables with normal data distribution. Spearman and Pearson correlations were used to determine the correlation between questionnaire scores and knee measurements. The alpha error was set at 5%.

RESULTS: Nineteen women and 12 men with a mean age of 67.3 years participated in the study. Of the five levels of depression, the first level was the highest (61.3%-normal mood disorder), whereas the other levels were much lower (19.3%-mild mood disorder; 12.9%-borderline depression; 6.5%-moderate depression; no subjects with severe or extreme depression). As expected, all four variables measured for knee status showed statistically significant improvement. Correlation tests revealed that a certain level of depression had no significant effect on any of the measured outcomes (flexion - $p=0.737$; extension - $p=0.416$; knee circumference - $p=0.06$; thigh circumference - $p=0.894$).

DISCUSSION AND CONCLUSION: Although early detection and treatment of depressive episodes contributes significantly to a faster and more successful recovery of patients, as well as to the quality of life during and after rehabilitation(4), this study showed that depression may influence subjective indicators of rehabilitation outcomes, but has no influence on objective measures such as knee motion parameters.

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Assessing of the Functioning Profile Patients Following Total Knee and Hip Arthroplasty Using the Modified ICF Core Set for Osteoarthritis

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BACKGROUND: Osteoarthritis (OA) is a leading cause of disability worldwide, affecting quality of life and limiting outdoor activities and social interactions. Knee and hip joint arthroplasty procedures are common surgical interventions for patients with advanced OA. Despite advancements in surgical techniques, many patients with Total Knee Arthroplasty (TKA) and Total Hip Arthroplasty (THA) still experience limited range of motion, pain, and decreased quality of life. Traditional rehabilitation programs for TKA and THA patients primarily focus on physical abilities. The International Classification of Functioning, Disability, and Health (ICF) provides a comprehensive approach to patient functioning assessment, considering contextual factors and disability experience.

AIM: The objective of this study is to verify the utility of the modified ICF Core Set for osteoarthritis in patients post THA and TKA to determine the functional profile and rehabilitation needs of these patients.

METHOD: Appropriate categories of the International Classification of Functioning, Disability, and Health were selected for patients post TKA – 9 individuals and THA – 18 individuals based on the ICF Core Set for osteoarthritis using available literature data. The final version of the Set consisted of 13 codes in the Body Function domain, 4 codes in Body Structures, 9 codes in Activities and Participation, and 4 codes in Environmental Factors. The study group consists of 27 patients (n=5M; n=12F) hospitalized in the Department of Medical Rehabilitation, subjected to structured interviews and examinations to gather data for the created ICF Core Set. Functioning profiles were constructed based on qualifier modes. Statistical analysis was conducted using the chi-square test, with a significance level of alpha=0.05.

RESULTS: The obtained qualifier distributions for the assessed codes allowed for the construction of a functioning profile for patients post TKA and THA. The statistical analysis of code distribution for the compared patient groups showed statistically significant differences in the distribution of codes: b152 - Emotional functions; b710 - Mobility of joint functions; b735 - Muscle tone functions; s740 - Structure of pelvic region; s770 - Additional musculoskeletal structures related to movement, and d430C - Lifting and carrying objects, Capacity.

DISCUSSION AND CONCLUSION: The application of the modified ICF Core Set for osteoarthritis in patients post THA and TKA provides valuable insights regarding the functioning profile, which can be utilized for programming effective therapeutic strategies, setting objectives, and creating a rehabilitation plan executed by multiprofessional rehabilitation teams. The obtained results require confirmation in more in-depth studies.

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Balance Control Skills Improvement of Elder Women Using Visual Biofeedback and Balance Plate

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BACKGROUND: Balance disorders are frequent in elder population (3). The control of balance is complex neuronal mechanism based on unconditioned reflexes, conditioned reflexes and cognitive processes (1). Learning and memory belong to the most important mechanisms of neuroplasticity, for improving balance control skills by motor learning we can use also devices based on registration of changes of projection of position of center of gravity (COG) and applying visual biofeedback (2).

AIM: To set adequate goals in training of stability and balance as prevention of falls for elder people (without or expecially with movement disorder) we assessed impact of different measurement sets on ability to improve velocity and accuracy of movement reaction during targeted training.

METHOD: Group of 30 women over 65 years, without balance disorder. They trained for 10 weeks ones a week on balance plate (Homebalance stabilometric platform plus tablet with software) with visual biofeedback on screen of tablet. We adjust 3 types of training set: 2 sets formed of small movements around the projection of center of gravity, 3 sets formed of larger movements training the shift of center of gravity above base, 1 set with random appearence of target points (near and far from center of support base). The goal is to reach highlighted target point, changing position in pre-programmed sequence (except set with random appearance), other mark representing COG gives visual biofeedback to the trainee about movement of her body. Duration (time in seconds) of each training set was measured and the differences between measurements were statistically evaluated. The shorter time, the better performance and improvement.

RESULTS: We recorded changes of balance skills during 10 week training. Results varied by sequence type. Trainees improved in all types of sequence, test 1 and 2 (sequences requiring small movements and a quick change in direction of movemens) improved about 23% and 14% of initial value. Test 3, 4, 5 (sequences requiring a larger range of motion) improved about 22%, 24% and 22%. Test with random appearance of targets improved about 19%.

DISCUSSION AND CONCLUSION: The results confirmed the ability of motor learning even at an older age. Results are used for planning of physiotherapy, for setting tasks in special balance training, for submitting adequate training at home including training on balance plate with visual biofeedback, for illustrative definition of improvement and easier motivation of patients.

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Rejuvenation of Aged Muscle Stem Cells by Dihydrotestosterone and Exercise

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BACKGROUND: Age-associated loss of muscle mass, function, and regeneration capacity greatly affects the quality of life in elders. The decreased number and function of muscle stem cells (MuSC) is believed to be a major cause of age-related dysfunction in muscle (1, 2). We previously reported that the hypothalamus-pituitary-gonad (HPG) axis establishes a reserve pool of adult MuSCs at puberty (3) and regulates autophagy to maintain the functionality of MuSCs until advanced age (4), which is critical to maintain muscle integrity. However, as organisms age, the HPG activity gradually decreases, resulting in the systemic functional decline in target tissues including skeletal muscle (5). Indeed, we found that functional decline in the HPG axis leads to senescence of MuSCs (4) and loss of type IIb fast-twitch muscle fibers (6). Importantly, endurance exercise exacerbates sarcopenia in animal models with reduced HPG activity (6).

AIM: Can aged senescent MuSCs revert their function? In addition, can activating the HPG axis ameliorate the loss of fast-twitch myofibers in aged animals?

METHOD: Aged (24-month-old) and geriatric (28-month-old) mice were administered with dihydrotestosterone for various periods and examined the function of MuSCs and muscle integrity following BaCl2 injury and endurance exercise.

RESULTS: When dihydrotestosterone was administered for more than a month, the functional decline of aged MSCs was completely rejuvenated and the number of functional MuSCs increased comparable to those of young animals. Moreover, further loss of fast-twitch myofibers in aged animals was prevented by dihydrotestosterone treatment. Importantly, muscle regeneration activity upon BaCl2 injury was markedly rescued by dihydrotestosterone for one month.

DISCUSSION AND CONCLUSION: Decreased numbers and dysfunction of MuSCs and loss of fast-twitch muscle fibers are characteristic features in the elderly, eventually leading to sarcopenia. Endurance and resistance exercises are generally recommended to prevent or improve further sarcopenia progression. As we previously reported (6), endurance exercise under decreased HPG activity exacerbates sarcopenia progression. Thus, endurance exercise in the elderly requires prerequisites for functional rejuvenation of aged MuSCs.

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The Assessment of the Fracture and Sarcopenia Risk in Postmenopausal Women

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BACKGROUND: Osteoporosis is a systemic disease that is characterized by low mineral bone density and impaired microarchitecture of the bone, thus it is associated with an increased risk of fracture [1]. Sarcopenia is a progressive musculoskeletal disease that is defined by the loss of muscle mass and function [2]. Osteosarcopenia presents a combination of two age-related chronic musculoskeletal diseases osteoporosis and sarcopenia. Sarcopenia has a high prevalence in people with osteoporosis, therefore screening for the second condition should be recommended whenever the first is suspected [3].

AIM: The goal of this study was to determine the fracture risk in postmenopausal women that have sarcopenia.

METHOD: The diagnostic method DXA (dual energy x-ray absorptiometry) was used to determine BMD (bone mineral density) and T-score. BMI (Body mass index) was used to classify overweight and obese patients based on height and weight. FRAX score was used for the assessment of a patient's 10-year probability of hip fracture and major osteoporotic fracture. SARC-F questionnaire was used as a screening tool for sarcopenia and for evaluating the physical function.

RESULTS: The study was conducted on 80 postmenopausal women. The median age was 68 (36-91) years. Osteoporosis was diagnosed among 21 (26%) of the patients. A higher risk of hip fracture determined by FRAX score was found in 21 (26%) of the patients. With the use of the SARC-F questionnaire the value of ≥4 was determined in 51(64%) of the postmenopausal women, which indicates a higher risk of sarcopenia. 33 (41%) of the patients were found to be overweight. Patients that had osteoporosis, as well as a positive SARC-F questionnaire and a higher FRAX score for hip fracture were statistically significantly older in comparison to the other patients ($p<0.05$). When comparing the patients with osteoporosis with those without it significant statistical differences were found in relation to BMI ($p<0.02$) and FRAX score for the risk of hip fracture ($p<0.001$), but not in other parameters. Using the logistic regression older age and being overweight was shown to have a statistically significant connection with developing osteoporosis ($p<0.03$), while only older age ($p<0.01$) has shown statistically significant correlation with a higher risk of sarcopenia and FRAX score for hip fracture.

DISCUSSION AND CONCLUSION: This study has determined a higher risk of sarcopenia with the use of the SARC-F questionnaire in 64% of the patients, as well as an increased risk in a 10-year probability of hip fracture using the FRAX score in 26% of the postmenopausal women that underwent the DXA diagnostic examination.

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Early Detection, Enhanced Care: Optimizing Rehabilitation Outcomes through Delirium Screening in Older Adults

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BACKGROUND: Delirium, characterized by an acute decline in cognitive function, serves as a significant indicator of patient safety. It arises from medical conditions or medication side effects and may necessitate transfer to acute hospital care. In rehabilitation facilities, older patients (aged ≥65) have multiple delirium risk factors, including cognitive or visual/sensory impairments, depression, and chronic diseases [1]. Systematic screening on admission enables clinicians to identify patients who require interventions to correct contributing factors, to prevent further cognitive decline and facilitate customization of rehabilitation plans [2]. Active screening for at-risk patients enhances rehabilitation outcomes and patient safety, contributes to more efficient use of healthcare resources [3]. Interruptions in rehabilitation adversely affect clinical progress [3]. The 4AT assessment, a rapid and straightforward instrument, could be employed by clinical staff in rehabilitation units to identify patients with potential acute care needs [4].

AIM: The primary aim of this audit was to evaluate compliance with an established delirium screening protocol using the 4AT assessment tool in older patients on admission to a rehabilitation unit. The objective was to reduce the incidence of delirium and enhance patient outcomes.

METHOD: This study used a retrospective review of patient admission records in two wards of St Finbarr's Hospital, Cork, Ireland, a university hospital rehabilitation unit for older patients. The analysis measured the prevalence of delirium screening using the 4AT score on admission in compliance with the established protocol. In addition, a cross-sectional point prevalence of delirium was performed among current inpatients using the 4AT and compared with recent documentation in the medical charts to determine if cases of delirium are potentially under-identified. In this context, a 4AT score of 4 or higher was considered indicative of significant risk for delirium.

RESULTS: 67 medical charts from the rehabilitation units were reviewed, with 63 patients (37 females, 26 males, average age 81.96 years) included in the final analysis. Polypharmacy, defined as the use of six or more drugs [5], was present in 61 patients at admission. Overall, 37 patients had no cognitive impairment, 14 had mild cognitive impairment, and 12 had dementia. Delirium screening using the 4AT tool was conducted on 34 patients on admission, with two scoring four or more. In a cross-sectional rescreening, three out of 63 patients scored four or more on the 4AT, indicating a higher risk of delirium.

DISCUSSION AND CONCLUSION: Delirium, though well-recognized in acute care settings, is also prevalent in older patients in post-acute care facilities, such as inpatient rehabilitation hospitals. Given that delirium is potentially reversible, early screening identifies patients at high risk of requiring transfer to acute hospitals or those unsuitable for rehabilitation programs. This proactive approach facilitates early medical care by addressing immediate health concerns to improve rehabilitation outcomes. Enhanced clinical staff training and a multidisciplinary approach, involving doctors, nurses, and pharmacists, is essential for ongoing improvement in patient care quality.

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Effect of Personalized 360° Virtual Reality Videos on the Well-Being of Institutionalized Older Adults

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BACKGROUND: To help achieve rehabilitation goals for the elderly, it is important to consider factors that can influence rehabilitation, such as the well-being of the elderly. Mental illness can have a negative impact on rehabilitation. 1,2 Virtual reality, especially immersive virtual reality, appears to be an interesting alternative to promote well-being. Studies have found a positive effect of this technology on well-being, especially for apathy, emotions and anxiety. For other variables tested in the literature, such as depression, loneliness, quality of life, and social engagement, the results are unclear due to a lack of investigation or variations across studies. These variations include heterogeneity in the number of participants, the number of sessions, and virtual reality content. 3

AIM: The objective of this research is to evaluate the impact of individually tailored 360° virtual reality experiences, delivered through head-mounted displays (HMD), on the well-being of elderly residents in institutional settings, including both those with and without cognitive impairments.

METHOD: This pilot study was carried out in residential aged care in Auvergne-Rhône-Alpes and Nouvelle-Aquitaine in France. Sixty-eight participants with and without cognitive impairment took part in the study. The protocol consisted of eight virtual reality sessions, with a different video for each session. The videos were selected using information about each participant's life history, to promote reminiscence. Only videos that could recall memories associated with positive emotions were selected. Anxiety, depression, loneliness, social identification, emotional state and quality of life were measured in pre/post intervention period to assess the changes. The side effects that can occur with HMD and the sense of presence provided by this technology were also measured.

RESULTS: Results showed a significant decrease in depression (p=0.025) and increase of quality of life (p=0.031) after the intervention period. The effects of sessions on depression were exclusively present in older adults with cognitive decline (p=0.031). There were no significant effects on the other variables.

DISCUSSION AND CONCLUSION: The 360° immersive videos had beneficial effect on depression for older adults with cognitive impairment and on quality of life. 360° videos seem to be well tolerated and provide a high level of sense of presence. This study highlights the potential of 360° immersive videos to promote the well-being of the elderly, and would be an interesting tool for geriatric rehabilitation programs.

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A Case of Transient Osteoporosis of the Hip: From Diagnosis to Rehabilitation

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BACKGROUND: Transient osteoporosis of the hip syndrome is a rare disease that causes a transient decrease in bone density of the proximal part of the femur and occurs more often in young and middle-aged men or women during the last months of pregnancy or during delivery. Patients suddenly experience hip pain that worsens with walking and gradually increases. The causes are unknown, although intra-osseous vascular occlusion, hormonal disorders and excessive mechanical loads have been implicated. The main symptom is pain with sudden onset, which worsens with walking and improves with rest, limits hip range of motion and gradually increases over a period of weeks/months.

AIM: The aim of this paper is to present a case with this rare diagnosis.

METHOD: A 36-year-old electrician (manual worker) was transmitted to the outpatient clinic of the Physical Medicine and Rehabilitation Department due to reported pain in the right buttock (lasting for at least ten days), gradually worsening despite taking NSAIDs.

RESULTS: Clinical examination revealed hip pain during the FADIR test. He was immediately referred for an MRI of the right hip which revealed bony swelling of the right femoral head, a pathognomonic sign for transient hip osteoporosis syndrome. Ibuprofen was started for 10 days, right lower extremity loading restriction (walking with crutches) for 2 months combined with mild isometric right lower extremity strengthening exercises were implemented. Calcium and vitamin D were also administered for two months. Pain gradually subsided with complete resolution 4 months after its occurrence.

DISCUSSION AND CONCLUSION: The combination of appropriate medication, proper ergonomic modifications, and individualized exercise program had beneficial results in the case of this patient.

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Difference in Terms of Fragility Fractures Risk Between Women With Osteoporosis and Osteosarcopeny a Retrospective Study

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BACKGROUND: Osteoporosis and sarcopenia are conditions characterized by alterations in bone microarchitecture and reduction in Bone Mineral Density (BMD), and a progressive decrease in age-related muscle mass and function, which can lead to a progressive risk of falls and fractures. Concomitance of sarcopenia and osteoporosis has been defined as a new nosological entity called "osteosarcopenia," considered aa a "dangerous duet" because of the heavy clinical impact on the risk of fragility fractures.

AIM: The aim of our study was to investigate the difference in fragility fracture risk in a group of postmenopausal women diagnosed with osteoporosis and osteosarcopenia, the latter diagnosed by EWGSOP2 criterion.

METHOD: In a cohort of 259 postmenopausal women with osteoporosis, we analyzed the following data: muscle strength by handgrip strength measured with Jamar's dynamometer, muscle mass measured as Appendicular Lean Mass (ALM), and BMD and T-Score values by DXA. Osteosarcopenia was defined as the concomitance of low bone mineral density (<-1 SD), low muscle mass (ALM <15 kg) and reduced muscle strength (HGS<16 kg). We categorized our sample into 2 groups: osteoporotic and osteosarcopenic. Data on the following outcomes were collected for both groups: health-related quality-of-life by EuroQol-5D and EuroQol-5D(VAS) questionnaire, physical activity levels by IPAQ questionnaire, nutritional assessment by short-MNA, pain assessment by BPI scale, number of falls in the past 6 months, history of fragility fractures at any skeletal site.

RESULTS: 182 osteoporotic and 77 osteosarcopenic were analyzed. Chi-square analysis found a significantly higher prevalence of fragility fractures in the osteosarcopenic group than in the osteoporotic group (67.53% vs. 31.87%, p<0.001). Univariate logistic regression analysis showed a higher risk of fragility fracture in subjects with osteosarcopenia compared with patients with osteoporosis (OR 4.37, 95% CI 2.47-7.74, p<0.0001). Mann Whitney's test for continuous variables showed significantly higher values for BPI SI (p=0.02), BPI II (p=0.01), number of falls in the last 6 months (p= 0.03) and significantly lower for EQ-VAS (p=0.02) in subjects with osteosarcopenia compared with those with osteoporosis. In contrast, no statistically significant difference was found in the two groups for the following outcomes: Euro QoL-5D (p=0.85), IPAQ (p=0.12), short MNA (p=0.67).

DISCUSSION AND CONCLUSION: Our study reported a more than 4-fold increased risk of fragility fractures in patients with osteosarcopenia compared with patients with osteoporosis. This result confirms data in the literature from other studies using older criteria for the diagnosis of sarcopenia. On the other hand, statistical analysis showed no influence of physical activity levels and nutrition on fracture risk, remarking a severe impact of the only osteosarcopenia on this risk. Significant differences were found for pain and number of falls, confirming that the sarcopenic component has a significant impact on falls and suggesting that such patients may suffer more pain. Finally, discordant data were found on quality of life, in which the categorical analysis using EuroQoL 5D did not seem to identify significant differences that did emerge

from the analysis using the continuous EQ-VAS parameter, suggesting a greater sensitivity of the latter in assessing this outcome in the population examined.

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Denosumab in Thalassemia-Related Osteoporosis

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BACKGROUND: Osteoporosis represents an important cause of morbidity in adult thalassemic patients with increased risk of fracture. Multifactorial causes stand out in the etiopathogenesis of osteoporosis due to thalassemia, so its management is quite complicated. Regarding pathogenesis, RANK-RANK-Ligand and OPG have been implicated to play an important role in these patients (1).

AIM: We aimed to share 2 cases of thalassemia-related osteoporosis and early effect of denosumab in these patients.

METHOD: Case report of 2 patients with thalassemia-related osteoporosis who are twins treated with denosumab.

RESULTS: Case 1: A 32-year-old patient with beta thalassemia (NS) was referred from hematology department for osteoporosis screening. BMI of the patient was 22.22, and according to FRAX, the patient's 10-year risk of major osteoporotic fracture was 10% and the risk of hip fracture was 3.2%. Patients DEXA results were: L1-4 BMD:1.175, L1-4 T-score: -0.0, Femoral neck BMD: 0.657 and Femoral neck T-score: -3.0. The patient's laboratory values were: 25 OH Vit D: 36 ng/ml, Ca: 9 mg/dl, PTH: 30 pg/ml. Since the patient also has a history of peptic ulcer, the patient was treated with subcutaneous 60mg denosumab twice a year. DEXA results of the patient at the end of 1 year were: L1-4 BMD: 1.038, L1-4 T-score: -1.2, Femoral neck BMD: 0.853 and Femoral neck T-score: -1.1. No fragility fractures developed during the treatment period.
Case 2: A 32-year-old patient with beta thalassemia (AS) was referred from hematology department for osteoporosis screening. BMI of the patient was 21.48, and according to FRAX, the patient's 10-year risk of major osteoporotic fracture was 10% and the risk of hip fracture was 3.1%. Patients DEXA results were: L1-4 BMD: 0.965, L1-4 T-score: -1.8, Femoral neck BMD: 0.636 and Femoral neck T-score: -3.1. The patient's laboratory values were: 25 OH Vit D: 31 ng/ml, Ca: 9.6 mg/dl, PTH: 42 pg/ml. Since the patient also has a history of peptic ulcer, the patient was treated with subcutaneous 60mg denosumab twice a year. DEXA results of the patient at the end of 1 year were: L1-4 BMD: 0.966, L1-4 T-score: -1.4, Femoral neck BMD: 0.692 and Femoral neck T-score: -2.3. No fragility fractures developed during the treatment period.

DISCUSSION AND CONCLUSION: In the thalassemia patients, the lumbar spine and femoral neck BMD is reported to be below the normal reference (1). Morabito et al. demonstrated that the OPG/RANKL system acts as an important paracrine mediator of bone metabolism in thalassemia (1). In these cases, denosumab administration resulted in a significantly greater increase in bone mineral density, especially in femoral neck, in patients with thalassemia-related osteoporosis. Denosumab, unlike oral bisphosphonates, may provide a more favorable efficacy and tolerability profile as its subcutaneous administration bypasses the gastrointestinal tract and avoids gastrointestinal side effects, while being associated with better pharmacokinetics.

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Can Handgrip Strength Predict 6-Month Mortality After Hip Fracture Surgery?

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BACKGROUND: Although the overall quality of medicine has improved in recent decades, mortality in all hip fracture patients remains a big problem. Existing literature notes that individuals with hip fractures and lower handgrip strength (HGS) are at an increased risk of mortality.

AIM: The present study aimed to identify factors that could predict mortality within six months following hip fracture surgery (HFS) conducted at a tertiary-care hospital. Special attention was given to assessing the predictive capacity of HGS, measured shortly after hip fracture and categorized according to EWGSOP2 criteria.

METHOD: This observational cohort study included 191 patients with acute hip fractures. Multivariable logistic regression analysis was carried out using pre-fracture functional status, sociodemographic variables, HGS, surgical procedure, postoperative complications, length of hospital stay, Short Physical Performance Battery, and Barthel Index (BI) on the fifth postoperative day as potential predictors for mortality at 6 months after a hip fracture surgery.

RESULTS: The mean age of the participants was 80.3±6.8 years, and 77.0% of our cohort were women. Multivariate regression analysis revealed that postoperative complications and HGS were independent predictors of mortality 6 months after a hip fracture surgery.

DISCUSSION AND CONCLUSION: The findings of this study align with recent research, supporting the notion that HGS serves as a predictor for mortality following hip fracture surgery. Measuring HGS early after a hip fracture can serve as a quick and convenient method for predicting postoperative mortality. By identifying HGS, healthcare providers can gain valuable insights into their patient's health status and facilitate early interventions to reduce mortality.

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A 10-year Study Service Review of the Major /Neuro Trauma Rehabilitation Care at the Walton Centre, Liverpool, United Kingdom

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BACKGROUND: The Walton Centre NHS Foundation Trust(WCFT) along with Aintree University Hospital and Royal Liverpool Hospital, Liverpool, United Kingdom became the major trauma centre collaborative(MTCC) for the Cheshire and Merseyside region covering 2.4 million population in June 2012 and since has been providing specialist care to major trauma patients.
The Walton Centre being a specialist Neuroscience Centre treats neuro-trauma patients and provides rehabilitation care.
The England commissioners incorporated rehabilitation prescriptions or passports as a criterion to achieve the best service provision to all major trauma patients. A nearly individualised rehabilitation prescription was implemented to outline the rehabilitation needs required by each patient to help maximise their recovery. We aim to initiate a rehabilitation prescription within 48 hours of admission to the MTC.

AIM: To analyse demographics and outcomes following neurotrauma/Major Trauma (MTC) at the Walton Centre.

METHOD: The samples were the neuro/polytrauma patients aged 30 years and less admitted from March 2012 to March 2022 and are predominantly brain and spinal trauma with injury severity scores ISS>15 and<15. The data is gathered from the Trauma Audit and Research Network-TARN database.
We collated data on patients aged between 16-30 years, gender, mechanism of injury, Injury Severity Scale-ISS, ICU and length of stay-LOS, the outcome at 30 days, rehabilitation prescriptions, Glasgow Outcome Scale-GOS

RESULTS: The MTC received 2,599 polytrauma patients in total with 2,240 brain and 264 spinal injuries. The number of patients between 16-30 years having predominantly brain injury was 336 (310 ISS>15, 26 ISS<15) and 33 spinal (8 ISS>15, 25 ISS<15) with males comprising 80% and 20% females.
The rehabilitation prescription was completed in 96% of cases.
Our study showed that non-violent mechanism (falls and RTC) in this age group is responsible for 64.2% of brain and 90% of spinal trauma. The ICU and hospital LOS for brain injury were longer than for spinal injury.
The patient outcomes at 30 days in this age group demonstrated 94% alive in severe brain injury versus 100% in mild-moderate brain injury. In spinal injuries, regardless of severity, the outcome at 30 days revealed 100% alive in severe, mild and moderate trauma.
Patients aged 16-30 group with severe brain trauma GOS showed 50% achieved good recovery and 17% with moderate disability. In severe spinal trauma, an increased level of disability was observed.

DISCUSSION AND CONCLUSION: Major Trauma Walton Centre patients delivered high-quality care as per guidelines which are evident from the improved outcomes of patients.
Successful delivery of high-quality early rehabilitation care provision accomplished which is evident from improved outcome scores. The on-time prescription passports generated a seamless pathway within teams during the patient's rehabilitation journey.

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Poster Session D

Improvement in Spasticity-Associated Dressing- and Hygiene-Related Disability in Adults Following Treatment With incobotulinumtoxinA: A Pooled Analysis

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BACKGROUND: Spasticity-associated dressing- and hygiene-related disability (DRE and HYG) are limitations on activities and participation that negatively impact patient quality of life. IncobotulinumtoxinA (incoA) is an effective treatment for upper-limb spasticity (ULS) and its role in treating DRE and HYG has been further analysed in this pooled analysis.

AIM: To evaluate impact of incoA on DRE and HYG in adults with ULS based on pooled data from six phase 2 or 3 clinical studies.

METHOD: DRE and HYG data were pooled from six phase 2 or 3 studies (four double-blind, placebo-controlled) of incoA for treating ULS in adults. IncoA was administered over one to four injection cycles, with re-injections given when required. DRE and HYG were assessed at baseline and at 4 weeks post-injection using the Disability Assessment Scale (DAS) domains dressing and hygiene: score 0 (none), 1 (mild), 2 (moderate) and 3 (severe) disability. Response was defined as ≥1-point improvement in DRE/HYG score from baseline. Only data for patients with DRE/HYG at baseline (score ≥1) were analysed. Response rates were compared for incoA versus placebo (PBO) 4 weeks after the first cycle using Chi-square tests (95% confidence interval [CI]), and evaluated for incoA without PBO control 4 weeks after each of the subsequent three treatment cycles.

RESULTS: Of the 937 patients at baseline, 907 (96.8%) had DRE (incoA, n=690; PBO, n=217), and 865 (92.3%) had HYG (incoA, n=655; PBO, n=210). Mean ± standard deviation time since diagnosis of spasticity was 5.1 ± 6.1 years (incoA, 5.5 ± 6.4; PBO, 3.9 ± 5.0) for DRE and 5.0 ± 6.0 years (incoA, 5.3 ± 6.2; PBO, 4.0 ± 5.0) for HYG. The response rate for DRE 4 weeks after the first cycle was 32.2% for incoA versus 18.6% for PBO ($p<0.0001$). The HYG response rate was 33.0% versus 19.2% ($p<0.0001$), respectively. IncoA-treated patients were therefore at least twice as likely to achieve a response after the first cycle than PBO-treated patients [odds ratio (OR) 2.03 (95% CI 1.32, 3.12; $p<0.0013$) for DRE and OR 2.73 (95% CI 1.77, 4.21; $p<0.0001$) for HYG]. Response rates 4 weeks after the first cycle were significantly higher for incoA vs PBO regardless of DRE baseline severity ($p<0.05$ for all severity groups) and in patients with moderate or severe HYG at baseline ($p<0.05$). Response rates in DRE increased progressively over repeated incoA treatment cycles, reaching 49.2% 4 weeks after the fourth cycle. For HYG, response rates increased at each cycle, reaching 55.6% 4 weeks after the fourth cycle.

DISCUSSION AND CONCLUSION: These results support the use of incoA to sustainably improve DRE and HYG, both considered important treatment goals by many patients with ULS.

REFERENCES: N/A

Improvement in Spasticity-Associated Limb Position Abnormality in Adults Following Treatment With incobotulinumtoxinA: A Pooled Analysis

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BACKGROUND: Patients with upper-limb spasticity (ULS)-associated limb position (LPOS) abnormality have limitations on activities and participation that impact quality of life and psychological and social well-being. IncobotulinumtoxinA (incoA) is an effective treatment for ULS and its role in treating LPOS has been further analysed in this pooled analysis.

AIM: To assess changes in ULS-associated LPOS abnormality in incoA-treated adults using pooled data from six phase 2 or 3 studies.

METHOD: LPOS data were pooled from six phase 2 or 3 studies (four double-blind, placebo-controlled) of incoA (one to four injection cycles, patients re-injected as required) for treating ULS in adults. LPOS was assessed at baseline, each injection visit and 4 weeks after each injection using the Disability Assessment Scale (DAS) limb position item scale: score 0 (none), 1 (mild), 2 (moderate) and 3 (severe) abnormality. Response was defined as ≥1-point improvement in LPOS score from baseline and complete relief as LPOS score=0. Only data for patients with LPOS abnormality at baseline (score ≥1) were analysed. Response rates and complete relief were compared 4 weeks after the first injection for incoA versus placebo (PBO) using Chi-square tests (95% confidence interval [CI]), and evaluated 4 weeks after each of the subsequent three cycles for incoA without PBO control.

RESULTS: Of the 937 patients at baseline, 918 (98%) had upper limb LPOS at baseline (incoA, N=699; PBO, N=219; 62.2% male; mean age 56 years; 52.1% BoNT naïve), rated as mild (10.5%), moderate (51.0%) or severe (38.6%). After the first cycle, incoA treatment produced a higher response rate than PBO (46.0% vs 19.4%; p<0.0001) and logistic regression showed incoA-treated patients were 3.1 times more likely to achieve a response than PBO-treated patients (odds ratio 3.11, 95% CI 2.04, 4.75; p<0.0001). The difference in response rates between incoA and PBO patients was significant for those with moderate LPOS abnormality (21.3%, 95% CI 13.1, 29.4; p<0.0001) or severe LPOS abnormality (35.2%, 95% CI 23.1, 47.2; p<0.0001). Response rates and complete relief increased over repeated incoA injection cycles, showing a cumulative effect. Response rate in DAS limb position increased from 0% at injection visit (IV) 1 to 48.4% at control visit (CV) 1, from 32.3% at IV2 to 59.3% at CV2, from 42.8% at IV3 to 63.8% at CV3 and from 44.7% at IV4 to 59.5% at CV4. Similarly, the proportion of patients achieving complete relief of DAS abnormal limb position over the four incoA injection cycles increased from 0% at IV1 to 4.1% at CV1, from 2.2% at IV2 to 5.3% at CV2, from 2.3% at IV3 to 6.4% at CV3 and from 4.1% at IV4 to 7.1% at CV4.

DISCUSSION AND CONCLUSION: These results support the use of incoA to achieve sustained patient-centred improvements in ULS-associated LPOS abnormality.

REFERENCES: N/A

In-Plane US BTX Injection to Lumbrical and Interosseus Muscles

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BACKGROUND: A blind or an out-of-plane US guided BTX injection have limitations that can lead to inaccurate
needle placement and suboptimal treatment outcomes (8,10).

AIM: In-plane ultrasound guidance has the potential to revolutionize precision and safety in BTX injections for the lumbrical and interosseous muscles of the upper limb(1,2,3,4,9).

METHOD: This article aims to deliver a comprehensive overview of the in-plane ultrasound-guided BTX injection technique for the lumbrical and interosseous muscles in the upper limb (6,7). It will cover the pertinent anatomy of these muscles, their role in various neuromuscular conditions (5), and the significance of accurate targeting to attain favorable therapeutic outcomes.

RESULTS: By delving into the intricacies of this technique, it is anticipated that its role as a valuable addition to the array of treatments available for patients with upper-limb neuromuscular disorders will be further solidified.

DISCUSSION AND CONCLUSION: The in-plane ultrasound-guided technique for injecting botulinum toxin into the lumbrical and interosseous muscles offers a promising solution for managing spasticity and dystonia in the upper limb. Despite recognizing the possible learning curve associated with this approach, its enhanced precision, safety, and efficacy hold the potential to significantly enhance patient outcomes and minimize complications. Further research studies and the widespread adoption of this technique in clinical practice may further establish its value as an indispensable tool in the realm of neuromuscular medicine.

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The Use of Onabotulinumtoxim A to Improve Gait Quality in Camptocormia

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BACKGROUND: Camptocormia, also known as bent spine síndrome, is a disabling acquired postural pathology. It consists of a flexion of the trunk greater than 45 degrees while standing, which is associated with pain (1). It can be present in multiple neurological disorders, with Parkinson's disease (PD) being the most common cause (2).

AIM: Evaluate the effectiveness of use of Onabotulinumtoxim A treatment in a patient with severe camptocormia to improve back pain and trunk standing flexion.

METHOD: Case presentation description and literature review. Clinical observation of trunk flexion before and after treatment. 100U of onabotulinumtoxin injection into each psoas muscle from the posterior approach (3).

RESULTS: A 79-year-old patient diagnosed with PD two years ago was referred from neurology for pathological gait and stiffness. In his personal history, the patient presented a chronic D12 vertebral body fracture, cane-assist walking and had partial dependence on activities of daily living. He had experienced progressive worsening of gait due to marked anterior flexion of the trunk, making sitting difficult, causing significant lower back pain, and affecting his functional status.
In the first clinical examination, bilateral hip flexion of 25 degrees, partially reductable, 15 degrees of knees flexion, cogwheel rigidity, preserved strength, and bilateral positive Thomas sign were observed. In the observational analysis of gait, the patient had a shuffling gait, gripping the middle part of a cane, with a trunk flexion of 100 degrees and significant difficulty in turning. Trunk flexion was completely reduced in supine position.
After one month of treatment, lower back pain had disappeared and trunk flexion had improved to 70 degrees, further improving to 60 degrees with the use of a walker. The Thomas sign also turned negative. To enhance tolerance, we chose Spinomed active orthoses rather than hip devices for additional treatment, with partial improvement (4).

DISCUSSION AND CONCLUSION: Camptocormia in PD is not uncommon, although their treatment options remain diverse and somewhat ineffective. Oral levodopa, botulinum toxin injections , the use of orthoses, sensory tricks or deep brain stimulation can be considered treatment options for camptocormia in patients with PD (5). In our clinical presentation, the use of toxin provided satisfactory results, and initial goals were achieved. Otherwise, camptocormia is frequently associated to myopathy in most cases of Parkinson's disease, thus making treatment with botulinum toxin not indicated.

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Goal-Oriented Use of Botulinum Toxin (BoNT) in the Rehabilitation of Post-stroke Patients in Hungary

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BACKGROUND: Stroke is one of the most common causes of disabilities. The rehabilitation of post-stroke patients involves different types of therapies and independence of the patients is the main goal. Spasticity is detected during rehabilitation phase and spasticity centres are available in Hungary mostly as a part of the neurorehabilitation departments. Spasticity can restrict the post-stroke recovery and limit the goals of rehabilitation.

AIM: There are new methods aiming to reduce spasticity of post-stroke patients. The impact of local injected botulinum toxin is one of them and combination of the methods decrease disabilities.

METHOD: After the renaissance of the main botulinum-centres the professional education of the specialists started and our National Institute was involved to the education. The application of BoNT is patient-centred, individualized, ultrasound-based, local treatment. The new trained specialists' experience was started in March of 2022 and the first request was send to the National Health Insurance Fund of Hungary in December of 2022. The consideration of the requests was slow in the beginning but after this period is getting better and two or three months needed only to get the decision. Close to 20 patients were involved BoNT-treatment between March 2022 and end of December 2023. Describing data analysis was used.

RESULTS: The presenters would like to show the first results of the beginnings such as patient characteristics for example rate of gender, patient's age, type and side of stroke, the time since onset of the stroke and the time between poststroke onset and first BoNT-injection. The patients' follow-up is easier during monitoring and registering different types of assessments from the first time.

DISCUSSION AND CONCLUSION: These outputs and experiences of this field inspire how to make the patients able to reach their goals. After the first treatment patients found it useful and they would like to take part again and continue with pleasure.
This supplementation of the traditional rehabilitation programme in post-stroke may present some further advantages for patients. It can reduce disabilities and make a better outcome. It follows functional improvement and activity of daily living are expected.

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Combination of Botulinum Toxin Injections and Rehabilitation With Fes Systems for Spasticity Management

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BACKGROUND: Spasticity affects up to 50% of people suffering from stroke and is characterized by a velocity-dependent increase in tonic stretch reflexes and increased muscle tone (1). No pharmacologic treatments are commonly combined to manage spasticity based on prespecified goals. Functional electrical stimulation (FES) is a technique that uses low-energy electrical pulses to artificially generate body movements in individuals who have been paralyzed due to injury to the CNS (2).

AIM: The purpose of this study is to describe our experience with spasticity management using botulinum toxin injection in conjunction with rehabilitation with FES systems in patients with spasticity after stroke.

METHOD: A retrospective study including 28 patients with the mean age of 73±7.5 in the sub-acute phase after stroke. All patients received injections of botulinum toxin to the affected upper and lower limb. After the injections, each patient followed a rehabilitation program based on each patient's needs. The FES systems were applied to all the patients for both the lower and upper limbs. We evaluated the muscle tone using the Modified Ashworth Scale (MAS) after 1 and 3 months post-injection. We also evaluated the clinical state of patients by evaluating joint amplitude, walking by using the 10-Meter Walk Test (10MWT), upper limb functionality by using the Fugl-Meyer Assessment, and activities of daily living with Barthel Index.

RESULTS: In the follow-up visit, over 65% decreased their MAS score over the third month compared to the first month. 75% of patients with walking impairments showed improvement in their gait. Most patients had functional improvement in daily life activities.

DISCUSSION AND CONCLUSION: The use of botulinum toxin in conjunction with a rehabilitation program with FES systems is a beneficial method of treatment for improving spasticity, walking, and functional ability.

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Virtual Reality Application in Lower Limb Botulinum Toxin Treatment Training- Pilot Study

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BACKGROUND: Virtual reality(VR) applications are gaining increasing attention both in rehabilitation interventions and in medical training1. Immersive technologies have a positive impact on learning experiences and provide repeatable training scenarios improving skills and user satisfaction2. As regards botulinum toxin treatment(bta) training only preliminary data exist

AIM: In this study we aim to describe acceptability and feasibility a VR training session as well as some preliminary effectiveness data.

METHOD: Through a virtually reality platform that offers both the option of anatomy training and actual guided botulinum toxin injections with haptics in lower limb spasticity, training sessions were offered to PRM trainees. One on one training was offered, and a pre & post evaluation survey was filled with 1-5 likert scales and knowledge check questions

RESULTS: The 8 participants had a mean age of 30,4 y (±1,8), half being men and 62% in their first half of their training period. Mean training time was 62' (±12,0'). As regards pre- post evaluations, median of familiarization with VR tech increased from 1 to 3 (IQR 0,25 to 1), injection ease 2 to 3 (IQR 1,25 to 1), value of VR application 4 to 4,5 (IQR 1,25 to 1). As regards specific muscles, ease to inject the gastrocnemius increased from 3 to 5 (IQR 2,5 to 0,25), soleus from 2 to 5 (IQR 2,25 to 0,25), posterior tibialis from 2,5 to 4 (IQR 1,5 to 0,25), flexor digitorum longus from 2 to 3,5 (1,25 to 1) and flexor hallucis longus from 2 to 3(IQR 1,25 to 1). In the 3 questions asked, the correct answers increased correspondingly from 37,5% to 62,5%, 0 to 62,5% and 12,5% to 50%.

DISCUSSION AND CONCLUSION: The VR platform for botulinum toxin was met with enthusiasm by the participants and large effects have been measured, even larger than the first such study by McGonigle et al3. These preliminary results show a possible gap in both knowledge and injection technique in trainees and the positive impact VR education might have. The number and duration of sessions for maximizing the effect remains to be determined.

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An Efficient Ultrasound Window for Simultaneous Botulinum Neurotoxin Injection into Three Deep Leg Muscles in Ankle and Foot Spasticity Patterns

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BACKGROUND: Ankle and foot spasticity patterns commonly involve the tibialis posterior (TP), flexor digitorum longus (FDL), and flexor hallucis longus (FHL) muscles. Traditional ultrasound-guided injection approaches often lack needle visualization, demanding different injection points and windows, resulting in longer procedure times and increased patient discomfort.

AIM: The authors aim to highlight the feasibility and advantages of a specific ultrasound window to guide simultaneous botulinum toxin injections in these three critical deep muscles: TP, FDL, and FHL.

METHOD: The authors leveraged their experience in the botulinum neurotoxin (BoNT) outpatient department and in placing ultrasound-guided fine-wire Electromyography in the gait laboratory. They adopted a transverse probe placement on the posterior middle and distal third of the leg, providing a single ultrasound window to simultaneously visualize and inject these three important deep leg muscles. The injection site is medial (just posteriorly and adjacent to the tibia bone) and the needle progresses from medial to lateral into the FHL where the BoNT injectate is deposited. Then the TP, and finally the FDL are injected.

RESULTS: The posterior leg ultrasound window offered a comprehensive view of the three deep leg muscles in a single plane, suggesting four significant advantages:
1. Concurrent Muscle Assessment: Precise localization and assessment of muscle position, depth, size, and architecture. This approach enabled the evaluation of hypertrophy, atrophy, and quantification of echointensity using the Modified Heckmatt scale for these three muscles simultaneously, presenting valuable insights that can guide treatment decisions.
2. Simultaneous Injection: The single ultrasound window allowed for in-plane parallel to the transducer visualization of the needle, enabling simultaneous BoNT injection into the TP, FDL, and FHL muscles, reducing the number of injection points through the skin and decreasing patient discomfort.
3. Improved Needle Visualization: The in-plane visualization of the needle facilitated continuous monitoring of the needle, target muscles, innervation zones and structures to be avoided, warranting safety and precision.
4. Enhanced Injectate Visualization: The single ultrasound window delivered excellent visualization of the injectate within the target muscles and structures, ensuring accurate placement.

DISCUSSION AND CONCLUSION: The traditional approaches for BoNT injection into the TP, FDL, and FHL muscles frequently require a combination of windows, increasing the complexity and duration of the procedure. In contrast, the single posterior leg ultrasound window offers a more efficient and patient-friendly approach. The simultaneous injection of the TP, FDL, and FHL muscles not only reduces injection time but also minimizes discomfort and improves precision and safety through continuous needle visualization. Furthermore, this approach allows for the assessment of muscle activity and structure, providing valuable information for treatment decisions. This approach not only simplifies the injection process but also has the potential to enhance the efficiency of BoNT treatment, improving patient

experience and aiding clinical decision-making, making it a valuable addition to the armamentarium of clinicians treating patients with spasticity.

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Use of Botulinum Toxin to Improve Function in Hemiplegic Shoulder Pain Syndrome

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BACKGROUND: Stroke is a disease with a great impact on the global population and is currently the leading cause of disability in developed countries [1-2]. Painful hemiplegic shoulder syndrome (PHSS) is shown in this context as a condition of great relevance due to its high prevalence and impact on quality of life. Thus, PHSS interferes with the function of the upper extremity, impairing daily life activities and appropriated participation in rehabilitation programs [1], [1-4]. Its prevalence varies, in the literature, between 16% and 84% [3-4]. The literature contains few studies to assist therapeutic decision in rehabilitation programs to justify the use of BTxA as a treatment for PHSS.

AIM: Assess whether the use of 200 units of abobotulinum in the pectoralis major and subscapularis muscles modifies function evaluated by Fugl Meyer Scale in subjects with shoulder pain spastic hemiplegia when compared to the application of placebo to the same muscles.

METHOD: A prospective, double-blind, randomized and placebo controlled clinical trial study. Patients older than 18 years who were included, presented upper limb spasticity resulting from ischemic or hemorrhagic stroke and diagnosis of PHSS. In this study 24 patients were divided into two groups, one of them underwent application of botulinum toxin (TXB-A) in the pectoralis major and subscapularis muscles, at a total dose of 400 U, and other with saline solution in the same muscles. Patients were assessed for a change in functionality using the Fugl Meyer Scale for upper limbs.

RESULTS: The placebo group started with a Fugl Meyer upper limb of 55.33 (SD: 18.29) vs 54.85 (SD: 28.94) in treated group, after 01 and 04 months respectively, the values were 48.46 (SD: 28.09) and 56.79 (SD: 21.14) in placebo group compared to 63.81 (SD: 18.39) and 60.38 (SD: 24.17).

DISCUSSION AND CONCLUSION: The evolution of the patients functionally evaluated by the Fugl Meyer scale, had a greater increase in functionality, especially in the first evaluation in the group that applied the botulinum toxin, with important weight of the sub-item pain and range of motion in this improvement, but without stastistical significance when compared with placebo group. This improvement, although partial, shows that the toxin group had a much clearer evolution than among the placebo group.
The use of botulinum toxin in the subscapularis and pectoralis major muscles did not result in a functionality increase in PHSS patients compared with placebo.

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Research Protocol of the Biological Effect of Botulinum Toxin Type A in Functionality of Stroke Patients, Using the Fugl-Meyer Scale

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BACKGROUND: The Fugl-Meyer scale belongs to the "function" category of ICF and measures quantitatively five categories of functionality: Motor function of upper and lower limbs, Balance in sitting and standing position, Superficial and deep sensation, Joints' range of motion and pain sensation.

AIM: The study aims to measure the quantitative change in the Fugl-Meyer scale in a stroke patient that has regional spasticity in the affected upper extremity, before and after 15 days of injecting botulinum toxin type-A into selected muscles.

METHOD: The study sample will be consisted of stroke patients, who during evaluation have voluntary movement, which is covered by spasticity, with pathological synergistic pattern of the affected upper limb, with a NIHSS score of 4-7 as following: No limitations in cognition (0), dysarthria (0-1), aphasia (0-1), sensory (0-1), neglect (0-1) and in the muscle strength category (1-3).
Initial administration of the Fugl-Meyer scale in patients with stroke at an early stage (onset of stroke one to three months), upper limb spasticity and NIHSS score 4-7. Spasticity level is measured by modified Ashworth scale, in every muscle separately of the affected upper limb.
Group A (experimental group): Injection of botulinum toxin into selected spastic muscles of the upper extremity, with a higher dosage in the muscles considered dominant in manifestation of pathological motor pattern.
Group B (control group): Occupational therapy intervention without botulinum toxin infusion. The occupational therapy intervention is performed throughout the study and in both groups.
New Fugl-Meyer scale admission, in group A and B, after 15 days.

RESULTS: The outcome of Fugl-Meyer scale that was administered 15 days after the injection of boutilinum toxin type-A and occupational therapy intervention, compared to the initial scores, will determine the biological effect of the specific toxin injection on the functionality level of stroke patients.

DISCUSSION AND CONCLUSION: Study of the biological effect of botulinum toxin type A in functionality levels of a stroke patient, modification of pathological synergistic upper limb patterns and the acceleration of neurological recovery.

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Outcome Measurement and Goal-Setting Recommendations in the Multipattern Treatment of Shoulder Spasticity With Botulinum Neurotoxin

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BACKGROUND: Botulinum neurotoxin (BoNT) is a first-line treatment for post-stroke spasticity, helping reduce pain and involuntary movements and restore function.[1–3] Clinical trials have reported improvements in pain and function after shoulder-muscle BoNT injections.

AIM: The aim was to present expert consensus on choice of outcome measurement scales and goal-setting recommendations for BoNT in the treatment of shoulder spasticity.

METHOD: Following a pre-meeting survey, a two-part meeting was held online in late 2021. Five European experts with ~100 years' cumulative experience in post-stroke spasticity gave presentations on shoulder spasticity and treatment with BoNT injections, followed by discussion.

RESULTS: Although velocity-dependent increase in muscle tone is often a focus of patient assessment,[4] it is only one component of spasticity and a wider range of measurements is required. For outcome measurement following BoNT shoulder muscle injection, shoulder-specific scales are recommended: Ashworth Scale shoulder sumscore,[5,6] Spasticity-Associated Arm Pain Scale[7] and shoulder-relevant items of the Arm activity measure,[8] plus standard measurements.

Goal-setting is an essential part of the multiprofessional management of spasticity; goals should be patient-centric, realistic and achievable; functional-focused goal statements and a mix of short (3–6 month) and long-term (9–18 month) goals are recommended. Goals can be grouped into symptomatic, passive function, active function, personal factors and global mobility, measured with the Goal Attainment Scale.[9]

DISCUSSION AND CONCLUSION: Clinical evaluation tools, goal-setting and outcome expectations for multi-pattern BoNT shoulder-spasticity treatment should be defined by the entire team, ensuring patient and caregiver involvement. These recommendations will benefit clinicians who may not be familiar with injecting shoulder muscles and assessing treatment outcomes.

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Choice of Shoulder Muscles for the Multi-Pattern Treatment of Upper Limb Spasticity With Botulinum Neurotoxin Injections

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BACKGROUND: Botulinum neurotoxin (BoNT) is a first-line treatment for post-stroke spasticity, reducing pain and involuntary movements and helping restore function.[1–3] BoNT is not routinely injected into shoulder muscles, despite clinical trials demonstrating improvements in shoulder pain and function after BoNT injection.

AIM: We aim to present expert consensus on the use of BoNT injections in the multi-pattern treatment of shoulder spasticity.

METHOD: Following a pre-meeting survey on preferred treatment practices, a two-part meeting was held online in 2021. Five European experts with ~100 years' cumulative experience in post-stroke spasticity gave presentations on shoulder spasticity and treatment with BoNT injections, followed by discussion.

RESULTS: Traditionally, when using BoNT to treat shoulder spasticity, target muscles were chosen based on the spastic pattern and underlying functional anatomy. The expert consensus proposed a more patient-centred approach: identify which activities are limited by the spastic shoulder and consider treating the muscles involved in hindering those activities. Two patterns of shoulder spasticity were identified. For adduction, elevation/flexion and internal rotation of the shoulder, injecting the pectoralis major and teres major was recommended in most cases; for abduction or adduction, extension and internal rotation of the shoulder, injecting the posterior part of the deltoid, teres major and latissimus dorsi was recommended in most cases.

DISCUSSION AND CONCLUSION: Choice of shoulder muscles for BoNT injection can be based on spasticity pattern, but functional limitation and patient expectations should be considered to establish more patient-centred treatment goals. These recommendations will benefit clinicians who may not be experienced in evaluating and treating spastic shoulders.

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The Independence in Persons with Multiple Sclerosis from the Perspective of the Occupational Therapist

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BACKGROUND: Multiple sclerosis (MS) is a chronic neurodegenerative disease that affects and can cause neurological disability in young adults. The course and symptoms of the disease are variable and specific to each patient, who may have an impaired ability to perform activities of daily living (ADLs) (1).

AIM: The aim of the study was to map problem areas in ADLs of people with MS and their knowledge about occupational therapy in order to better plan occupational therapy services for people with MS.

METHOD: People with MS who were referred to rehabilitation services were asked to complete the ADL questionnaire (inspired by Lawton-Brody questionnaire) focusing on instrumental and personal ADL and our occupational therapy questionnaire. The ADL questionnaire contains 16 questions (8 questions on instrumental ADL according to the Lawton-Brody questionnaire (2) and 8 other questions on personal ADL). We also asked people with MS if they knew what occupational therapy was, if they had previous experience with it and if they would be interested in it. The reason for using a custom questionnaire adapted in this way was that we did not find a suitable ADL questionnaire applicable to people with MS (most questionnaires focus on ADL activities in the elderly and MS patients are typically younger).

RESULTS: A total of 62 people with MS (15 men) completed the questionnaire. The mean age of respondents were 47.5 years (SD 11.7) with mean disease duration 18.7 years (SD 12.1) and mean neurological disability 4.5 EDSS (SD 1.7). Thus, the study included people with all disability groups from mild (EDSS 1.5) to severely disabled people using an electric wheelchair (EDSS 8.0).
Shopping was the most problematic instrumental ADL (for 41.9 % people with MS), followed by household care (30.7 %) and meal preparation (27.4 %). In personal ADLs, incontinence (48.4 %) and mobility (walking and transferring) were the most problematic activities for 38.7 % participants.
More than half of patients report having some knowledge of occupational therapy. However, only 31 % have any previous experience of this form of therapy. And 42 % of the patients surveyed expressed an interest in occupational therapy.

DISCUSSION AND CONCLUSION: Although difficulties in instrumental and personal ADLs for people with MS are relatively common, it is still not routinely available for MS patients in the Czech Republic. Our findings on problematic ADLs may help to better plan occupational therapy interventions for people with MS.
The most problematic ADL activities for people with MS are shopping and taking care of the household. For people with moderate and higher levels of disability, personal ADL activities such as managing incontinence and transfers are also common.

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Influence of Anxiety and Depressive Reactive State on Functional Status and Quality of Life After Rehabilitation of Patients With Multiple Sclerosis

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BACKGROUND: Multiple sclerosis (MS) is the most widespread chronic inflammatory disease of the CNS. Rehabilitation is increasingly recognized as an essential part of the comprehensive treatment because it can improve the functional status. In MS patients anxiety and depression are often reactive states and patients consider those to be even more important determinants of their health condition than impaired physical function.

AIM: To determine how the change in functional status of patients with MS influences the quality of life taking into account anxious and depressive reactive conditions among these patients.

METHOD: The research was conducted at the Institute "Dr Miroslav Zotović", Banjaluka, Bosnia and Herzegovina on a sample of 56 patients (control group 22, experimental 34). The criterion for dividing patients was the value of the hospital anxiety and depression scale >7. Before the beginning and at the end of the rehabilitation process, the functional status of all patients was assessed using EDSS score and the functional mobility test, and the quality of life with the SF36 test. Statistical analysis was performed using SPSS software, descriptive statistics methods, t-test, Mann-Whitney U test, and Pearson's correlation coefficient. Values of $p<0.05$ were considered statistically significant.

RESULTS: There was no statistically significant difference at the beginning and end of rehabilitation in the functional status between the examined groups (Kurtzke scale before 0.498, after 0.166; functional mobility test before p=0.498, after 0.166). In SF 36 categories, there was a statistically significant difference between the groups in SF limitations physical health (before 0.006, after 0.03), energy fatigue (before, after $p<0.001$), SF social functionality (before 0.044, after 0.033), SF general health (before p=0.002, after 0.008).

DISCUSSION AND CONCLUSION:The prevalence of anxiety disorder in patients with MS is on average 22.1%. Anxiety is a reactive psychological response to an illness, and not an independent illness or a consequence of brain lesions. Depression is significantly more common in patients with MS than in the general population, average 23.7% and it could be a reaction to the unpredictable nature of MS. Our results showed that regardless of how similar the functional changes in both groups were, patients with anxiety and depressive reactive disorders have a worse quality of life both at the beginning and at the end of rehabilitation.

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Effectiveness and Follow-Up of Virtual Rehabilitation Therapy for Multiple Sclerosis Patients

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BACKGROUND: There are several types of exercise therapies which seems to be effective to improve clinical and motor symptoms in multiple sclerosis (MS), but there are only a few studies comparing the effects of different movement therapies on clinical and motor outcomes.

AIM: We compared the effects of exergaming (VR), balance (BAL), cycling (CYC), proprioceptive neuromuscular facilitation (PNF), and a standard care wait-listed control group (CON) on clinical and motor symptoms and quality of life (QoL) in people with MS and determined the effects of subsequent maintenance programs for 5 years in a hospital setting.

METHOD: A randomized clinical trial, using before-after test design. Of 112 MS outpatients, 96 were randomized, and 89 completed the study. The initial high-intensity and -frequency interventions consisted of 25, 1-h sessions over 5 weeks. After the 5-wk-long initial intervention, the 5-year-long maintenance programs followed, consisting of 3 sessions per week, each for 1h. The primary outcome: Multiple Sclerosis Impact Scale (MSIS-29). Secondary outcomes: Measures five aspects of health-related QoL(EQ-5D), Beck Depression Inventory (BDI), six-minute walk test (6MWT), Berg Balance Scale (BBS), Tinetti Assessment Tool (TAT) and static balance (center of pressure, COP).

RESULTS: MSIS-29 improved most in VR (14 points), BAL (7), and CYC (10, all $p<0.05$). QoL improved most in EXE (7 points) and CYC and BAL (6, all $p<0.05$). TAT and BBS improved significantly ($p<0.05$) but similarly ($p>0.05$) in EXE, BAL, and CYC. 6MWT improved most in EXE (70m), BAL (55m), and CYC (32m all $p<0.001$). Standing sway did not change. Maintenance programs further increased the initial exercise-induced gains, robustly in EXE.

DISCUSSION AND CONCLUSION: 25 sessions of EXE, BAL, CYC, and PNF, in this order, improved clinical and motor symptoms and QoL and subsequent, 5-y-long maintenance programs further slowed symptom-worsening and improved QoL. EXE was the most and PNF was the least effective to improve clinical symptoms, motor function, and QoL in MS.

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Multiple Sclerosis Gait Rehabilitation with Brain Computer Interface Treatment

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BACKGROUND: Multiple sclerosis (MS) is a chronic neurodegenerative disease in which a person's own immune system attacks healthy nerves. People with MS (pwMS) often experience pain, fatigue, cognitive dysfunction, and reduced mobility. MS is still incurable, and treatments can at best slow the progression of the disease and manage some symptoms.

AIM: The current study investigates the efficacy and safety of a BCI technology in facilitating functional improvements in pwMS by reducing fatigue and improving gait ability and endurance.

METHOD: Six pwMS were enrolled in this study. All completed 30 BCI-sessions. The BCI system was based on Motor Imagery (MI) of paretic ankle dorsiflexion and healthy wrist dorsiflexion with Functional Electrical Stimulation (FES) and avatar feedback. Assessments were performed to evaluate changes before and after therapy. The functional scales used were 6 Minute Walking Test (6MWT), Multiple Sclerosis Impact Scale (MSIS-29), Modified Fatigue Impact Scale (MFIS), and Timed Up and Go (TUG).

RESULTS: The results show that patients were able to increase their endurance by 55.4 m [39.9 to 73.6] according to the 6MWT. Additionally, increase in coordination and gait ability as evaluated by the TUG were observed -2.1 s [-3.2 to -1.8]. Patients also reported that they were less impacted by MS during activities of living as assessed by the MSIS-29 of -5 points [-11.3 to -2.5] and a reduction in fatigue as assessed by the MFIS of -8.5 points [-10.8 to -5.5].

DISCUSSION AND CONCLUSION: This is the first time that BCI technology has been used to treat pwMS. These preliminary results demonstrate the safety and efficacy of the treatment. MS patients improved endurance and coordination and reported improvements in activities of daily living, with the improvements in 6MWT exceeding clinically important difference. Nonetheless, these results are from six MS patients, so the authors believe that this approach should be further validated in larger studies involving more patients.

REFERENCES:

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Effectiveness of Robotic Rehabilitation in Improving Muscular Strength and Mobility in Patients With Multiple Sclerosis: Preliminary Results of a Randomized Controlled Open-Label Trial

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BACKGROUND: Patients with multiple sclerosis (MS) may suffer from balance and gait impairments, which may affect quality of life (1). New technologies are attracting growing interest in the management of MS patients, offering the possibility of diversifying therapeutic approaches compared with traditional treatment methods. These new approaches make it possible to add a motivating and playful aspect to a conventional treatment session. New approaches such as robot-assisted rehabilitation show promising results, but require further validation through more in-depth research, including larger-scale studies, to confirm their effectiveness (2). One of these robotic rehabilitation techniques is the LUNA- EMG (Samcom®), a multifunctional upper and lower limb rehabilitation robot for patients with neurological or orthopaedic conditions (e.g., 3).

AIM: This randomized controlled open-label study aims to assess the effects of the LUNA-EMG rehabilitation robot (RR) on MS patients' muscular strength, balance and gait.

METHOD: 35 patients with MS were randomly assigned to the RR group (n=19) or to the control group (n=16). The RR group received thirty to forty minutes of RR once a week for twelve weeks in addition to conventional physical therapy, whereas the control group received conventional physical therapy only. Patients' balance (Timed-Up and Go – TUG), speed (25 feet walking test – T25-FW), quadriceps (Q) and hamstring (H) muscular strengths and proprioception were collected at baseline and after four, eight and twelve weeks. We used two-ways repeated measures ANOVAs to analyse the treatment effect on variables of interest. Analyses were adjusted for age and performed in intention to treat.

RESULTS: Results revealed a statistically significant interaction between the effects of time and group regarding muscular strength for Q and H. Other variables of interest did not differ significantly between groups.

DISCUSSION AND CONCLUSION: Preliminary results show that RR improved MS patients' muscular strength. Analyses should be confirmed once the total sample size is collected (n=40).

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Neurogenic Bladder in Patients With Multiple Sclerosis

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BACKGROUND: Neurogenic lower urinary tract dysfunction (NLUTD) is common in patients with multiple sclerosis (MS). However, it is often underdiagnosed and undertreated. Urodynamic examination (UDS) is crucial for defining the underlying pathophysiology.

AIM: To evaluate symptoms' pathophysiology, different patterns of LUT dysfunction and concomitant bladder wall changes.

METHOD: Patients diagnosed with clinically definite multiple sclerosis (CDMS) according to the revised McDonald criteria, were referred to Rehabilitation department, urodynamic division for assessment. Demographic data, medical history, type and frequency of LUT symptoms were recorded. Patients underwent Urinalysis, bladder ultrasound and UDS.

RESULTS: 42 patients (28 women and 14 men) with mean age 47,7 years, median disease duration 14,9 years and median symptoms duration 5,8 years were enrolled. Recorded symptoms included: incontinence (69,2%), urgency (65,3%), urinary frequency (50%) incomplete bladder emptying sensation (42,3%) and nocturia (26,9%). Detrusor hyperactivity was the main finding after UDS (47,3%) with mean Maximum detrusor pressure (Pdetmax) 64,7cmH2O and mean cystometric bladder capacity 222 ml. Other urodynamic abnormalities included detrusor underactivity (28,9%) and detrusor-sphincter dyssynergia (7,9%). Micturition was achieved in 50% of patients with median postvoid residual volume 169,7 ml. Bladder wall thickness (BWT) was detected in 50% of patients, indicating chronic disease. Modification of pharmacologic treatment was required in 38.4% of patients after UDS while 56,2% of participants received a first-line therapy (pharmacologic agents/ Clean intermittent catheterization -CIC).

DISCUSSION AND CONCLUSION: A complete UDS represents an important diagnostic tool, particularly useful to evaluate the pattern of LUT dysfunction and create a framework for goal directed management, improving quality of life for MS patients.

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PREPARE: Personalized Rehabilitation via Novel AI Patient Stratification Strategies: The Case for Parkinson's Disease

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BACKGROUND: The Individual Rehabilitation Project (IRP) is the main tool used by PRM physicians to manage the delivery of care to people expressing or at risk of developing disability. Drafting an IRP entails setting goals based on functional prognosis. However, in rehabilitation, outcome prediction, with consequent patient stratification, is greatly hampered by various issues. The main outcome is neither mortality nor morbidity but functioning, which is multifaceted and mostly individually defined. Furthermore, rehabilitation treatment is a complex, multimodal intervention delivered through a multidisciplinary approach. Parkinson's disease (PD) represents the archetype of complexity. It affects multiple (if not all) body functions, producing a range of functioning profiles that vary in severity and course across patients and are strongly influenced by several other individual variables.
A multimodal and intensive rehabilitation treatment helps people with PD to achieve long-lasting benefits in any disease phase and subtype. However, the outcome after any rehabilitation approach largely varies across patients exhibiting different demographic, motor, and non-motor features. In a multifaceted scenario of several factors affecting disability progression, clinicians are frequently challenged by the need to recognize and correctly discriminate which patients will benefit from highly expensive (namely robotic rehabilitation) and demanding (namely multimodal intensive training) rehabilitation interventions, also combined with the best available drug treatment or with functional neurosurgery. A refined predictive ability will avoid delaying proper treatment in people with a less aggressive disease while also excluding from invasive approaches those who exhibit multiple factors of poor responsiveness to any intervention and would deserve palliative care.

AIM: PREPARE Rehab [1] aims to advance rehabilitation care by developing, validating, and implementing robust, clinically relevant, and data-driven computational prediction and stratification tools in nine health conditions, including PD and Parkinsonism.

METHOD: PREPARE Rehab will apply machine learning (ML) techniques on large-scale patient datasets, developing a platform for sharing model results, exploiting the open-science EHDEN platform, and using the Observational Medical Outcomes Partnership (OMOP) Common Data Model (CDM) standard. Partners will develop prediction and stratification ML strategies that will be validated via demonstration studies in the nine health conditions. For PD, we will exploit the database implemented at a tertiary care facility delivering medical diagnosis, treatment, and rehabilitation to people with PD according to a structured care pathway. In this Movement Disorder Centre, data are collected at baseline and every 4 to 6 months, regularly, in an electronic patient record comprising age, gender, BMI, professional activity, physical activity level, disease phenotype, disease duration, drug treatment schedule, or Deep Brain stimulation parameters, UPDRS total and subtotal scores, Non-Motor Symptom Scale score, PD Sleepiness Scale, King Pain questionnaire, PDQ-39.

MAIN EXPECTED RESULTS:
1) A unified advanced decision-support platform for the management of big data and federated access to clinical data;
2) novel patient stratification methods and prediction models enhanced by advanced ML/Artificial Intelligence (AI) tools;

3) a Medical Device Regulation roadmap for any (software as a) medical device embedding.

DISCUSSION AND CONCLUSIONS: The goal is to offer an innovative tool aimed at ensuring the best possible therapy tailored to the patient.

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Plantar Statics and Postural Disorders in Parkinsonian Patients

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BACKGROUND: Parkinson's disease is a neurodegenerative disorder affecting the balance function. Plantar statics disorders are among the peripheral efferencess that can affect balance and influence posture in the parkinsonian patient.

AIM: To study the prevalence of plantar statics disorders associated with postural disorders in Parkinson's patients.

METHOD: This was a cross-sectional and descriptive study carried out in the Physical Medecine and Functional Rehabilitation Department of the Principal Military Hospital of Tunis during the period july-december 2021. Patients followed for Parkinson's disease evolving for at least one year were included and had a complete clinical assessment, an evaluation of podiatric footprint and stabilometric examination. The surface S, the lateral and anteroposterior projection of the center of pressure were registred in open and closed eyes condition.

RESULTS: Twenty patients were included with a mean age of 63 years. Abnormalities of spinal curvature were found in all patients.The most common plantar statics disorder was flatfoot (11 patients). Thirteen patients had symmetrical feet.
In the stabilometric examination, the projection surface S of the center of pressure was pathological, especially in the open eyes condition. Lateral misalignment of the center of pressure was registred in50% of patients, with pathological retroprojection in14 patients in the open eyes condition and 16 patients with closed eyes.A significant association was found between asymmetry of the footprints and an increased oscillation area (p=0.025).The lateral projection of the center of pressure was significantly (p=0.049) altered in both conditions in case of plantar statics disorder. A significant association was registrated between plantar footprint type and anteroposterior projection at eye closure.

DISCUSSION AND CONCLUSION: About plantar static disorders in the parkinsonian patient, we found a majority of flat feet(1) and symmetrical feet. These results were not in agreement with the literature, which could be explained by the fact that plantar statics differ according to race(2), and our population was composed entirely of Caucasians, but also according to gender and BMI. Concerning the oscillation surface in parkinsonians, we found that it was normal in the majority of our patients, which was in agreement with the litterature(3,4) .We also found a significant relationship between asymmetry of the footprints and a pathological surface.
In conclusion, disorders of plantar statics are among the afferents that can alter balance and posture in Parkinson's disease. The relationship between different types of footbed and postural disorders is poorly studied internationally so a special attention should be paid to this easily correctable entry to improve their quality of life.

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Whole-Body Cryostimulation in Parkinson's Disease Induces an Improvement in Heart Rate Variability and an Increase of Serotonin Level: A Pilot Study

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BACKGROUND: Parkinson's disease (PD) is a complex disease, evolving over time in a neurodegenerative way (1). The application of cryostimulation in PD patients is a promising field both in therapeutic and rehabilitative setting. In fact, pre-clinical and clinical data on cooling in PD pave the way for its application on autonomic dysfunction, motor symptoms, fat and muscle metabolism and neuroprotection (2,3). However, so far there is no available data about the effects of whole−body cryostimulation (WBC) in Parkinson's disease.

AIM: The main aim of this study is to examine the effects of repeated whole−body cryostimulation session on the sympathovagal balance in Parkinson's disease. A secondary aim is to correlate heart rate variability indexes with peripheral biomarkers of autonomous nervous system (ANS) and well-being.

METHOD: Patients affected by Parkinson's disease [Postuma, 2015] of mild to moderate motor severity undertook 10 WBC (− 110 °C) sessions over 5 consecutive days. Cardiac autonomic activity was assessed through heart rate variability (HRV) using RR interval variability (RRmean, RRmin, RRmax), power density of high and low frequencies (HF, LF), standard deviation of the normal-to-normal interval (SDNN) and sympathovagal balance (LF/HF). Systemic sympathetic activity was assessed via circulating blood catecholamines and cortisol, whilst wellbeing was assessed measuring serotonin blood levels.

RESULTS: Seventeen PD patients were consecutively enrolled. Only ten patients completed successfully the protocol and were analyzed (5 males, 5 females; mean age 62.5 ± 9.8 years; mean disease duration 5.4 ± 3.2 years; mean disease severity UPDRS part III 32.8 ± 7.4). All patients were in treatment with levo-dopa and did not present clinical autonomic disfunction and cognitive impairment. RR interval variability, HF significantly and SDNN increased within sessions ($p<0.05$). Also, serotonin significantly increased within sessions ($p=0.02$), whereas catecholamines and cortisol showed a decremental trend.

DISCUSSION AND CONCLUSION: These results suggest that repetitive − 110 °C WBC exposure stimulates the ANS inducing an improvement in HRV indexes associated with an increase of serotonin level. A lower sympathetic response was recorded compared to day one, therefore suggesting the development of physiological habituation to WBC. For these reasons, could become a precious "rehabilitation booster" in Parkinson's disease, especially in relation to sympathovagal balance and well-being.

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Effectiveness of Rehabilitation Treatment for Parkinson's Patients With Long-Term Follow-Up

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BACKGROUND: There are scant data to demonstrate that long-term non-pharmaceutical interventions can slow the progression of motor and non-motor symptoms and lower drug dose in Parkinson's disease.

AIM: According to our hypothesis, system-controlled physical therapy training can slow down the progression level of patients. We also aimed to observe the changes in the motor and non-motor functions of the patients during a 8-year follow-up.

METHOD: PD patients in this 3-group randomized clinical trial met UK Brain Bank criteria and had a Hoehn-Yahr score of 2-3. During the preliminary screening, 173 patients were identified from the hospital medical records, of which 12 did not meet the inclusion criteria and 14 of them refused to participate.
After randomization, the Virtual Exercise (EXE, n=101) group completed an initial 5-week, 15-session, supervised high-intensity sensorimotor agility exercise to improve postural instability. The virtual therapy group completed the 3-week program and continued the same program 3 times per week for 8 years. The no-exercise and no-maintenance control (C, n=46) continued their normal lifestyle. Each patient had 10 outcomes measured before and after the initial 3-week exercise program, and at 3, 6, 12, 18, 24, 36, 48, 60, 72, 84, and 96 months. Group C members did not participate in hospital rehabilitation or virtual therapy during the 8-year observation period.

RESULTS: Longitudinal linear mixed effects modeling of each variable was fitted with maximum likelihood estimation and adjusted for baseline and covariates, followed by semiparametric Cox regression to model survival. The exercise program strongly improved the primary outcome, Motor Experiences of Daily Living, by ~10 points and all secondary outcomes (body mass index, disease and not- disease-specific quality of life, depression, mobility, standing balance). In E, detraining effects lasted up to 12 months. EXEtr further improved the initial exercise-induced gains up to 3 months and the gains were sustained until year 8. In C, symptoms worsened steadily. By year 8, Leva-dopa equivalents increased in all groups but least in in EXEtr.

DISCUSSION AND CONCLUSION: A short-term, high-intensity sensorimotor agility exercise program improved PD symptoms up to a year during detraining but the subsequent 8-y maintenance program was needed to further increase or sustain the initial improvements in symptoms, quality of life, and drug dose.

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Medical Rehabilitation in Parkinson's Disease – the Advanced Clinical Form – Using Virtual Reality and Robotic Therapy

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BACKGROUND: Parkinson's disease (PD) is the second most common neurodegenerative disease after Alzheimer's disease. The prevalence of PD is increasing as life expectancy has increased, and the number of cases worldwide is estimated to be 9 million by 2030.

AIM: Robotic therapy and virtual reality, by providing task-directed activities, are known to facilitate motor learning. Therefore, the application of new functional therapies can improve balance, gait and quality of life in patients suffering from PD, who are on drug treatment administered by gastro-jejunal pump in the advanced stage of the disease.

METHOD: In a prospective study using two groups of patients: a control group that received a conventional recovery program and a second experimental group that received a rehabilitation program using both robotic therapy and virtual reality.

The included patients were diagnosed with idiopathic PD, without other significant neurological or orthopedic problems, having a quasi-supportive treatment regimen in the last month and during the study, having the ability to walk unassisted or with minimal assistance for a distance of 10 meters. Patients with inability to understand the instructions required by the study (informed consent comprehension test) – MMSE<23; those immobilized in wheelchairs; those with active depression, anxiety or psychosis that could interfere with the use of the equipment or testing; those diagnosed with atypical parkinsonian syndrome were excluded.

The therapy was applied for 10 days (5 days/week for 2 weeks), each exercise session lasting approximately one hour, supervised by a physiotherapist. Considering that the patients are predominantly elderly and with multiple comorbidities, they were cardiac monitored during the whole medical rehabilitaion program.

RESULTS: During the study, several tests were applied to the patients: the stability test, the Berg Balance Scale (BBS), the Timed Up and Go Test (TUG), the 10-meter test (10M), the Unified Parkinson Disease Rating Scale-Motor Examination (UPDRS-III), Mini-Mental State Examination (MMSE), Parkinson's Disease Quality of Life Questionnaire (PDQ8). The obtained results will be processed biostatistically and represented statistically.

DISCUSSION AND CONCLUSION: Pharmaceutical therapeutic acquisitions (for example device-assisted therapy – gastro-jejunal pump) encourage and determine the feasibility of initiating an integrative rehabilitation program with state-of-the-art medical devices for these patients.

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Study of the Efficacy of Cerebellar tDCS Associated With Interactive Treadmill in Improving Freezing of Gait Phenomenon in Parkinson Disease: TELEGRAM Study

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BACKGROUND: Among the motor disorders of Parkinson's Disease (PD), freezing of gait (FoG) represents one of the most disabling symptoms and a particularly challenging issue as specific effective therapies have not yet been identified.
Treadmill training is an effective rehabilitative treatment for gait disorders, improving adaptability in the early stages of PD (Wang et al.). Transcranial Direct Current Stimulation (tDCS) enhances motor performance by strengthening the neuronal interactions of the cortico-subcortical network. When applied to the primary motor cortex (M1), it improves motor performance and reduces the number and duration of FoG episodes; if combined with treadmill exercise it enhances step and balance (Na et al.). Cerebellum is a site for tDCS application of extreme interest thanks to its dense neural network connections (Priori et al.).

AIM: To evaluate the effectiveness of the combination of interactive treadmill (C-Mill VR+) and cerebellar tDCS in reducing FoG.

METHOD: 20 patients were recruited from those affiliated with Policlinico San Marco in Zingonia (Bergamo).
Inclusion criteria:
- Diagnosis of PD
- H&Y scale: 2-3
- Presence of FoG
- Age: 40-85 years
- Absence of significant cognitive deficits on the MoCA test

Exclusion criteria:
- DBS/PM/neurosurgery interventions
- Positive history of epilepsy/psychiatric pathology

Patients underwent 10 consecutive 20-minute sessions of walking training on C-Mill VR+, with or without concurrent cerebellar tDCS (ctDCS).
Single-blind randomized patients in group A underwent ctDCS with an intensity of 2mA and a duration of 20 minutes. Patients in group B underwent discontinuous tDCS (sham-tDCS) with the stimulus fading out 2 seconds after initiation.
Unipolar montage was performed (anode at the level of the posterior cranial fossa and cathode on the right arm).
Patients were evaluated on the first day (T0), at the end (T1), and one month after the end of the rehabilitation cycle (T2) using specific test batteries including:
- UPDRS III
- FOG-Q
- MoCA
- FAB

- C-Mill VR+ Test for postural and gait control (at T0 and T1)
Gait training on the treadmill involved 4 types of exercises (gait assessment, gait adaptability, random stepping stones, and speed adaptability), followed by 3 types of cognitive-motor exercises (trace, soccer walking, and Italian Alps).
Data analysis was performed using jamovi software.

RESULTS:
The dual treatment results in a significant improvement in some stability and gait parameters, as well as in the Barthel index ($p=0.008$) and ADL scale ($p=0.013$). A trend of improvement was observed in the FoG-Q, UPDRS III, MoCA, and FAB scales.

DISCUSSION AND CONCLUSION:
Physical exercise on C-Mill VR+ combined with ctDCS can produce improvements in both motor and cognitive aspects, making the cerebellum a highly interesting study target.
The trend towards a reduction in FoG in group A encourages further research with an expanded case study.
These data suggest that the combined effect of the dual treatment may offer a potential rehabilitative strategy to address the current lack of targeted FoG reduction treatment.

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Compressive Neuropathy of the Median Nerve: The Diagnostic and Therapeutic Relevance of Ultrasound in Prm Consultation

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BACKGROUND: Ultrasound is an excellent diagnostic and therapeutic tool in PRM consultations. It allows a dynamic assessment and, consequently, a more targeted treatment. Patients with compressive neuropathies (CN), for example in median nerve (MN), may describe symptoms such as pain, paresthesia, hypoaesthesia, and decreased muscle strength. MN mononeuropathy is most common in the carpal tunnel (CT). However, nerve entrapment along other sites may happen.
(1) Since it is more infrequent, it is sometimes forgotten. With this in mind, we can wonder that CN are examples of pathologies that benefit from a PRM assessment with ultrasound since the physiatrist can detect where is exactly the compression site and evaluate if putting pressure into the probe can mimic symptoms.

AIM: The literature has demonstrated the specificity of ultrasound in diagnosis and its effectiveness in treating CN, both in the upper and lower limbs, through hydrodissection. We aim to raise awareness of its differentiating role.

METHOD: In a prospective database of patients with CN, a patient with CN of the median nerve was selected and reviewed.

RESULTS: A 59-year-old woman, followed up in PRM consultation (PRMC) for neuromotor sequelae on the right side of the body from a haemorrhagic stroke, presented paresthesias in the palm of her hand and the base of her left thumb with 4 months of evolution (DN4 questionnaire: 7 out of 10). She underwent electromyography (EMG) which reported a diagnosis of CTS with severe severity. However, in PRMC, an ultrasound scan of the left wrist and forearm revealed an increase in the cross-sectional area of MN in the location where it branches off into the palmar cutaneous branch (proximal to the entrance to CT). Given the aforementioned echographic sign and the patient's symptoms, we were able to diagnose a CN. Thus, an ultrasound-guided hydrodissection of the left NM was carried out 3cm proximal to the CT; 0.5cc of 1% lidocaine, 2cc of NaCl, and a 1cc of 40 mg/ml methylprednisolone and 10 mg/ml lidocaine were used. On re-assessment, 1 week after the procedure, the patient showed a marked improvement in her condition (DN4 questionnaire: 0 out of 10). Two months after the procedure, patient remains asymptomatic.

DISCUSSION AND CONCLUSION: Through this case, it can be concluded that ultrasound assessment in PRMC was decisive for the correct diagnosis and, consequently, treatment. It should be noted that, contrary to what was described on the EMG, it was not CTS. Traditionally, nerve decompression surgery is the treatment offered. However, it is more invasive and has a longer recovery time. An alternative is hydrodissection of the nerve under ultrasound control: it's effective, less invasive, has fewer complications, is performed in an outpatient office, and it neither requires hospitalization nor avoidance of work. Therefore, referral to a PRM consultation with ultrasound expertise should be an option to be considered when this pathology is suspected so that the diagnosis can be confirmed and targeted treatment can be carried out.

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Sudden Improvement of Upper Extremity Weakness in a Patient with Unilateral Cervical Radiculopathy

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BACKGROUND: Cervical radiculopathy is a disorder involving dysfunction of cervical nerve roots that commonly manifests as pain radiating from the neck into the distribution of the affected root. In previous studies, there are many cases of sudden improvement in motor weakness due to surgical treatment or procedure, but few cases of improvement in motor weakness over a long term follow-up have been reported. We report a case of a patient who suddenly developed posterior neck pain and right upper extremity weakness while pulling a heavy object weighing about 250 kilograms with a rope. The patient came to our hospital for diagnosis and treatment after injury.

AIM: In this study, we would like to report a case of a patient who showed sudden improvement of shoulder weakness after around 2 years of injury onset.

METHOD: A 57-year-old man had developed sudden posterior neck pain and weakness of right upper extremity while pulling a heavy object. At that time, the manual muscle test (MMT) showed poor grade on flexion and extension of right shoulder and poor grade on the right elbow flexion, and range of motion (ROM) was limited to 60 degrees in flexion and 90 degrees in abduction in right shoulder. Electrodiagnostic study (EMG) that was conducted before surgery revealed right cervical radiculopathy involved in mainly C5/6 nerve roots. After one month, MRI showed right lateral herniated cervical disc (HCD) in C4/5 level and right neural foramen stenosis in C5/6, and surgery was performed. There was no significant change in MMT and AROM after surgery, but posterior neck pain improved. EMG performed after surgery revealed more improved state of cervical radiculopathy. After that, two EMG studies were performed, and the cervical radiculopathy findings showed mild but gradual improvement. The patient received physical therapy, including electrical stimulation, passive and active assisted ROM exercises. Also, Ultrasound-guided perineural injection at brachial plexus with dexamethasone were performed for treatment.

RESULTS: After continuous physical therapy, the elbow joint improved from poor grade to good grade in about 1 year from onset, and the shoulder joint improved from poor grade to good grade after in 2 years. In the last 2 months of the follow up of the shoulder weakness, sudden improvement from fair- grade to good grade was notable.

DISCUSSION AND CONCLUSION: The patient had had sudden and severe weakness of right upper extremity by cervical radiculopathy. In two years of comprehensive rehabilitation therapy, this patient showed much improvement especially in the last 2 months. Even in severe radiculopathy, continuous treatment might bring great results.

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Targeting Ischemic Brain Lesions with Fucoidan-Coated PLGA Nanoparticles via Endothelial P-selectin in MCAO Rat Models

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BACKGROUND: Endothelial P-selectin plays an essential role in the initial recruitment of leukocytes to the site of brain injury, such as ischemic stroke or traumatic brain injury, and in the aggregation of platelets at areas of vascular injury [1]. In a previous study, P-selectin-targeted nanocarriers encapsulating vismodegib (a hedgehog pathway inhibitor used to treat basal cell carcinoma) effectively crossed the blood-brain barrier via caveolin-1-dependent transcytosis in a brain tumor rat model [2].
AIM: This study aims to explore whether fucoidan-coated PLGA nanoparticles can induce ischemic brain lesions using endothelial P-selectin in a middle cerebral artery occlusion (MCAO) rat model.

METHOD: Rat models used in this study included control, sham, and MCAO groups. 7-week-old rats weighing between 200-230g were utilized. To model the MCAO rat, we first anesthetized the rats with a ketamine injection, followed by isoflurane during the procedure. An endovascular catheter was inserted through the left common carotid artery (CCA) and removed an hour later. The control group was neither injected with drugs nor manipulated. The sham group consisted of uninjured rats given fucoidan and PLGA coating material through a jugular vein. The MCAO group was injected with the same material (fucoidan and PLGA) and at the same site immediately after modeling. Histologic examinations using 2,3,5-triphenyltetrazolium chloride (TTC) and hematoxylin and eosin (H&E) staining were performed 24 hours post-modeling to validate the model. Immunofluorescence (IF) was conducted 2 hours post-modeling to determine P-selectin expression in the damaged brain area. A Fluorescence in vivo imaging system (FOBI) was used 24 hours after material injection to confirm and quantitatively analyze absorption.

RESULTS: In H&E staining, we observed pathological findings, such as vacuolation, neuronal loss, lymphocyte infiltration, and enhanced eosinophilic presentation in neurons in the damaged cortex area compared to the non-damaged cortex. In TTC staining, damaged areas appeared white, while undamaged areas were red, validating our model's accuracy. We identified the presence of endothelial P-selectin in the MCAO model through IF. Furthermore, increased FOBI intensity towards the damaged area in the MCAO model coated with material was observed compared to the control and sham groups.

DISCUSSION AND CONCLUSION: This study suggests that fucoidan-targeted PLGA nanoparticles successfully induced ischemic damage in the MCAO rat model by using P-selectin to cross the blood-brain barrier.
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Orthostatic Tolerance in an Upright Standing Position in Patients With Incomplete Locked-In Syndrome

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BACKGROUND: Mobilisation is an important type of intervention in handling of patients with severe disability after acquired brain injury. Incomplete Locked-in syndrome (iLIS) is a rare condition with tetraplegia, anarthria and dysphagia, in which patients are severe disabled and often in need of comprehensive physical assistance to change position. A standing position is expedient to stimulate the muscle-skeletal system, pulmonary and heart function, and the digestive system. However, we know little about the orthostatic tolerance, i.e. blood pressure (BP) and heart rate (HR) response, in upright standing position, in patients with an iLiS.

AIM: To investigate BP and HR during sitting and standing in a standing frame in patients who have been poorly mobilised after iLiS.

METHOD: An explorative descriptive case study design was applied. Before inclusion participants had to perform a negative head-up-tilt test, i.e. BP drop <20 mmHg combined with an HR increase. Then, participants performed two sessions in a standing frame (Delta 2004 Evolution) combined with active and guided active movements or exercises when possible, on two separate days. Systolic blood pressure (SBP) and HR were measured during 5 minutes rest (supported sitting) and after 1-5, 10, 15, 20, 25 and 30 minutes in an upright position. Participants were instructed to stand until they reached volitional exhaustion, or if they showed symptoms of orthostatic intolerance (reduced consciousness, dizziness, etc.). The total standing time and changes in SBP and HR were monitored.

RESULTS: Two male and three female patients with iLiS, all admitted to inpatient rehabilitation at Sunnaas Rehabilitation Hospital, during a period of one year, were included in the study. Median (min-max) age was 57 years (39-73), height 170 cm (164-183) and weight 72 kg (65-79). Four of the participants were in the subacute phase (less than one year post-injury) and one in the chronic phase. Two participants had tracheostomy, while four were in need of airway clearance with respiratory physiotherapy and assisting devices for coughing. Eight training sessions were performed. Median (min-max) standing time in standing frame was 30 minutes (20-30). Five sessions lasted as scheduled for 30 minutes, three for 20-21 minutes and two were not performed. No adverse events occurred during sessions. SBP and HR in sitting ranged from 94 to 143 mmHg and 67 to 113 beats/minute. The change in SBP and HR from sitting to standing in the standing frame after 5 minutes, ranged from -25 to +7 mmHg and 7 to 16 beats/minute. After 10 minutes, the change ranged from -23 to +15 mmHg and 9 to 20 beats/minute. The change in SBP and HR from sitting until the end of the session, ranged from -29 to +19 mmHg and 10 to 26 beats/minute.

DISCUSSION AND CONCLUSION: In this study, patients with incomplete Locked-in syndrome, after having passed a negative tilt test, tolerated upright standing for 20 to 30 minutes. Exercise in a standing frame should therefore be considered in the rehabilitation of medical stable patients with incomplete Locked in syndrome.

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Herpes Zoster (HZ) Induced Brachial Plexus Neuritis – Case Report

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BACKGROUND: HZ is the reactivation of dormant varicella zoster virus in the dorsal root ganglia. It is usually presented as a painful vesicular rash within the corresponding dermatomes. Motor involvement is probably due to the spreading of inflammation to the ventral roots, plexus and peripheral nerves. HZ brachial plexopathy has rarely been reported.

AIM: To highlight the importance of multidisciplinary input to a potentially variable clinical manifestation of HZ and to emphasize the role and contribution of rehabilitation to the healing process.

METHOD: case report

RESULTS: A 63 – year – old woman was examined by an infectious disease specialist 7 days after a zoster skin eruption on the lateral side of the shoulder, upper arm and forearm and medical treatment with Aciclovir was applied. She had Covid 19 infection ten months before the skin rash. The motor weakness developed 18 days after the onset of the disease. The neurologist revealed a severe weakness in shoulder abduction (1/5 MRC scale). Sensory examination and reflexes were normal as well as the strength of the other muscles. Intravenous Corticosteroid was added to the therapy. EDXs were performed 6 weeks after the onset of motor weakness. It showed the wilder distribution of the neurogenic lesion. Nerve conduction studies (NCSs) showed decreases in amplitude of SNAPs (n.medianus, n.radialis), marked decreases in amplitude of CMAPs of n.radialis and n.axillaris. Electromyography showed positive sharp waves and fibrillations in the right Deltoid and Biceps brachii, a few in Triceps. However, the cervical paraspinal and the muscles of the right hand were normal. The findings of EDXs supported plexus neuritis mainly involving upper trunk and less middle trunk with dominant affection the fibers of posterior and lateral cords. MRI that was taken 3 weeks after EDXs was consistent with electrophysiologic findings. Rehabilitation started 7 weeks after onset of the motor weakness and full motor recovery of the right arm was achieved within the next four months. She received electrotherapy, electrical stimulation, ROM and strengthening exercises.

DISCUSSION AND CONCLUSION: The motor weaknesses that appeared 18 days after the skin manifestations presented as mononeuritis of the axillary nerve. Widespread subclinical motor involvement is common in HZ (Ismail et all). The EDXs clearly confirmed it although the abnormalities were most prominent in the clinically affected segments. The previous Covid infection in our patient can't be linked to the reactivation of the virus. The literature review published by Algaadi stated that HZ rash related to Covid 19 appeared averaging, 17 days after Covid 19. Combined medical and physical treatment resulted in a good outcome despite the evidence that complete or partial recovery is about 76 % after two years.
As a rare and often unrecognized complication of HZ, brachial plexopathy requires a multidisciplinary approach and with initial medical therapy, rehabilitation focused on pain reduction, prevention of muscle atrophy and contractures, as well as strengthening of weakened muscles has a great contribution to a favorable outcome of the disease.

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Application of Mesotherapy in the Treatment of Bell's Palsy

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BACKGROUND: Bell's palsy is a sudden, usually unilateral palsy of the facial nerve. Given that the etiology of Bell's palsy is not fully elucidated, neither etiological treatment or specific prevention is possible.

AIM: To evaluate the effectiveness of mesotherapy in combination with laser therapy in the treatment of patients with Bell's palsy compared to conventional therapy,

METHOD: The study included 73 patients, divided into two groups. The first group of 35 patients underwent laser and mesotherapy (Dexason and Lidocaine in the area of the foramen stylomastoideum on the affected side), and the second group of 38 patients underwent laser therapy. To assess the degree of damage to the facial nerve, we used the House-Brackman (HB) scale and the Sunnybrook facial grading system (SBS) before inclusion in the therapy and after the treatment.

RESULTS: The difference in scores at discharge compared to admission was statistically significantly higher in the group subjected to laser and mesotherapy ($p=0.009$). In both groups, SBS was higher at discharge than at admission, but without statistical significance between groups. In both groups, the HB score was lower at discharge than at admission and without statistically significant difference ($p=0.579$) between groups. The difference in the score at discharge compared to admission was greater in the group subjected to laser and mesotherapy, statistically significant ($p<0.001$).

DISCUSSION AND CONCLUSION: In the group of laser and mesotherapy, we included patients with a more severe grade of damage (HB scale V and VI and SBS up to 30%). We had better results in the group with mesotherapy and there was no statistically significant difference in the duration of the therapy.
This study is the first description of the effectiveness of mesotherapy in combination with laser therapy in the treatment of Bell's palsy. In the future, prospective randomized studies are needed to prove its effectiveness.

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Multimodal Rehabilitation approch in patients with Peripheral Facial Palsy

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BACKGROUND: Peripheral facial nerve palsies (PPF) are a disabling condition that causes both cosmetic and functional impairment, significantly impacting patient autonomy and quality of life [1]. The most frequent form is Bell's palsy, which occurs at a rate of 20-25 cases per 100,000 individuals every year [2]. Despite the increasing use of therapeutic approaches in clinical practice, the optimal management of PPF rehabilitation remains controversial [3].

AIM: The aim of the research was to evaluate how a rehabilitation program that incorporates Neuromuscular Proprioceptive Facilitation (FNP), Local Vibration Therapy (LVT), and Functional Electric Stimulation (FES) can enhance facial expression, muscular endurance, functional limitations, and independence in patients suffering from PPF.

METHOD: The study involved patients with PPF diagnoses who were referred to Hermitage Capodimonte Diagnostic and Treatment Institute in Naples between April and July 2023. At baseline (T0), patients underwent an assessment protocol that included biographical and anthropometric data, as well as functional assessment scales such as the Sunnybrook Facial Evaluation Scale (SB), the House Brackmann Grading System (HB), and disability scales such as the Facial Clinimetric Evaluation Scale (FACE) and the Facial Disability Index (FDI). Lip closure force was directly measured using a spring-loaded dynamometer (PESOLA®) 3000 G by taking three measurements on the affected hemilateral angle and three measurements on the healthy hemilateral angle, calculating the arithmetic mean for each side. After measurement, patients underwent an 8-week rehabilitation program (5 sessions per week) that included 20 minutes of facial Kabat, 20 minutes of LVT through Novafon PRO®, and 15 minutes of FES with exponential currents. At the end of treatment (T1), patients were re-evaluated.

RESULTS: The study involved six participants, with four men and two women. One of these individuals left the trial due to personal reasons, which resulted in the discontinuation of treatment. Idiopathic PPF was diagnosed in all patients, and the illness lasted from one to four months. The preliminary data showed that all relevant outcomes for each patient improved, with significant changes in the FDI for both total and partial Physical Function and Well-Being scores (p <unk> 0.05). Patients will be re-evaluated at the end of treatment (T2) after 8 weeks to assess long-term efficacy.

DISCUSSION AND CONCLUSION: In the management of patients with PPF, early evidence suggests that an integrated rehabilitation approach is effective. However, additional data from a wider range of patients are needed to substantiate this hypothesis and assess its long-term effectiveness.

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ICF Use to Identify Common Problems in Patients With Muscular Dystrophy in a Rehabilitation Service

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BACKGROUND: Muscular dystrophies (MDs) are a subgroup of neuromuscular diseases characterized by progressive loss of muscular force; usually there are other symptoms present. The functioning status of affected person is evaluated by many professionals with various points of view, thus the need to use a common language to describe patient problems. The International Classification of Functioning, Disability and Health (ICF) constitutes the framework for a comprehensive understanding of the components of functioning.

AIM: to describe functioning and disability of patients with MDs within ICF perspective.

METHOD: a prospective cross-sectional study conducted in a tertiary hospital in a rehabilitation unit, approved by the local ethics committee. We collected social demographic data and a checklist of ICF categories that we elaborated using as a starting point the general ICF checklist 2.1 developed by the World Health Organization. Our final ICF checklist included 91 categories (30 in the field of body functions, 12 for body structures, 39 for activity and participation and 10 for environmental factors). Thirty-three patients (54,54% males) were included; 10 patients had facioscapulohumeral dystrophy, 11 myotonic dystrophy, 3 oculopharyngeal MD, 6 limb gridle MD, 1 Bethlem myopathy, 1 LAMA2 related MD.

RESULTS: Out of the 91 categories 95.6% were found relevant for at least 10% of patients; as expected, the most affected were the body functions domains related to Musculo-skeletal function and fatigue; pain was punctuated in more than 50% of patients. In the domain of Activity and participation, 22 out of 39 categories were affected in more than 50% of patients, and 38 out of 39 were relevant for all patients. In the domain of environmental factors family, friends, caregivers, and health professionals were found as facilitators.

DISCUSSION AND CONCLUSION: To date, there is no universally accepted overall outcome measure that incorporates the full spectrum of functional impairments and quality of life associated with MDs. Literature research highlights the necessity of a comprehensive evaluation of patients. Our results shows that patients with MDs have problems in functioning across the 4 domains of ICF. ICF based checklists can help clinicians in focusing on “what” needs to be measured and allowed them the independency of “how” (e.g. Outcome measures) to measure. This study can help further research for the development of a specific disease outcome measure for these patients as well as guide clinicians in the common general practice.

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Approach to Rehabilitation of Persons With Chronic Severe Mental Illness and Persons With Non-Organic Impairment Across Europe

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BACKGROUND: Rehabilitation of patients with a concurrent major psychiatric illness is complex, multi-faceted, and has it's unique challenges[1]. The same can be said regarding the rehabilitative approach for patients who suffer from a disorder of a non-organic aetiology[2]. Both patient groups present a more substantial impact on participation due to their condition, and present more challenges to providing rehabilitative care due to difficulties with compliance and cooperation, complexities with the patients' perception of one's illness, and their ability to undergo intensive multidisciplinary rehabilitation. To assess the nature of rehabilitative care for both patient groups and promote their advocacy, a Special Interest Scientific Committee (SISC) was recently formed by the European Society of Physical & Rehabilitation Medicine (ESPRM).

AIM: The goal of our study was to assess the varied approaches between PRM physicians on the subject of rehabilitation for patients with concurrent major psychiatric illness, and for those undergoing rehabilitation for a disorder of non-organic origin, with the assumption that these patients would be treated differently due to the nature of their condition.

METHOD: In 2021 an online survey was sent to representatives for each country in the ESPRM. The survey consisted of 14 questions regarding the nature of rehabilitative care for patients with concurrent major psychiatric illness and for those with non-organic disability.

RESULTS: 30 responses were received from 28 countries. From an analysis of the responses the following results were obtained:
A PRM specialist serves as the rehabilitation team leader for 20% of the responses for non-organic patients, and 33% for patients with concurrent psychiatric disorder. From a previous survey regarding the general population of rehabilitation patients, 89% of responses were for a PRM specialist as team leader. ($P<0.05$)
While 66% of responders believed that the psychiatric and non-organic patient groups would be receiving more PRM physician's attention, they are less likely to be involved ($P<0.05$)
Patients with non-organic disorders are more likely to be admitted to a psychiatric unit (36%) than patients with rehabilitative needs who have concurrent psychiatric illness. (10%, $P<0.05$)

DISCUSSION AND CONCLUSION: The results of our study reflect the expert opinions of leading PRM specialists in ESPRM regarding rehabilitative care for patients with concurrent psychiatric disorderד and for those with a non-organic disorder. The responses convey that there is a prevalent understanding that such patients are in more dire need of rehabilitative care. However, it also seems that the PRM specialist is less likely to play a key role in the rehabilitation pathway. These results reflect the variability between different countries in their approach to the rehabilitation of such patients, and might be helpful in our common goal of advocating for both special patient groups and confronting their ongoing stigmatization by the medical community and the general population.

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Poster Session E

Initial Results of the Hungarian Pilot Test With an Information Communication Technology Based Assistive Technology Service Supporting Older Adults' Independent Living

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BACKGROUND: The growing number of older people in our societies puts a heavy duty on the working generations, families, social and rehabilitation service providers, and economies to help the "silver generation".

AIM: Information Communication Technology-based Assistive Technology (ICT-based AT) can effectively help maintain the independence of older people and reduce the burden on caregivers. In our work, the Safety of elderly people and Vicinity Ensuring (SAVE, https://save-aal.eu/) elderly care system was developed and tested within the framework of an Active Assisted Living (AAL) project. The usability and efficiency of the SAVE system were evaluated.

METHOD: The SAVE system included three types of environmental sensors, a smartwatch, a smartphone, and the operational ICT infrastructure. Older adults (aged 65 years and over, living alone) tested the SAVE system in their homes for at least 21 days. Caregivers (relatives or professionals) and decision-makers of the care services (persons who are related to home care and social assistance in municipal care, research field, decision-makers in financing and management) tested the SAVE support web platform during the period of the field test, paying special attention to the changes in the burden of care. Older adults filled in questionnaires three times while the log data from the smartwatch and sensors were recorded continuously during the field test. The trial is registered on the ClinicalTrials.gov platform under registration number NCT05626556.

RESULTS: 26 older adults (of which 1 dropped out), 25 caregivers, and one decision maker participated in the field test. The age of primary users was 67-96/77.81/7.20/77 (min-max/mean/standard deviation/median) years. 22 women and 3 men participated, and more than 50 percent of them had higher education (14/25 tertiary education). All 25 participants were retired and lived in the capital city of Hungary. Four of them worked part-time, eight did voluntary work, and 21 of them did some physical activity regularly. No participant had an accident during the testing period.
Older adult participants remarked on the smartwatch's poor ergonomics and short battery life. During the field test, the SOS function of the smartwatch didn't work twice. The smartwatch did not detect the steps when walking with crutches or a rollator (while a simple activity meter did). The time spent on filling in the questionnaires for each user was told too long (about 1,5 hours).

DISCUSSION AND CONCLUSION: While using the SAVE system, at half-time 80% and at the end of the test 92% of older adults felt safe. 52% of the older adults felt a positive change in their habits by the end of the test. 92% of the participants did not notice a change in their need for help. At the final meeting, only 36% of the participants wanted to continue using the SAVE system, and 40% of the participants thought that they would like to continue using the system if it were to come to market.
The authors believe that the SAVE system is a good support tool, but not for everyone over the age of 65. It would be worthwhile to extend the test period and collect data with fewer questionnaires.

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Long-Term Successful Rehabilitation Following Non-traumatic Spinal Cord Injury: Case Report

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BACKGROUND: Studies on non-traumatic Spinal Cord Injury (NTSCI) incidence are not only far fewer than the ones on traumatic Spinal Cord Injury (TSCI) incidence but also not representative or comparable. Reliable national data concerning the rate and the etiology of NTSCI are restricted but the existing studies suggest that the leading causes are neoplastic tumors and degenerative conditions of the spinal column. According to population-based studies, the rate of Spinal Metastatic tumors is 15.67% in patients with a solid tumor. Although metastatic tumors from any primary site can cause NTSCI, approximately half of the cases arise from common cancers such as lung (25%), postage (16%), breast (7%). About 11% are related to multiple myeloma and in lower rates are related to Hodgkin and non-Hodgkin lymphoma and leukemia.

AIM: To present the benefits of the early intervention for a NTSCI, not only with the appropriate therapeutic approaches but also with long-term rehabilitation programs.

METHOD: Case Report:
Female 59years old, with history of B-cell chronic lymphocytic leukemia. Two years following the diagnosis of leukemia, the woman presented incomplete paraplegia. Imaging control identified a neoplastic spinal cord tumor at the level of T4-T6 vertebrae causing spinal cord compression. After complete diagnostic investigation and based on biopsy's result, the tumor was considered to be a relapse of leukemia and the patient started immediately radiotherapy treatment. Nine weeks after onset of paraplegia, the patient started Inpatient-Rehabilitation program concomitantly with her oncological treatment. During admission to the PRM department, she presented incomplete paraplegia AIS B-T6. Specific goals were set by the rehabilitation team and neurogenic lower urinary tract and bowel dysfunctions as well as spasticity of limbs were treated accordingly. After a 36weeks Inpatient Rehabilitation she presented paraplegia AIS D-T6 and she was ambulatory with a rollator walker. After discharge, the patient presented further improvement of ambulation and neurogenic lower urinary tract and bowel dysfunction and based on her last urodynamics' data, Intermittent self- Catheterizations are no longer needed.

RESULTS: (-)

DISCUSSION AND CONCLUSION: Early treatment of the primary disease combined with the long-term rehabilitation program, following a NTSCI can offer a benefit to the prognosis of the disease and improve the patient's quality of life.

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The Use of Power Assistant in a Manual Wheelchair for the Increase of Independent Movements in the Communty

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BACKGROUND:Manual wheelchair users commonly face problems when moving mainly outdoors. These places are outright connected with accessibility problems and environmental difficulties.

AIM: To research the benefits and the obstacles that patients with spinal cord injury (SCI) face in the perspective of using power assistance.

METHOD: In our study were included 52 patients with SCI (N=52) from 2017-2023 who were hospitalized in our PMR department and followed a functional rehabilitation program.
They were evaluated with the SCIM (Spinal Cord Injury Independence Measure) at the beginning, every month, at the end of their impatient stay and one month later. Also the COPM (Canadian Occupational Performance Measure) was used in order to assess the goals that were a priority in the occupation of everyday tasks in the community.
The everyday sessions of the occupational therapy included transfers and moving with a manual wheelchair indoors, as well as outdoor spaces.

RESULTS: Patients (N=11) who chose the power assistant in a manual wheelchair (device of power assist) showed an increased SCIM score as far as it concerns their transfers outside their home (mobility category) , from a 0 score to 2. The increase of the SCIM index was connected with their choices at COPM concerning their priorities for productivity and management their free time outdoors in the community. The use of these devices reduced the restrictions from the natural and structural environment.

DISCUSSION AND CONCLUSION: The use of power assistant in a manual wheelchair was connected with increased independence and participation in the productivity and the management of their free time.
The choice and its use seems to be affected by the information provided, the age and it's cost.

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Human-Centred Lasting Care Functional Beds: Views Among Patients and Assistants on the Functions of the Bed and the Needs of the Patients

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BACKGROUND: Global increase of chronic and long-term health problems has resulted in growing number patients with reduced mobility including persons that are forcedly bedridden for months or years. In this context, the design, materials, ease of use, etc. of functional beds for home use are of great importance, which is a little-studied issue. This research study in Latvia aimed at formulating criteria for the selection and design of high-performance care beds to reduce the need for direct and extensive assistance from others

AIM: This study aimed expectation of bedridden patients and their caregivers on necessary improvements for nextgeneration design of functional beds.

METHOD: Opinions, organizing qualitative research, were gathered from patients, caregivers, family members and other specialists who are familiar with the problem. Questionnaires and focus groups were used, and the researchers analysed questionnaires from 17 bedridden patients and 51 caregivers.
Patients were divided into 4 groups according to their body weight - under 75kg, up to 100kg, up to 125kg and over 125kg. During the discussion, it was determined how many times an assistant is needed at night - 1x, 2x, 3x or more. Caregivers were asked about the mobility of their patients in bed, and the answers were as follows: very limited (occasional small movements or changes in body position, but no large movements independently); completely restricted (total inability to engage in even small movements to change body position without help; slightly limited (small changes in movement, body and limb position that can be done independently; and no restriction (large and frequent changes of body position can be performed without assistance).

RESULTS: The result was finding key elements that would be required for designers who prepared a new prototype of a next-generation bed to serve the following functions:
• Provide patients with greater personal independence in self-care, mobility and communication;
• Reduce the need for direct assistance and physical strength of assistants to ensure that the person receiving care is moved or changed in bed;
• Improve the environment of the home with a functional bed that has assistive technologies as part of its design.

DISCUSSION AND CONCLUSION: Functional beds available in Latvia are in practice only partially resolve the problems of long-term bedridden patients in terms of their care and the fact that it is not really possible to ensure an appropriate quality of life for such patients;

Studies like this provide evidence-based data on potential improvements and development of new concept of functional beds that could ensure better quality of life for bedridden long-term patients and improve health risks for patients and caregivers.

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The Effects of Distractor Inhibition on Space Exploration Gaze Behavior in a Visual Immersive Virtual Reality Search and Distractor Inhibition Task: Implications for Neurorehabilitation

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BACKGROUND: The ability to ignore irrelevant information during a visual task decreases with increased age[1,] as well as contrast sensitivity and visual pathway, resulting in reduced visual exploration performance[2]. Supplementary to age, stroke can lead to attention impairments such as hemineglect[3]. Hemineglect individuals, in addition to spatial attention impairments, can show distractor inhibition difficulties[4]. We created REAsmash[5], an immersive virtual reality (iVR) serious game to simultaneously identify spatial attention and distractor inhibition impairments, based on the Treisman's feature integration theory[6].

AIM: Combining for the first time REAsmash with eye-tracking (ET), we aimed to add new understanding of how inhibition demands influenced gaze behavior in different age groups. We hypothesised age-related differences, with the older being less efficient, particularly in low relative to high saliency target-distractors contrast conditions. We expected no lateral bias (as seen in hemineglect).

METHOD: REAsmash was developed on the HTC Vive Pro eye for iVR and ET. REAsmash consisted of a 3D garden containing 24 molehills from which a target mole and other distractors could emerge. In level 1 (baseline), no distractors were presented. Levels 2 to 4 consisted of high saliency target-distractor contrasts while levels 5 to 7 are low saliency target-distractor contrasts. We tested three groups of 15 healthy participants each (20-39; 40-59 and 60-75 years). Responses were made with dominant hand. Independent variables: group, target-distractor saliency (low vs high), distractor number (11, 17 or 23) and target laterality (ipsi- vs contra-lateral to the dominant hand). Dependent variables: mean response time to hit the target and ET metrics (e.g., fixation number, duration and localization; capture/recapture fixation rate and path complexity).

RESULTS: We found a significant response time main effect for target-distractor saliency and distractor number, and a significant interaction between these two variables. Only for the low saliency condition, response time increased with distractor number, replicating the Triesman effect. There was a significant group effect, and group salience and distractor interaction, with the older group having a bigger inhibition cost. ET analyses show consistent results.

DISCUSSION AND CONCLUSION: REAsmash provides an excellent tool to investigate target-distractors inhibition performance. We currently investigate post-stroke participants. We expect overall longer exploration times prior to target selection, with hemineglect subjects' scan paths particularly influenced by low relative to high saliency conditions. Gaze behavior may determine the reasons for slower lateralised performances in hemineglect. REASmash with ET metrics provides a new tool for the clinical assessment of post-stroke, improving diagnosis with consequent impact on rehabilitation care.

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The Variety of Professional Roles of a Social Worker at URI Soča, Department for Rehabilitation of Patients After Traumatic Brain Injury, Multiple Sclerosis and Other Neurological Diseases

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BACKGROUND: Social workers at URI Soča engage in a large number of diverse roles for successful, individualised social work practice, ranging from informants and organisers to motivators, listeners, teachers, allies and advocates. Because the working methods and roles that may work for one person may not necessarily work for another, social workers seek and co-create solutions through a wide range of techniques, methods and theoretical knowledge. Among other we draw knowledge from action research, which can serve as a guide to practice in exploring the social network of people in rehabilitation, as well as a professional and theoretical basis for describing the range and complexity of the roles that social workers take on.

AIM: Our research explores the diverse roles of social workers in health care. Simultaneously, we also explored the potential improvements of the clinical practice itself by highlighting the roles that aren't often taken by the practitioners.

METHOD: Qualitative analysis of forty randomly selected social work practice case files unveils the complexity and diversity of the social worker's role within the rehabilitation team.

RESULTS: This contribution is based on the results of a study with a special emphasis on the recognition of the diversity of professional roles taken on. The roles we have focused on are: trainer, connector, advocate, activist, teacher, mediator, advisor, coordinator, provider and provider.

DISCUSSION AND CONCLUSION: Clinical practice in social work demands a versatile approach as we navigate intertwined roles, making precise distinctions challenging. Undoubtedly, professional roles express the essence of social work in rehabilitation, i.e. to provide individual help and assistance to patients, by achieving their maximum involvement and decision-making power and treat them holistically, so that they remain competent for their lives. Recognizing and fortifying individual’s sources of strength, with a co-created goal in the direction of the desired changes. Given the complexity, continuous reflection on patients' expectations, role definition, collaborative solutions, and self-evaluation in clinical practice is paramount.

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Factors Influencing Patient Preference for Gait Assistance Robots in Stroke Patients

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BACKGROUND: Robotic-assisted gait therapy (RAGT) is a promising approach for enhancing walking recovery in stroke patients (Hidler, 2009). RAGT devices are broadly categorized into end-effector robots and exoskeleton robots, with exoskeleton robots further divided into static type and wearable type (Calafiore, 2022). Among these devices, selecting a suitable robot based on the patient's characteristics is crucial.

AIM: While numerous studies have investigated the efficacy of different robotic devices, limited research has explored patient preferences. Therefore, this study aims to investigate the factors that influence patient preferences for gait assistance robots in stroke rehabilitation and the effects of RAGT

METHOD: We recruited 16 patients in the early subacute stage of stroke with a Functional Ambulation Category (FAC) score of 2 or less. Prior to RAGT, we assessed their walking ability including manual muscle testing (MMT), Berg Balance Scale (BBS) and the 10-meter walk test (10MWT) and evaluated psychological status using the Hamilton Depression Scale (HDS) and Hamilton Anxiety Scale (HAS). Before training, all patients experienced both a static type of gait assistance robot (Walkbot, P&S Mechanics, Seoul, Korea) and a wearable type (Angel Legs M20, Angel Robotics, Seoul, Korea). They then chose a robot they would use for further training. RAGT was conducted for 30 minutes a day for two weeks. After the end of the training period, we re-measured MMT, BBS, HDS, HAS, and 10MWT, and asked patients whether their robot preferences had changed or not. Logistic regression was used to examine patient factors influencing initial robot selection. We used the Wilcoxon rank test to compare pre- and post-training test results for patients who changed their robot preferences. A paired t-test was conducted to assess the effectiveness of patient-selected robot training. The level of significance was set at $p<0.05$.

RESULTS: FAC had the most significant impact on robot preference, followed by HDS and MMT. Six patients changed their preferences from static to wearable gait assistance robots after training. These changes correlated with improvements in FAC, MMT, BBS, and 10MWT. When comparing the pre and post-training tests, significant improvements were observed in FAC, MMT, BBS, 10MWT, and HAS.

DISCUSSION AND CONCLUSION: Walking ability, balance, leg strength on the hemiplegic side, and psychological status influenced the patient preferences for the static type gait assistance robot. RAGT, even based on the patient's preference also proved effective in gait rehabilitation. Understanding the factors influencing robot preference allows for the personalized application of robots which can enhance the effectiveness of RAGT. This study will be able to provide insights into selecting robots based on the patient's functional state in operating a robot rehabilitation center.

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Robot-Assisted Gait Training in Parkinsonism: A Prospective Randomized Controlled Study

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BACKGROUND: Patients with Parkinsonism has a common neurologic disease resulting in a progressive, degenerative disease manifested by motor and non-motor symptoms [1]. Robot-assisted gait training (RAGT) is believed to offer promising benefits; however, there is still limited research regarding the optimal treatment approach. This includes areas such as specific treatment targets, types of robots, the methods used by these robots, potential synergies when combined with other treatments, and so on [2, 3]

AIM: The aim of this study is to investigate the effect of RAGT, using the end-effector type gait robotics “Morning Walk®”, on improving motor and non-motor symptoms in patients with Parkinsonism.

METHOD: This study was a prospective, single-center, randomized controlled trial. Twenty Parkinsonism patients were recruited and randomly allocated to two groups: the RAGT (n=9) and the conventional physical therapy (CPT) group (n=11). Both groups underwent a total of 18 sessions (30 minutes/day, 3 days/week for 6 weeks). The former was treated with the end-effector type gait robotics "Morning Walk®," while the latter received therapeutic exercises (including stretching, strengthening, proprioceptive exercises, balance, and walking training) and/or manual therapy techniques, such as joint mobilization or neuromuscular techniques. The primary outcomes were the 2-minute walk test (2MWT) and 10-meter walk test (10MWT). The secondary outcomes of motor symptom were Berg Balance Scale (BBS), Timed Up and Go Test (TUG), New Freezing of gait questionnaire (FOG-Q), the Movement Disorder Society-Unified Parkinson’s Disease Rating Scale (MDS-UPDRS) part II and III. Non-motor symptom were assessed by MDS-UPDRS part I and Non-Motor Symptoms Assessment Scale (NMSS). These measures were evaluated at two different time points; E1 (pretreatment) and E2 (post-treatment).

RESULTS: The results showed a significant improvement in 2MWT in both the RAGT (E2-E1: 14.00±12.80 meter, p=0.007) and the CPT (E2-E1: 8.25±7.69 meter, p=0.019) while 10 MWT showed significant improvement only in the RAGT (E2-E1 -3.20±4.33 second, p=0.005) in the within-group comparison. For the within-group comparison to the secondary outcomes of motor symptom, BBS (p=0.004) and TUG (p=0.042) showed significant improvement while MDS part II (p=0.010) and III (p=0.036) showed significant decrease only the RAGT. Both group showed significant decrease in MDS part I (p=0.035 in RAGT and p=0.044 in CPT). In non-motor symptom, RAGT showed significant decrease in NMMS (p=0.028 in total, p=0.043 in anxiety subscale, p=0.042 in urinary subscale, and p=0.039 in gastrointestinal subscale) whereas the CPT did not. There were no other significant differences between groups.

DISCUSSION AND CONCLUSION: RAGT can be one of the effective treatments for Parkinsonism in improving both motor and non-motor symptoms. However, in order to become a more reliable treatment, larger scale studies are necessary.

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Robotic Evaluations and Treatments in Neuromyelitis Optica: A Case Study

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BACKGROUND: Neuromyelitis optica (NMO), also called Devic's disease, is a rare autoimmune disease of the central nervous system (annual incidence of 1 in 1 million) (Hor, 2020).
It is characterized by acute episodes of transverse myelitis and optic neuritis. There is a loss of astrocytes, demyelination in the spinal cord, optic nerve and brain due to the presence of anti-Aquaporin-4 antibodies.
The diagnostic criteria are therefore the presence of AQP4-IgG and clinical and instrumental manifestations of involvement of the nervous structures. (Dean2015).
Typical clinical features of NMO include (Jasiak-Zatonska2016): eye pain with visual difficulties; transverse myelitis with paraplegia, paresis, spasms and muscle weakness, pain, sensory deficits and bladder dysfunction, joint limitations; difficulty walking; loss of balance; high risk of falling.
Hunova is a robotic device for the rehabilitation and sensorimotor functional evaluation of the lower limbs and trunk. The advantage of using a robotic system is to allow the patient to carry out both passive and active exercises precisely calibrated and above all monitored with regard to movement, speed, force and time

AIM: Objective of treatment with Hunova: to obtain an improvement in balance and greater safety during ADLs through the use of 3 protocols structured to be progressively more difficult.

METHOD: the patient in question is a 51 years old woman, who has been suffering from NMO since 1992. MRI shows involvement at the level of the dorsal cord and the left optic nerve
On physical examination the upper limbs are not affected, while weakness and hypoesthesia of the lower limbs are detected; stiffness and weakness of the trunk muscles; walking possible with two antibrachial sticks, with a significant deficit in knee and hip flexion.
The three protocols used involve performing exercises in a sitting and standing configuration for 5 weeks. 4 evaluations were carried out with Hunova: at the beginning, at the end and two intermediate evaluations.

RESULTS: The results on balance proved to be in line with a 2015 Review (Park2015) which states the effectiveness of using an External Focus to train balance.
The results on mobility, however, are less positive, although there are studies (Gokeler2015) that support the importance of using an External Focus to improve a movement.

DISCUSSION AND CONCLUSION: the results of this work suggest the effectiveness of robotic treatment with the Hunova system for balance in patients suffering from neuromyelitis optica. However, it should be underlined that the study concerns a single subject and that to confirm the results obtained, it would be necessary to analyze a larger sample.

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Effect of Walking Training With ReWalk Restore™ Soft Exoskeleton on Quality of Life, Coordination and Performance in Post-stroke Patients: A Randomized Clinical Trial

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BACKGROUND: Stroke is one of the most frequently occurring diseases worldwide and leads to permanent disability. Robotic technologies can appear in many forms in stroke rehabilitation. More than half of stroke survivors experience some level of lasting hemiparesis or hemiplegia resulting from the damage to neural tissues. These patients are not able to perform daily activities independently.

AIM: The aim of the research was to compare robotic assisted therapy (ROB) with standard therapy treatment (STT) in stroke rehabilitation.

METHOD: The subacute stroke participants (n=30) were divided into two groups: Robotic+Standard Therapy (ROB, n=15) group and Standard Therapy (STT, n=15) group. Participants were assessed at three different time points: pre-intervention (baseline), post-intervention (immediately after the intervention) and follow-up (some time after the intervention). During Robotic Therapy Treatment (ROB), patients received standard therapy with robotic treatment. During Standard Therapy Treatment (STT), only standard therapy is used. The primary outcome is the modified Rainkin scale (MRS), which is a stroke-specific questionnaire. Secondary outcomes are balance, walking ability, coordination and quality of life. (Berg Balance Scale, 6MWT, 10M walk test, Barthel Index)

RESULTS: ROB improved MRS median scores. Post-hoc analyses showed that the 2-unit pre-to-post improvement by ROB was significant and the additional 1-unit improvement at follow-up was also significant. STT also improved MRS median scores; post-hoc analyses revealed that the 1-unit pre-to-post improvement by STT was significant but did not change further by follow-up. The 1-unit between-group difference at follow-up was significant. There were significant differences between ROB and STT in Berg Balance, 10m walking, 6MWT improvement differences. There were also significant differences in follow-up results in Barthel-index.

DISCUSSION AND CONCLUSION: The use of robotic therapy can be useful in the rehabilitation after stroke. These devices support the restoration and improvement of movement in different ways and can help restore balance and stability.

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The Advantages of Robotic Assisted Gait Training in Stroke Rehabilitation

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BACKGROUND: Robotic assisted gait training (RAGT) has been prescribed to help stroke patients regain ambulation stability. However, the results occasionally become equivocal.

AIM: In this clinical observation, a criterion of patient selection was tested to evaluate the advantage of RAGT in stroke rehabilitation.

METHOD: From Jan. 2021 to Dec. 2023, a total of 2340 times of RAGT by MRG-P100 were performed at Jen-Chun Hospital for 95 stroke patients (less than 2 years after onset), with an average of 26 times per patient. There were 58 males and 37 females, the average age was 61.9 ± 9.2 years. These patients were classified into two groups according to the status of motor recovery. 50 patients harboring Brunnstrom stage III and above belonged to group A, 45 below stage III as group B. The 6-meter walking test was used to evaluate the result of RAGT with a standard of 0.8 m/sec.

RESULTS: After more than 20 sections of training, 40 patients in group A (80%) reached the standard walking speed, that happened in 12 of group B (26.7%). The difference between group A and B was very significant ($P < 0.01$).

DISCUSSION AND CONCLUSION: The result of this clinical observation reveals the importance of patient selection before prescription of RAGT. Those patients present with motor recovery of Brunnstrom stage III and above may be able to retain social walking following RAGT within 2 years of stroke onset. Although the other patients cannot reach the standard walking speed, they usually report revived after training.

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The Effectiveness of Hybrid Robotic Gait Training System in a 16-Year-Old Stroke Patient: A Case Report

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BACKGROUND: Robot-assisted gait training has been introduced as a practical treatment adjunctive to traditional stroke rehabilitation to provide high-intensity repetitive training. The design of robots is usually based on either the end-effector and exoskeleton method. The novel Robot Gait Training System (RGTS), a hybrid mixed type of end-effector and exoskeleton, tries to combine advantages from both methods.

AIM: Robot-assisted gait rehabilitation has been proposed as a plausible supplementary rehabilitation strategy in stroke rehabilitation in the last decade. However, its exact improvement over rehabilitation of post-acute care remains sparse and unclear, especially in younger patient. It is therefore the purpose to report the clinical improvement of the additional robot-assisted training in a 16-year-old stroke patient.

METHOD: A patient received an additional 30 min RGTS sessions totally 20 times for 2 weeks. The outcome measures included the Brunnstrom Stage, Manual Muscle Test-lower extremity (MMT), Modified Ashworth Scale (MAS), Lower Extremity subscale of the Fugl-Meyer Assessment (FMA-LE), Functional Ambulatory Classification (FAC), Timed Up and Go test (TUG), Berg Balance Scale (BBS) and Modified-Functional Reach Test-forward. These measurements were performed at the pretest and posttest.

RESULTS: The patient demonstrated improvement in the Brunnstrom Stage, MMT, FMA-LE, FAC, TUG and BBS, which indicated improvements substantially across the neurological status, muscle strength, movement control, ambulation, transfer and balance after intervention.

DISCUSSION AND CONCLUSION: This hybrid RGTS thus leverages the advantages of both system types. Our system as designed for use in patients who exhibit severe leg dysfunction and insufficient active control of the paretic leg, which would hamper conventional standing or ambulation training.
The addition of robotic gait training and high-intensity repetitive training on top of standard hospital neurorehabilitation for a younger stroke patient appear to produce an improvement in clinical functional outcomes.

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Influence of Robotic Therapy on Gait Rehabilitation After Stroke

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BACKGROUND: The loss and/or decrease in the ability to move is among the main complaints related to functional disabilities generated by Acquired Brain Injuries. There is growing research related to the use of robotics to improve gait performance. Gait training using a robotic device involves a high number of movement repetitions and, according to the literature, has demonstrated benefits related to improved gait performance 1,2.

AIM: To identify the effects of botulinum toxin type A on the functional independence of post-stroke spastic hemiparetic individuals.

METHOD: This was a case report of a 33-year-old female patient, with aphasic right-sided spastic hemiparesis due to the sequelae of a stroke two years ago. The patient underwent 14 sessions (twice a week, lasting 30 minutes each) of robotic gait therapy (LokomatNanos), for the first time.
Gait assessment was carried out before and after robotic therapy using the following tests: Functional Ambulation Categories (FAC), 10-meter walk test; Six-minute walk test; Time up and Go (TUG) and gait cadence. The present study was approved by the Ethics and Research Committee with Human Beings of Universidade Lusiadas, Brazil (No. 3533882).

RESULTS: In the moment before the robotic gait training, the patient presented TUG (20 seconds), 10-meter walk test (20 seconds), 6-minute walk test (75m) and a cadence of 51 steps/minutes. After the intervention, she performed TUG (16 seconds), 10-meter walk test (13 seconds), 6-minute walk test (244m) and cadence of 82 steps per minute. There was no difference in FAC (FAC 3).

DISCUSSION AND CONCLUSION: The Lokomat robotic system consists of an exoskeleton used for gait training for patients in a physical rehabilitation program. Studies have demonstrated significant effectiveness of this continuous and intensive robotic training on gait performance in patients with hemiparesis after stroke, especially when compared to gait training in conventional physiotherapy 1,2.
Robotic gait training with a high number of movement repetitions has shown benefits in gait performance, even in chronic patients. Our patient in the chronic phase showed positive improvements in functional aspects, with a marked improvement in gait speed, after the intervention.

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Telerehabilitation – The Educational Perspective From the Point of View of Two Eramus+ Projects

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BACKGROUND: From the available studies, there is moderate-to-good quality consistent evidence to indicate that telerehabilitation may be as effective as usual care. Other advantages include equal access for patients from remote areas, lowering costs for transportation, better adherence to the treatment, and better satisfaction of patients. During COVID 19 crisis many rehabilitation clinics oriented to this type of service, but found that their employees lacked the theoretical and practical knowledge to provide the service. Until now the educational offer regarding telerehabilitation is very limited. Several studies regarding the evaluation of telerehabilitation knowledge, awareness, and opinions of physical therapy professionals indicated that the majority of the respondents stated that even if the topic is of great interest, they were not prepared for telerehabilitation due to the lack of curriculum.

AIM: The present paper presents new educational approaches for online rehabilitation in the framework of two Erasmus + projects. The main aim of the projects was to enhance the theoretical knowledge, skills, and competencies regarding telerehabilitation and to train physiotherapy professionals to use these resources in order to develop digital skills for telerehabilitation as needed by the labor market.

METHOD: The methodology for delivering e-KINE project outputs was tailored to the target group's needs. The delivered educational materials were included in an interactive platform, aiming to teach physiotherapy professionals how to manage online patient evaluation and rehabilitation but also how to build and manage their own online rehabilitation virtual space. The training path prototype (environment and content) was tested internally by all project team members and by a group of trainees and patients (iterative and formative evaluation) with feedback to identify potential changes that were incorporated into subsequent forms.

RESULTS: The partnership developed online courses regarding theoretical aspects of telerehabilitation, a database including 100 protocols and correspondent videos for online rehabilitation, and a virtual medical environment as a pilot application of the e-course. Innovation included the development, testing, and implementation of new teaching/learning methods such as open and flexible learning, open educational resources, real problem-based teaching and learning through virtual consultations, and treatment of patients under teachers’ supervision.

DISCUSSION AND CONCLUSION: Online rehabilitation services represent a contemporary problem-solving idea for physiotherapists' education and professional development. The educational offer in physiotherapy lacks courses related to digital competencies for online rehabilitation services. The development of sustainable learning tools for lifelong learning will encourage telerehabilitation replication and promote transferability.
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Telemedicine and Conventional Use of Standardized Questionnaires and Rehabilitation Protocols in People With Multiple Sclerosis

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BACKGROUND: Treatment of people with multiple sclerosis, in addition to drugs, also includes rehabilitation. During the Covid 19 pandemic, rehabilitation models were significantly changed; their availability, intensity, volume and outcome evaluation. The four basic types of rehabilitation are: inpatient rehabilitation, outpatient rehabilitation, rehabilitation in the patient's home and telerehabilitation. The prescription of rehabilitation modalities, their types, intensity, frequency and duration differ significantly. The advantages and disadvantages of each of these models must be measurable so that the treatment outcome can be predictable The use of functional indices, diagnostic indices and disease activity indices enables interobserver and intraobserver comparison, both inter-entity and inter-specialist.

AIM: The study aimed to:
1. increase the availability of rehabilitation
2. standardize the prescription and implementation
3. monitor the outcome of treatment
4. reduce the treatment costs.

METHOD: The study included adult patients of both sexes who have been diagnosed with multiple sclerosis in accordance with McDonald's criteria from 2017. 40 persons where included in the study in order to obtain an adequate number of respondents in all groups and achieve sufficient statistical power of the sample. The subjects were randomly selected patients who were treated at the KBC Zagreb Neurology Clinic. The control group were the respondents themselves due to the ethics of the research. Contact with patients has been within the framework of conventional direct contact in outpatient and inpatient conditions and telemedicine contact, which included image and sound contact via digital platforms: smart mobile phones and/or computers. Variables within and between groups have been examined, and treatment outcomes have been measured according to standardized questionnaires by comparing initial and final measurements. The digital platforms Doxy.me, Zoom, Viber, WhatsApp, FaceTime, Google Meet, Teams and Skype had been used. Anamnesis data, findings of clinical examination, laboratory diagnostics, imaging diagnostics, and standardized questionnaires of perception of effort (Borg RPE), functional disability index (EDSS) and psychiatric questionnaire (DASS-21) have been used. Rehabilitation procedures that could be carried out via telemedicine had been applied, and had included sensory, motor, breathing, transfer, standing, balance and sphincter control exercises. The form and type had been implemented according to the FITT principle in accordance with recent recommendations. Descriptive and experimental statistics were conducted

RESULTS: Patients who received telerehabilitation protocols demonstrated improvements in all measured parameters.

DISCUSSION AND CONCLUSION: Telerehabilitation contributes to a better treatment outcome, both independently and applied with other forms of rehabilitation, especially when other forms are less available (Covid 19 pandemic). The use of standardized questionnaires contributes to the uniformity of prescription and the predictability of treatment outcomes with conventional rehabilitation protocols. The use of functional indices, in particular, the Borg scale of perceived effort, significantly contributes to the inclusion, monitoring and outcome of the rehabilitation process.

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Telerehabilitation for Post-stroke Individuals: A Feasibility Study

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BACKGROUND: Telerehabilitation is a subset of telemedicine. It can be defined as the delivery of rehabilitation services through information and communication technologies. It mainly includes remotely supervised self-rehabilitation programs. Telerehabilitation is a promising solution for post-stroke individuals. In fact, they are not sufficiently active and their rehabilitation intensity is not optimal. Including telerehabilitation in neurorehabilitation programs would make it possible to prolong and intensify their rehabilitation treatments.

AIM: The aim of this feasibility study is to investigate, using a cohort design, the usability, adherence, and satisfaction of post-stroke individuals with our original telerehabilitation program called "TeleRe". This TeleRe program is a tablet application developed with the REAtouch® Home software.

METHOD: The TeleRe program includes motor and cognitive self-rehabilitation exercises presented using video and serious games. It also contains therapeutic education modules and PROM-type questionnaires. Individuals can also be personally monitored remotely by the therapist via teleconferencing.
Inpatients and outpatients were recruited during the subacute and chronic phases of stroke rehabilitation. The TeleRe program was used by each individual for four weeks and they were asked to use it 5 times 30 minutes a week to carry out their personalized exercise routine. An initial visit was organized to train and coach participants in the use of the program. Lists of therapeutic exercises were tailored by the rehabilitation specialist. Then, during one or two subsequent teleconference visits, coaching was continued as needed, along with the adjustment of these personalized exercise lists.
After four weeks of usage, surveys utilizing the Likert scales and the System Usability Scale (SUS) were conducted to evaluate the usability of TeleRe and the satisfaction level of individual users. In addition, data was collected from the devices on the frequency and duration of connections to the program to assess adherence.

RESULTS: A total of 27 individuals were included. The average post-stroke time was 7.3±7.6months and mean age was 56±16,3. The mean score on the Fugl-Meyer Assessment for upper extremity (pre intervention) was 46.3±15.1/66 and the average Barthel Index score was 87.3±12/100. They rated the usability of TeleRe as excellent, yielding an average SUS score of 80±11.3%. They were very satisfied with their telerehabilitation experience, scoring on averaged 7.8±1.1 out of 10 on the Likert scale. Concerning adherence, patients logged on to the program an average of 4±2.6 times a week, and the average recording time was 15±4.5 minutes.

DISCUSSION AND CONCLUSION: This feasibility study showed that TeleRe has excellent usability and is satisfactory in post-stroke individuals. Their adherence to treatment expectations was below the expected levels. However, patients did devote extra time to active exercises, which should be beneficial for their recovery. Rehabilitation was heightened by an average of 60 minutes per week. In conclusion, it appears that the TeleRe program represents an interesting supplement to conventional rehabilitation, which warrants further evaluation through a controlled clinical trial.

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The Use of Telerehabilitation in Oncogynecology

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BACKGROUND: The project focuses on the issue of oncological rehabilitation of patients with gynecological malignant tumours (cervical, uterine, ovarian) undergoing surgical treatment. The incidence and mortality of these diseases is high, so this is a socially serious problem for which it makes sense to find a solution. Several studies have already demonstrated the positive effect of rehabilitation in this group of patients, a reduction in the risk of perioperative and postoperative complications, a reduction in stress levels, a reduction in the length of hospital stay and subsequently the recovery time. Therefore, in addition to having a positive effect on patients, it also reduces the cost of cancer treatment.

AIM: The aim is the development of a new diagnostic and therapeutic telemonitoring method for oncological rehabilitation, including technologies for home telemonitoring of cardiorespiratory and motoric parameters of patients. The next goal is the clinical application of a new diagnostic and therapeutic telemonitoring method for oncological rehabilitation including objective and subjective evaluation of the effectiveness of the developed assistive system including verification of its applicability in clinical oncological practice.

METHOD: For the development of a new device for telemonitoring of patients, breathing trainers were used and a special mobile application was also developed. Patients regularly performed breathing exercises and other exercises to improve physical condition. Standardized objective tests were used to evaluate cardiorespiratory potential and muscle strength (6-MWT-6-minute walk test, Borg RPE scale-Borg rating of perceived exertion, 5xSST Five Times Sit to Stand, hand grip), ICF (International Classification of Functioning, Disability and Health). Subjective instruments (NRS-Numeric Pain Scale, WHODAS 2.0-Disability Assessment Questionnaire) were also used.

RESULTS: A system for telerehabilitation of oncology patients was developed. Within the pilot study, a significant improvement in most of the investigated parameters was demonstrated.

DISCUSSION AND CONCLUSION: There are currently few resources on this topic in the published literature. More detailed research can be found in colorectal cancer patients. Expertly guided physical activity is an important part of cancer treatment before and after surgery. Telerehabilitation contributes to increased motivation, and patients and therapists can monitor exercise regularity and effectiveness. This form of rehabilitation has the potential to reach a wider group of patients and is easily accessible.

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The Role of Intermittent Traction in the Treatment of Cervicobrachial Syndrome: A Case Report

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BACKGROUND: Cervicobrachial syndrome (CBS) is characterized by neck pain radiating to the arm (one or both), often accompanied by tingling, discomfort, or numbness, with or without associated headache [1]. CBS prevalence peaks around 50, prevalent among individuals with physically demanding occupations. Degenerative changes and disc herniation commonly underlie CBS. Diagnosis relies on history, clinical examination, and imaging modalities like X-ray, MRI, MSCT, and EMNG [2].

AIM: To demonstrate the efficacy of conservative management and intermittent cervical spine traction in CBS treatment.

METHOD: A 50-year-old male truck driver with chronic CBS experienced recurrent exacerbations over two years. Recent symptoms included escalated neck pain radiating to the right arm, with intermittent hand tingling (VAS pain score: 7/10). Clinical findings showed restricted right head rotation, positive plexus brachialis stretch test, and slight right-arm hypoesthesia. Imaging revealed cervical spine degeneration.
A 10-day treatment plan encompassed neck and cervicobrachial kinesiotherapy, TENS for the neck and arm, and ultrasound for paracervical muscles. Additional 45-minute daily home exercises were advised. Follow-up showed pain reduction to 6-7/10, minimal clinical change, and MSCT evidence of disc protrusion and spondylophyte complex. Subsequent 10-day therapy incorporated prior modalities, with intermittent traction of the cervical spine in the supine position starting at 4 kg and escalating every second day up to 12 kg. Traction sessions lasted 12 minutes daily.

RESULTS: After treatment, the VAS pain score decreased to 2/10, the plexus brachial stretch test normalized, and minor C6-C7 dermatomal hypoesthesia remained. The patient received guidance for ongoing exercise continuation.

DISCUSSION AND CONCLUSION: Intermittent traction's role in CBS treatment has been debated [3-5], but this case underscores its efficacy when combined with kinesiotherapy and electrotherapy. Consistent exercise implementation is crucial for preventing CBS reoccurrence.

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Detection of the Effects of Central Lymphatic Drainage and Myofascialtechnique as a Part of Combined Treatment on Echocardiography

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BACKGROUND: Calcific aortic valve disease (CAVD) is characterized by valvular fibrosis and calcification and driven by differentiating valvular interstitial cells (VICs) (1). Non-invasive therapy of aortic stenosis includes drug therapy and central lymphatic drainage . Central lymphatic drainage promotes the emptying of interstitial spaces by encouraging phase contractions of lymphangion myocytes by manually stretching them, which leads to flow-dependent diastolic relaxation. This improved diastolic filling makes lymphatic contractions stronger and propels more fluid forward during each contraction while decreasing contraction frequency. Such reduction in lymphatic tone is a regulatory mechanism that maintains pumping in the thoracic duct in a manner to conserve energy/increase efficiency which, i.a. lowers HRT, moves more fluid forward during each contraction while decreasing contraction frequency (2).

AIM: To demonstrate the significance of manual central lymphatic drainage as a part of treatment in aortic valve fibrosis as well as in other heart disorders.

METHOD: This is a case report paper. No similar cases are found in the literature.

RESULTS: Patient came for treatment to the author, after the patient had echocardiography done on 16.02.2022 which demonstrated that the aortic valve is tricuspid, with aortic regurgitation (AR) 2+. Her treatment included central lymphatic drainage, myofascial therapy, craniosacral therapy, visceral therapy, and vagus nerve stimulation. The echocardiography check-up of July 30, 2023 demonstrated AR grade 1+.

DISCUSSION AND CONCLUSION: This improvement might have resulted from administered medications(the patient was prescribed Concor) but it also could have been assisted by lymphatic drainage which, by stimulating the flow of the lymph in the central lymphangion. supported back flow of the lymph into venous blood thus „ releasing " space for peripheral lymph. It could also have assisted the free flow of interstitial fluid, which can be significant for pathogenesis of aortic valve fibrosis. It is possible that mobilizing macrophages from interstitial spaces decreases the content of M1 proinflammatory macrophages in favor of activation of M2 anti-inflammatory and immune regulatory M2 macrophages (3).M2 macrophages contribute to the control of inflammatory process through the release of IL10, arginase, TGF-β and HO-1, a process which promotes controlled wound healing and tissue regeneration (4).

CONCLUSION: manual specialized methods, including central lymphatic drainage, can have their place not only in rehabilitation but also in treating cardiovascular diseases. However, this field requires more thorough investigation.

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Safety of Combined Extracorporeal Shockwave-Radiofrequency Heating Device in a Porcine Model

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BACKGROUND: Extracorporeal shock wave therapy (ESWT) is a widely used modality for musculoskeletal disorders that has therapeutic effects through shock wave transmission. Radiofrequency (RF) therapy is a deep heating modality that increases blood flow and promotes metabolism, and is also commonly used in MSK pain management. In general, each modality has been applied one by one, but studies on the modality of simultaneously delivering two different mechanisms with one probe are rare.

AIM: The purpose of this study is to confirm the safety of ESWT-RF combination therapy targeting tendons and muscles in a porcine model.

METHOD: Four pigs weighing about 3kg were assigned to each of the four groups. For each limb of each pig, one tendon (common extensor or achilles tendon) and one muscles (Triceps brachii or biceps femoris muscle) were selected as stimulation sites. Group A was set as the untreated control group, and groups B, C, and D were set as the minimal intensity (2 Bar-10 Watt), the intermediate intensity (3 Bar-15 Watt), and the maximal intensity (4 Bar-20 Watt), respectively. Tendon sites were treated once a week for 10 minutes (3000 shocks and 5Hz for ESWT) per session for 3 weeks. Muscle sites were treated twice a week for 15 minutes (2700 shocks and 3Hz for ESWT) per session for 3 weeks. RF was delivered in pulsed mode (1s on/1s off) with a frequency of 450 kHz. The safety assessment was conducted in accordance with the guideline for the biological safety evaluation of medical devices of the Korean Ministry of Food and Drug Safety. First, as test for skin sensitization and irritation, erythema and edema of skin were identified and scored according to the scoring system by the guideline at 1 hour, 24 hours, 48 hours, and 72 hours after stimulation. Second, as a cytotoxicity test, hematoxylin and eosin stain of muscle and the skin in its area (muscle-skin), and tendon and the skin in its area (tendon-skin) tissues were also performed after the end of treatment and scored by the tissue injury scoring system.

RESULTS: First, in the test for skin sensitization and irritation, group D showed a significant increase in both erythema and edema in the skin of muscle and tendon sites than group A, B and C. Group B and C showed a mild level of erythema and edema. Second, in the cytotoxicity test, Groups B and C showed no abnormalities, and only group D showed inflammatory cell infiltration and histological damage. The tissue injury score of group D were 1.25±0.6 for inflammation, 1.43±0.7 for necrosis, 1.81±0.9 for granulation tissue, and 3.62±2.4 for the total injury score.

DISCUSSION AND CONCLUSION: Significant tissue damage was seen only with 4 Bar-20 Watt stimuli, an intensity of 2 Bar-10 Watt or 3 Bar-15 Watt is recommended. In clinical practice, by monitoring the patient's response, adverse events may be reduced.

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Topical Applications of Natural Factors (Mud and Sulfurous Mineral Waters) on Neuro-Myo-Arthro-Kinetic (NMAK) Apparatus Effects Explored by Biological Investigations Using Various Blood and Biochemical Parameters.

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BACKGROUND: The spectrum of pathological conditions related to NMAK apparatus includes arthroses, arthritis, spondylitis, traumatic injuries, stroke, neurodegenerative diseases, muscle tone dysfunction, and joint mobility – spasticity; peripheral nervous system pathology: discogenic and/or vertebrogenic radiculopathies, poly-radiculoneuritis, limb amputations, post-COVID-19, peripheral nerves or central nervous system sequelae, neurogenic heterotopic ossifications, traumatic musculoskeletal pathology, including degenerative diseases, fractures, endoprostheses for osteoarthritis especially on hip joints, disabling knees, contusions, muscle contractions/retractions, algoneurodystrophies, pressure sores, eschars or burns. Natural therapeutic factors such as mud and sulfurous mineral therapeutic waters are used in sanatoriums and rehabilitation clinics as baths or topical applications on the body for many affections in the Neuro-Myo-Arthro-Kinetic (NMAK) pathology.

AIM: The aim of this study is to evaluate the therapeutic efficacy of natural therapeutic factors, specifically mud and sulfurous mineral waters, on Neuro-Myo-Arthro-Kinetic (NMAK) pathology. This will be achieved by integrating hyperspectral imaging (HSI) data with traditional biological investigations. The objective is to gain a deeper understanding of the cellular and tissue-level effects of these natural factors, focusing on vascular changes and tissue oxygenation, and to correlate these findings with clinical outcomes.

METHOD: Hyperspectral Imaging (HSI): The study will employ HSI to scan the regions of interest in subjects receiving natural therapeutic treatments. This technology will provide detailed spatial and spectral data, allowing for the mapping of chromophores concentrations, such as oxyhemoglobin and deoxyhemoglobin, thereby offering insights into vascular changes and tissue oxygenation at the cellular level.

Biological Investigations: Parallel to HSI, a comprehensive set of biological investigations will be conducted. These will include both standard laboratory tests (hematological, biochemical parameters) and clinical evaluations (electromyography, pulse-oximetry, pain scales like VAS, and range of motion assessments). This approach aims to provide a multi-dimensional understanding of the therapeutic effects, encompassing both the molecular and systemic responses to the treatment.

RESULTS:
1) biological data at the cellular, molecular and systemic level on laboratory animals and human subjects regarding the effects of mud and sulfurous mineral waters, thus having scientific arguments for their medical use;
2) methodology experimentally induced by neuro-/myo-/arthro-/kinetic pathologies in laboratory animals. Our study is focused on the creation of cell cultures, the induction of animal pathologies necessary for testing the method, the formation of study groups, the preparation of environmental factor solutions, the application of biological analysis methods, the acquisition of hyperspectral images of cells and exposed animals to various therapeutic environmental factors and their storage in a database, the

appropriate processing and analysis of hyperspectral images to highlight the effects of environmental factors at the cellular and tissue level, and the evaluation of the results from a biological and medical perspective.

DISCUSSION AND CONCLUSION:

Recommendations include regular monitoring of kidney and liver functions, personalized treatment plans, and lifestyle changes. The experimental results reveal an improvement in the state of tissue oxygenation; the changes in the distribution maps of oxyhemoglobin and deoxyhemoglobin are clearly visible. Consequently, we can say that the BIOHIS method can be considered a beneficial treatment in the healing of various pathologies in the NMAK field.

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An Ultrasonographic Study of Superficial Radial Nerve Providing Safe Zone for Injection in the Wrist

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BACKGROUND: The Superficial Radial Nerve (SRN) has a significant anatomical pathway, originating from the radial nerve in the proximal forearm, passing under the brachioradialis (BR) muscle, and then traveling over the first extensor compartment which contains the abductor pollicis longus (APL) and extensor pollicis brevis (EPB) tendons. SRN injury may occur during injection procedures near the wrist, such as those performed for De Quervain's tenosynovitis and intersection syndrome.

AIM: The objective of this study is to leverage ultrasonography to closely examine the anatomical relationships between the SRN and its adjacent structures, aiming to delineate a 'safe zone' for injection procedures in the wrist extensor compartments to prevent potential SRN injuries.

METHOD: The study incorporated 20 forearms from 10 healthy volunteers, excluding individuals with a history of cervical radiculopathy, peripheral neuropathy, or trauma in the upper extremity. While the subjects were in a sitting position with their forearms semi-pronated and elbows flexed at 120°, various measurements were taken, including the total forearm length and distances at different levels concerning the radius from the styloid process. The SRN was scanned in short-axis view at four defined levels based on predetermined landmarks. Both the proportions of longitudinal distances and the horizontal distances at each level were assessed, and the depths of each structure from the skin surface were measured.

RESULTS: The sample exhibited a mean age of 28.6 years, a BMI of 20.8 kg/m², and a forearm length of 24.9 cm. The SRN was consistently identified superficial to compartment I, crossing over from the volar (proximal) to the dorsal (distal) direction. Detailed measurements at each level, including the depths from the skin surface and horizontal distances from reference points, provided data to infer the relative positions of SRN to adjacent anatomical structures.

DISCUSSION AND CONCLUSION: The results of the study offer a deep insight into the relative location of the SRN to its surrounding structures. The data gathered aids in determining safe zones for injection procedures in clinical settings This observational study reveals relative location of SRN to adjacent structures. In clinical situations, it is suggested to perform injection for intersection syndrome at the level between 6.8±0.8 cm (27% of forearm length) and 2.8±0.9 cm (10%) from radial styloid process with a proximal needle approach to avoid SRN injury. The results also suggest safe zone for injection in the distal extensor compartment I at the level distal to 1.5±0.9cm (6%) from radial styloid process with a distal and volar needle approach.

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Musculoskeletal Ultrasound as a Diagnostic Tool in Radial Nerve Injury: A Case Report

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BACKGROUND: Introduction: Perioperative neuropathy is one of the rare complications following general anesthesia which can have a large negative impact on the patient's quality of life. The frequently injured nerves including: branches of brachial plexus, the ulnar, radial and common peroneal nerves. Direct damage from nerve block or surgery, compression injury from a self-retractor, hard operating table, or pneumatic tourniquet, and stretching due to malposition are the possible causes of perioperative neuropathy. The radial nerve is the least frequently injured nerve, accounting for only 3% of neuropathies.

AIM: Here we present a case of radial neuropathy following a vascular bypass surgey. The patient had no neurological disease, or any history that might have caused it.
METHOD:
RESULTS:
Case Report: A 58-year-old male patient was admitted to the Department of Physical Medicine and Rehabilitation with a wrist drop. He had a history of diabetes mellitus and peripheral artery disease. His complaints occurred immediately after the aortobifemoral bypass surgery he had last month. Neurological examination revealed hypoesthesia in the left thumb, left biceps and triceps reflexes were normal, and muscle strength for wrist and finger extension was 0/5, with triceps spared. Based on the history and physical examination, radial nerve entrapment was considered as a preliminary diagnosis. Because the patient only consented to a nerve conduction study and did not want a needle procedure, a full ENMG could not be performed. The SAP of the left radial nerve was absent, and the CMAP amplitude of the left radial nerve was lower than that of the right. Diagnostic ultrasonography revealed enlargement and edema of the left radial nerve at the level of the lateral intermuscular septum between the brachialis and brachioradialis muscles.
Oral nonsteroidal anti-inflammatory drugs and B-complex vitamins were prescribed, and a radial nerve palsy splint was applied. The patient was enrolled in a 15-session physical therapy program.

DISCUSSION AND CONCLUSION: Musculoskeletal ultrasound is a powerful diagnostic tool for grading and mapping peripheral nerve injuries. It is not only complementary to electromyography and nerve conduction studies, but also useful as a stand-alone diagnostic tool.

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The Importance of Ultrasonography in Rehabilitation After Hip Arthroplasty With High Risk a Deep Venous Thrombosis (DVT): A Case Report

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BACKGROUND: Deep vein thrombosis (DVT) was a fatal complication of hip arthroplasty. An assembly of physical exercices with early mobilization and stocking support prevent DVT (1). Doppler Ultrasonography permit to exclude DVT (2). Also ultrasounds exams are helpful in DVT rehabilitation to control the deep vein thrombosis in lower limbs (4).

AIM: The aim was to examinate the role of early mobilization, physical exercises, pharmacological prophylaxis, ultrasonography DVT control after hip arthroplasty (1,2)

METHOD: Caprini Score for DVT Risk Calculator and D-dimer levels were used. Ultrasounds exams were performed using Hitachi Arietta Ultrasound Machine. Early mobilization and an assembly of physical exercises with stockings support were applied to prevent postoperative DVT (1,2,6)

RESULTS: The early mobilization, physical exercices with compression stockings and pharmacological treatment reduces D-dimer levels after hip arthroplasty (1,3,5). Ultrasonography was useful to control the vein thrombosis in lower limbs (4,7)

DISCUSSION AND CONCLUSION: D-dimer cannot be used to exclude DVT without ultrasound confirmation. Ultrasonography allowed to differentiate new, active from old thrombosis in deep inferior limbs veins. Also Ultrasounds with D-dimer levels allowed to control DVT after hip arthroplasty (5). Pharmacological prophylaxis with assembly of physical exercices with early mobilization reduced the risk of DVT after hip arthroplasty. DVT confirmed by ultrasounds pictures permited to apply curative dose of anticoagulants during hip arthroplasty rehabilitation. The role of pre-rehabilitation with physical exercices in patients with high risk of DVT may be very helpful in the future (1,4,7).

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Pulsed Radiofrequency on Radial Nerve Under Ultrasound Guidance for Treatment of Wartenberg Syndrome

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BACKGROUND: Pulsed radiofrequency (pRF) stands as an effective interventional pain management technique, for addressing peripheral neuropathic pain conditions (1).
We present the case of a 17-years-old female student and volleyball player, who developed right lateral epicondylalgia with radiating forearm pain after a volleyball serve. She also experienced forearm paresthesia and subjective sensation of handgrip weakness. Initially, her symptoms partially improved without medical evaluation. However, pain persisted during volleyball practice, resistance exercises and prolonged writing. Physical examination showed tenderness 2cm distal to the right lateral epicondyle and pain during resisted forearm supination, but no sensory deficits and overall strength preservation. Provocative tests for lateral epicondylitis were negative. Initially, physiotherapy and focal shockwave therapy were prescribed, assuming lateral epicondylitis, albeit yielding no relief.
Upon revaluation and given the lack of clinical improvement, the diagnosis of Wartenberg syndrome was postulated. After successful diagnostic Superficial Radial Nerve (SRN) block with local anesthetic, the patient was considered for pRF neuromodulation.

AIM: To present pRF as a safe and effective minimally-invasive therapeutic approach to pain regarding Wartenberg syndrome.

METHOD: Ultrasound-guided pRF neuromodulation of the right SRN, via a 60mm radiofrequency Unified RF injection electrode, connected to a RF generator (G4, Boston Scientific), with pulsed electrical-field application for 6min. The active tip was positioned parallel to the SRN, which position was confirmed using sensory stimulation.

RESULTS: At 4-moths follow-up, there was an improvement from 5/10 to 2/10 on the Numeric Rating Scale (NRS) regarding pain and a subjective symptom improvement of 90%. At 12-months follow-up, the patient was still benefitting from the procedure, scoring 3/10 on the NRS.

DISCUSSION AND CONCLUSION: Wartenberg's Syndrome is a compressive neuropathy of the superficial sensory radial nerve, clinically diagnosed by pain and paresthesia over the dorsoradial hand without motor deficits. Surgical decompression may be considered when conservative treatments prove ineffective (2).
While pulsed radiofrequency has shown efficacy in managing various peripheral neuropathic pain conditions, evidence regarding its application to the radial nerve is scarce (1). To our knowledge there is no literature supporting pRF in Wartenberg Syndrome management.
PRF employs low-energy, pulsatile sequences to target neural tissue and microglia without the thermal effects associated with high-temperature radiofrequency ablation. This makes pRF a non-ablative, neuromodulatory method, offering more reversible and less destructive outcomes. Its mechanism of action involves disrupting neuronal membrane functioning, affecting nociceptive afferent pathways by interfering with action potential generation and ectopic firing (3).
In this case-report, there was a significant improvement, with pain only reported during extended writing sessions. After a 12-month follow-up, the patient showed no strength or sensory deficits and maintained full functionality during volleyball practice.

Thus, the following case-report supports pRF as a minimally-invasive treatment option that may attain a role in the step-up treatment algorithm of patients with Wartenberg Syndrome.

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Ultrasound Echo Intensity of Cervical Muscles in Healthy Adults With and Without Forward Head Posture

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BACKGROUND: Forward head posture (FHP) is a common abnormal neck posture (1). Muscle echo intensity (EI), an objective index of muscle quality, demonstrates the amount of noncontractile tissue within the muscle (fat or fibrous tissue).

AIM: The aim of this preliminary study was to compare the EI of cervical spine muscles between healthy adults with and without forward head posture.

METHOD: Twenty healthy adults were included in the study. Age, gender and BMI of the participants were recorded. The distance of participants from the camera was 1.5 m, the examiner used the natural standing position to evaluate the head and neck posture. To measure craniovertebral angle (CVA), the examiner marked the tragus of the right ear and seventh spinous process of the cervical spine (C7) and the participants were included in the FHP group if mean CVA was less than 48◦. The examiner used a B mode, 7.5 MHz ultrasonography device with linear probe. After ultrasonographic images of the Sternocleidomastoid (SCM), Longus colli (LoC), Splenius capitis (SC), Semispinalis capitis (SsC), Obliqus capitis inferior (OCI) muscles were obtained, Echo intensity (EI) values were recorded using the ImageJ software.

RESULTS: Of the twenty participants, 17 women and 3 men, the mean age was 29.80 (min:22, max:47) years old and the mean BMI was 23.69. FHP was detected in 8 of the participants (CVA<48◦). While the mean CVA value of the control group was 57.76, the mean CVA value of the FHP group was 46.16. EI values of SC and SsC muscles were found to be statistically significantly higher in the FHP group compared to the control group ($p = 0.017$, $p = 0.025$ respectively). No statistically significant difference was detected between the EI values of the two groups in the SCM, LoC and OCI muscles ($p>0.05$).

DISCUSSION AND CONCLUSION: Evaluation of muscle EI can be informative about muscle quality. SsC and SC muscles appear to be the muscles whose quality is most affected in FHP. This matter highlighted the importance of assessment of the muscle quality in muscle evaluation of cervical posture disorders. These results should also be kept in mind in control groups of future studies conducted on patient groups.

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Returning to Driving After a Quadri-Amputation: A Clinical Case

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BACKGROUND: A quadruple amputation is a rare condition that severely limits activities of daily living. An important element of daily independence is driving a car (1–4). The current literature on returning to driving with an adaptive device in multiple limb amputees is poor and does not allow for consensus(5,6).

AIM: To describe the return to driving of Mrs X, a 35-year-old woman who lost all four limbs partially due to peripheral necrosis following septic shock. Amputation levels were transtibial bilaterally, transradial left, and disarticulation of the right wrist.

METHOD: a case study

RESULTS: After a long multidisciplinary course of care and rehabilitation, Mrs. X was able to benefit from adapted equipment and a vehicle that was specially adapted to her needs(7). All these adaptations have enabled her to use a steering wheel, an automatic gearbox and directional elements. Her license has been revalidated by the authorities. This will eventually allow her to pick up her daughter from school or go to her riding lessons. This is part of an overall rehabilitation process and an improvement in her quality of life.

DISCUSSION AND CONCLUSION: Despite the need for a caregiver to carry out some additional tasks such as using the heating system, the return to driving thanks to prosthetic and material aids, has enabled Mrs. X to regain her independence of movement, after the quadruple amputation(8,9).

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Driving Habits in Slovenian Patients With Neuromuscular Diseases

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BACKGROUND: Driving a car in Slovenia is nowadays almost mandatory if someone wants to actively participate in social life. However, driving represents a complex activity as it implies multiple simultaneous tasks with different temporal and cognitive requirements. It also requires one to be physically fit as it requires good eyesight, coordination, strength and muscle control. Patients with neuromuscular diseases have disabilities which affects their driving ability but it is still little understood about their driving habits and how successful drivers they are.

AIM: To find out basic driving habits in Slovenian patients with neuromuscular diseases.

METHOD: An interview with questions about basic driving habits.

RESULTS: Included were 12 patients (5 women) with different neuromuscular diseases. Average age of participants was 52,8 years, on average they owned driving licence more than 33 years. Two patients were professional drivers before diagnosis. Four patients had no problems in mobility, 5 were able to walk with aids for 500m, one could walk with aids for 100 m for longer distances was using an electrical scooter, two patients were power wheelchair users. Seven patients drive car without adaptations, three were using higher seats, one is using automatic transmission, two of them were driving car from wheelchair with joystick control. On average patients yearly drove between 10 and 15 hundred km, two of them drive les then 2000 km per year, one in last year drove 70 000 km. Three of patients needed to renew their medical licence for driving after they received driving licence, two of them car adaptation was prescribed. Only one patient had a car accident in last year.

DISCUSSION AND CONCLUSION: This pilot study on driving habits in Slovenian patients with neuromuscular diseases showed that only small proportion of participants were using car adaptations. They do not observe difficulties in driving, those who did, renewed their medical licences. On average we can claim that they are safe drivers. We need bigger studies to understand the importance of driving with more participants and objective assessments of driving abilities. Especially in higher ages and advanced stages of disease.

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Early Rehabilitation in Disasters: A Single Center Experience in Türkiye-Syria Earthquake

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BACKGROUND: Two devastating earthquakes caused extensive damage in ten provinces of Turkey in February 2023, resulting in thousands of deaths and injuries. Since a large part of Turkey was affected by the earthquake, the earthquake victims were immediately taken to various cities, especially the nearby towns, for further treatment.

AIM: The study was conducted to determine the demographic and clinical characteristics and early rehabilitation needs of patients who were inpatients or outpatients at our center within two months of the earthquake and referred to PM&R, and to make the necessary preparations.

METHOD: This study was carried out with a single centered, cross-sectional retrospective design on the victims of the 2023 Türkiye/Syria earthquake.Patient data including demographic data and type of injuries were evaluated.

RESULTS: A total of 36 patients (male: 20, female: 16), 1 patient was injured while removing the rubble, the others (97%) were injured by falling under the rubble. The average length of stay under debris is 22.2 hours (4-144). The average age is 27 years (5-60). 9 patients (25%) required treatment in the intensive care unit. 18 patients (50%) lost a first-degree relative to the disaster. 30 patients (83%) had multiple injuries. Peripheral nerve damage in 22 patients (61%), lower extremity amputation in 5 patients (14%), upper extremity amputation in 1 patient (3%), spinal cord injury in 1 patient (3%), upper extremity fracture in 6 patients (17%), Lower extremity fractures in 7 patients (19%), rib fractures in 3 patients (8%), lower extremity fasciotomy in 9 patients (25%), upper extremity fasciotomy in 6 patients (17%), crush injury in 12 patients (33%), crush injury in 6 patients. (17%) had other musculoskeletal system injuries.

DISCUSSION AND CONCLUSION: The majority of patients affected by the disaster (83%), mostly children and teenagers, had multiple injuries (fractures, peripheral nerve injuries, amputations, etc.). All patients need early psychosocial rehabilitation due to both the impact of the disaster and the death of their first-degree relatives. The higher number of lower extremity injuries shows that mobility is affected in the early period, so early rehabilitation is thought to be of vital importance due to both trauma and immobilization.

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Management of Dysphagia in Niemann-Pick Disease Type C Patients: A Case Study and Literature Review

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BACKGROUND: Niemann-Pick Type C (NPC) is a rare, progressive genetic lysosomal disorder with age-dependent symptomatology and estimated birth incidence of 1:120,000 [1]. Early life visceral symptoms include hepatosplenomegaly and jaundice. As children transition from infancy, neurological symptoms including hypotonia, developmental delay, ataxia, and dysarthria, become pronounced [1]. Dysphagia, which affects oral and pharyngeal stages of swallowing, is challenging. Studies highlighted the potential benefits of miglustat therapy in managing glucosylceramide synthesis for NPC-associated dysphagia.

AIM: To assess the therapeutic combination of miglustat and conventional swallowing interventions in an NPC patient and review pertinent literature.

METHOD: The patient received miglustat and two-week conventional swallowing therapy (oral motor training, thermal stimuli, and alternative swallowing techniques). Objective measures including frequency of drooling, swallowing reflex timing, and choking events, were recorded and analysed pre- and post-intervention.

RESULTS: Diagnosed with NPC at 3 months related to hepatomegaly and neonatal jaundice, the patient started miglustat at 3.5 years, prior to dysphagia onset at 5 years. Classified as late-infantile onset based on initial neurological symptoms at 5 years, she maintained oral feeding until 11 years. However, as disease progressed, the frequency of choking episodes increased, leading to recurrent hospital admissions due to aspiration pneumonia. By 15 years, she depended on total tube feeding and required tracheostomy due to respiratory failure. She then received two-week swallowing therapy to partially restore oral feeding ability.

Initially, she exhibited oral phase deficits, including weakness and incoordination of the lips, cheeks, and tongue, causing drooling, poor bolus control, and difficulty transporting food into the pharynx. In the pharyngeal phase, delayed swallowing reflex, diminished laryngeal elevation, weak swallowing strength, post-swallow residual, and aspiration were observed. After rigorous two-week therapy, the drooling frequency was significantly decreased, and she could swallow thin liquid without a delay in swallowing reflex, although limited improvement in laryngeal elevation and swallowing strength was noted. The patient is now 17-years-old and continues to attend regular check-ups, suggesting her lifespan was extended beyond the average of 7-12 years as previously reported.

DISCUSSION AND CONCLUSION: Dysphagia-related aspiration frequently leads to pneumonia, a major cause of NPC patient mortality. Starting miglustat therapy, particularly before neurological symptoms appear, can slow disease progression, stabilize or improve swallowing abilities (assessed by videofluoroscopic swallowing study), reduce aspiration risk, and extend life expectancy [2]. Therefore, early diagnosis and immediate initiation of miglustat therapy are essential. After starting medication, the monitoring of eating and swallowing functions is crucial. Whereas conventional swallowing therapy offers some benefits, as the disease progresses, it becomes crucial to adopt compensatory strategies to prevent aspiration. Considering tube feeding in a timely manner can mitigate the risks of choking and aspiration pneumonia.

This case study highlights the importance of prompt diagnosis and intervention for NPC and calls for extensive, longer-term research.

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The Value of the Use of Liquid Thickening Agent in the Treatment of Dysphagia in the Acute and Sub-acute Phases of Acquired Neurological Syndromes

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BACKGROUND: One of the complications of acquired neurological syndromes is dysphagia. Dysphagia in liquids is the most common. One way to safely administrate fluids by mouth is by adding a thickening agent to them, in conjunction with speech therapy sessions. The administration of a thickening agent to liquids makes them more viscous, to facilitate swallowing. Thus, patients adapt to swallowing liquids without complications, while they can gradually be weaned from the use of the thickening agent.

AIM: The purpose of this study is to assess the effectiveness of thickening agent use in patients with acquired neurological syndromes in the acute and subacute phases of rehabilitation.

METHOD: We studied 42 patients with fluid dysphagia in the acute and subacute phase of acquired neurological syndromes. Twenty-two out of them were diagnosed with from Cerebral Vascular Accident (17 ischemic, 5 hemorrhagic), 6 with Traumatic Brain Injury, 9 with high level Spinal Cord Injury and 5 with other neurological diseases (mainly Guillain Barre Syndrome). All of the above patients were given a thickening agent for fluid intake, while some also received fluids through gastrostomy.

RESULTS: During the clinical course of the patients, it was observed that there was an improvement when taking fluids in the majority of them. Most of the patients were weaned from the use of the coagulation agent in fluids and they were able to take fluids normally. In only 5 cases, patients had to continue receiving fluids with the administration of a thickening agent, but in a reduced amount, and 3 out of them continued receiving fluids through gastrostomy. Aspiration pneumonia was diagnosed in only 2 patients. None of the participants had significant long-term weight loss.

DISCUSSION AND CONCLUSION: Our results provide low level of evidence that the administration of thickening agent in liquids in patients with dysphagia in the acute and subacute phase of acquired neurological syndromes has beneficial effects, mainly reducing the need of nasogastric tube or gastrostomy. Furthermore, the rate of adverse events was remarkably low. In addition, the psychological status of the patients is strengthened during rehabilitation, as they feel that they can function normally in terms of swallowing.

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Dysphagia in Stroke Patients: Diagnosis and Intervntion

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BACKGROUND: Dysphagia is defined as a state characterized of difficulty in chewing and swallowing in neurological conditions, and can be diagnosed in all ages. In patients with stroke, dysphagia is a common complication seen as dysfunction of the muscles that function when swallowing.

AIM: Dysphagia can affect swallowing of liquids or solids. It is important to diagnose it, as when it is not possible for a patient to be fed through their mouth, different ways of providing nutrients and fluids can be used(ex. nasogastric tube, gastrostomy). The diagnosis of dysphagia from its early onset in patients with stroke is of outmost importance, as it can prevent complication such as aspiration pneumonia.

METHOD: This study consists of 22 patients with stroke that were inpatient in the Rehabilitation department of our hospital, that were diagnosed with dysphagia in liquids or solids. In our sample, 15 patients had dysphagia only with liquids and 7 in liquid and solid foods. In patients with liquids dysphagia, a coagulant factor was used. The rest of the patients used a nasogastric tube. All of the patients followed sessions with our speech and language pathologist for 5 days per week, for two months, with exercises to enhance their swallowing. A swallowing assessment was performed at the beginning of the treatment and repeated every two weeks.

RESULTS: Evaluation of the patients showed improvement of dysphagia. The patients with dysphagia in liquids improved faster compared to the rest of our sample. Out of those patients, 13 managed to not require any coagulant factor after being treated for two months, and 2 still needed to use it. In the two month mark, out of our patients with mixed dysphagia, the nasogastric tube was removed in 3 of them, while 4 patients needed the placement of a gastrostomy.

DISCUSSION AND CONCLUSION: Swallowing disorders, with more commonly found dysphagia in liquids. are a common complication in patients with stroke. The on-time diagnosis and integration of exercises to retrain swallowing are important in the improvement of swallowing and the avoidance of complications that can hinder the person's rehabilitation course.

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PREPARE Rehab: Personalized Rehabilitation via Novel AI Patient Stratification Strategies

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BACKGROUND: By definition, rehabilitation is person-centered and personalization (based on prediction and stratification) is essential. Despite this, the availability of well-developed and validated prediction models is currently limited. Predictive models are lacking for many health conditions and outcome domains. When available, they have often been developed with simple statistical tools, based on small data sets from single institutions in particular countries with specific treatment regimes, while external validation is often absent. Moreover, current prediction models lack intelligent application programming interfaces (APIs) that allow them to be fed with new data. As a result, they cannot be improved with time as datasets of different origins become available. Also, they cannot be considered reliable enough to facilitate shared decision-making since the hurdles for clinicians and patients to use the models are too high.

AIM: PREPARE Rehab (https://prepare-rehab.eu/) aims to advance rehabilitation care by developing, validating, and implementing robust, clinically relevant, and data-driven computational prediction and stratification tools.

METHOD: PREPARE Rehab is a HaDEA-Horizon European project with 20 partners from nine countries. We will apply machine learning (ML) techniques on nine large scale patient datasets on the following health conditions: (1) Hand and wrist disorders, (2) Scoliosis, (3) Intermittent Claudication, (4) Lower limb loss, (5) Parkinson disease and Parkinsonism, (6) Hip and Knee Arthroplasty, (7) Spine disorders, (8) Temporo-mandibular articulation, (9) Hypertension. In most of these conditions, rehabilitation plays a key role. These unique real-world collections of routinely collected data will be treated in a federated way not requiring a central location. As proof of principle, we will develop a platform for sharing model results, exploiting the open-science EHDEN platform and using the Observational Medical Outcomes Partnership (OMOP) Common Data Model (CDM) standard. Then we will develop prediction and stratification machine-learning strategies for rehabilitation medical data. Lastly the prediction models will be validated via demonstration studies in the nine health conditions.

RESULTS: The PREPARE Rehab project has been awarded 7 million Euro from the HORIZON EU Research Program, after a selection process that accepted only 3% of the projects. It started in June 2023 and will last four years. The kick off meeting took place in July 2023 in Rotterdam. The expected results are a unified advanced decision-support platform for management of big data and federated access to clinical data which integrate all the developed technologies, compatible with OMOP-CDM, EHDEN; novel patient stratification methods and prediction models enhanced by advanced ML/Artificial Intelligence (AI) tools and clinical data compatible with OMOP-CDM, EHDEN; a Medical Device Regulation roadmap for any (software as a) medical device embedding; AI to support (preparation for) conformity assessment. Deployment and validation of PREPARE tools/applications in realistic operational conditions through pilot cases, with the effective participation of end-users.

DISCUSSION AND CONCLUSION: Exploiting the latest advances in clinical, socio-behavioural and public health research, data science, and advanced statistical and AI learning methods, PREAPRE Rehab will pave the way to more personalized, reliable, and holistic rehabilitation and care that takes into account external circumstances and patient factors to improve quality of care and life.

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Grant Agreement 101080288 PREPARE HORIZON-HLTH-2022-TOOL-12-01

Physiotherapy Students and Physiotherapy Community Service Officers' Knowledge, Attitudes, and Perceptions Toward Mental Health.

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BACKGROUND: Physiotherapy in mental health is not very popular globally, although many physiotherapy students and physiotherapists are managing patients living with a mental illness (PLWMI) (Hooblaul, 2020). There is a paucity of studies on physiotherapy students' knowledge, attitudes, and perceptions toward mental health.

AIM: To determine the knowledge, attitudes, and perceptions of physiotherapy students at the University of KwaZulu-Natal (UKZN) and physiotherapy community service officers (PCSO) in KwaZulu-Natal (KZN) toward mental health.

METHOD: A concurrent mixed method was employed using the Attitudes toward Psychiatry (ATP-30) questionnaire and focus group discussions. The participants of the study were 2nd, 3rd and 4th-year physiotherapy students at UKZN and PCSO completing the community service year in KZN province of South Africa. The community service year is a compulsory year that has to be served in the public service health department. The questionnaire was distributed to 100 PCSO and 191 physiotherapy students. The focus groups were conducted to determine the knowledge that the participants gained through the undergraduate programme and their preparedness to manage PLWMI.

RESULTS: A total of 146 physiotherapy students and 72 PCSO completed the questionnaire. The participants had an overall positive attitude scoring a mean ATP-30 of 108.02 (SD= 10.86). Participants who had a family or friend with a mental illness had a higher ATP-30 score. The focus groups indicated the limited knowledge about mental health and the reluctance to work in the mental health field.

DISCUSSION AND CONCLUSION: The physiotherapy students at UKZN and PCOS in KZN had positive attitudes toward mental health even though they reported having limited knowledge. Participants expressed a desire for more information about mental health. The curriculum requires the inclusion of adequate mental health content to prepare the students to manage PLWMI after graduation. The inclusion of theory and practical exposure will greatly reduce stigma and negative perceptions and ensure confidence in managing PLWMI.

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Disability and depression in the PRM setting: Experience of the PRM department at Oran University Hospital, Algeria

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BACKGROUND: Depression is a frequent disorder in the aftermath of disability. It is a clear factor in the deterioration of quality of life for these patients. The care of severely disabled people with psychological impairments in rehabilitation settings is complex. In addition, the responsibilities and constraints involved in caring for these patients can be a burden for caregivers, leading to exhaustion.

AIM: To assess depression among people with disabilities in a Physical and Rehabilitation Medicine (PRM) department, and the factors that may contribute to its occurrence. Identify the burden on caregivers of some of these patients.

METHOD: This is an observational, descriptive, cross-sectional study of a sample of adult patients with disabilities admitted to the PRM Department of Oran University Hospital between January and December 2019.
We assessed patients' degree of functional independence using the Functional Independence Measure (FIM) and the intensity of depressive symptoms using the Hamilton Depression Scale. To assess the degree of fatigue and caregiver burden, we used the Zarit scale.

RESULTS: In the present study involving 61 hospitalized patients. Mean age was 50.69±18.83 years. The male sex (36) was more represented, with a ratio of 1.38. Among hospitalized patients, 27.4% were spinal cord injured, 21% were stroke and 6.5% with multiple disabilities. In terms of autonomy, 32.3% of patients were totally dependent, with an MIF of less than 45/126. Depression, classified as moderate to severe according to the Hamilton questionnaire, was present in 46.7% of patients, and was present in patients with an MIF below 45. The degree of burden was assessed in 10 caregivers, 9 women and 1 man. Six caregivers considered their burden to be mild, Zarit less than 20, and 4 considered it to be moderate to severe, Zarit 40 to 88.

DISCUSSION AND CONCLUSION: The present study has enabled greater attention to be paid to depressive symptoms, which should be systematically sought in all people with disabilities on hospital wards. In particular, it enabled us to study the factors that have a negative impact on the mood state of these patients, notably their higher level of functional dependence. Last but not least, the burden on caregivers must be taken into account for people whose mobility is severely restricted. Our sample size for assessing caregiver burden is too small to allow us to draw any conclusions.

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Poster Session F

Functional Nonretentive Fecal Incontinence in Children – What Is the Role of Biofeedback Therapy?

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BACKGROUND: Fecal incontinence (FI) is defined as the loss of stools in places inappropriate to the social context at least once per month in children with a developmental age of more than 4 years. In approximately 95% of the cases there is no organic cause and it is regarded as a functional defecation disorder (FDD). In FDD, 80% are associated with functional constipation (FC) with fecal impaction causing overflow incontinence and the remaining 20%, there are no signs of fecal retention; this is classified as functional nonretentive fecal incontinence (FNRFI).

AIM: To assess the current treatment and the role of biofeedback therapy in the treatment of children with FNRFI.

METHOD: A literature review was conducted using electronic databases. This included, Medline (via PubMed), ISI Web of Science and Google Scholar, from the past years, focusing on randomized controlled trials. We used the following keywords: Functional incontinence; Functional nonretentive fecal incontinence; Biofeedback therapy; Rehabilitation. Terms were combined using Boolean operators.

RESULTS: From our initial search only 6 articles were retrieved, but only 3 directly addressed the treatment of FNRFI. One randomized controlled study assessed the effect of a multimodal treatment with laxatives and additional biofeedback training versus a conservative treatment using laxatives alone in children with FI. At the end of the six-week intervention treatment with biofeedback training was more successful than treatment with laxatives alone, but no additional value of biofeedback training was found in further follow up (6 and 12 months). Another, a prospective randomized controlled study, included 93 children with FNRFI who were randomly allocated into the 3 groups. Group A were treated by dietetic regulation and Kegal exercises. Group B received biofeedback while group C received transcutaneous tibial nerve stimulation (TTNS) for 3 months. On comparing the three groups, there was statistically significant decrease in the incontinence score in Group B and C compared to Group A at 3 and 6 months, with the highest significant decrease observed in Group B. And finally, another RCT compared the effects of transcutaneous functional electrical stimulation (TFES) and biofeedback therapy (group A) with TFES alone (group B) in a cohort of children with FNRFI. It showed that FI significantly improved in 65% patients in group A and 55% patients in group B, with a significant reduction in FI score in each group at the end of treatment sessions and maintained at 6 months follow- up.

DISCUSSION AND CONCLUSION: FI, specifically FNRFI, remains a chronic devastating gastroenterological problem in children with a great impact in quality of life. Treatment options are still limited and there are many unanswered questions about the management of this problem, with very little investigation. According to our review, although one of the studies didn't show any additional value in using biofeedback in the long term, the other two showed that both biofeedback and TTNS are effective for the treatment of FNRFI, but with better short term outcome in patients managed by biofeedback.
In conclusion, biofeedback therapy is an effective, easy and non-invasive modality that could be used in conjunction with an educational program.

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Effects of Parental Age and Health on Intellectual Disability and/or Autism Spectrum Disorder in Offspring

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BACKGROUND: Intellectual disability (ID) and autism spectrum disorder (ASD) are the two most common disabilities in children (1). While many causes of ID and/or ASD have been proposed, research indicates that genetic factors predominate. Mutations of more than 400 genes are linked to ID and/or ASD to date (2). Compared to the past, in some countries, including South Korea, the average age of marriage has increased. The average age of first marriage in South Korea in 2017 was 32.9 years for men and 30.2 years for women. Therefore, there is much possibility that the average childbearing age has increased compared to the past. There is robust evidence that advanced paternal age is one of the risk factors for ID and/or ASD development in offspring (3-4). Meanwhile, there are several confounding factors regarding the effects of advanced paternal age to consider (5-6). Therefore, it is necessary to expand previous findings on the effects of advanced paternal age on ID and/or ASD development in offspring, with confounding factors adjusted together. To the best of our knowledge, there have been no such reports.

AIM: To verify the effects of parental age and health at conception on the risk of ID and/or ASD in offspring.

METHOD: We performed a population-based cohort study of parents–offspring trios in South Korea, where offspring was born from 2003–2015. We collected data on the age and socioeconomic status of the parents at childbirth. We identified parental diseases at conception. We estimated the odds ratio (OR) of ID and/or ASD development in offspring.

RESULTS: We set up the cohort of 3,869,860 parents–offspring trios. The paternal age≥30 years at childbirth linearly increased the OR of ID and/or ASD development in offspring up to 3.42 and 1.97, respectively. The presence of paternal diseases at conception did not cause any significant increase in OR. The maternal age of 30–39 years at childbirth significantly reduced the OR of ID development in offspring down to 0.88, while maternal age<25 years at childbirth showed a significant OR increase in ID development in offspring up to 2.19. The maternal age at childbirth showed an OR of 1.12 of ASD development in offspring only at the age of 35–39 years. Maternal diseases at conception, such as schizophrenia, depression, and type II diabetes mellitus, have significant effects on the risk of development of ID and/or ASD in offspring, independent of maternal age.

DISCUSSION AND CONCLUSION: These findings demonstrated that, regarding the risk of ID and/or ASD development in offspring, the effects of advanced paternal age begin as young as 30 years of paternal age, and maternal diseases at conception have significant effects, independent of maternal age. Therefore, these findings call for public awareness regarding the biological implications of delayed fatherhood and the importance of maternal health at a fertile age.

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Stimulating Positioning on a Horse and on a Human – Effective Rehabilitation for Infants and Toddlers

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BACKGROUND: Stimulating Positioning on a Horse (SPHo) is a form of therapeutic riding. Stimulating Positioning on a Human (SPHu) utilizes the quadrupedal and bipedal locomotion of an adult/parents. Both new methods can be used in high risk infants of cerebral palsy (CP) from the first months of life. By positioning the child on these living unstable platforms, we facilitate the individual phases of postural ontogenesis using positions adequate to their development age (1).

AIM: Our goal is to present new perspective methods that can be used in high risk infants of CP. For this reason, we designed two studies.

METHOD: In our ambition to find out more objective effects of SPHo, we established two groups of prematurely born 6 months infants with central coordination disorder. Children in both groups received a complex rehabilitation therapy until then. The control group with 20 babies continued in kinesiotherapy with Vojta´s reflex locomotion (VRL) 4 times daily. The experimental group with 15 babies continued in the same rehabilitation but additionally received SPHo twice a week. On those days, this group received VRL only 3 times.
During the next 6 month period, we followed the psychomotor progress (spontaneous motor activity, postural reactions, tonus, the development of primitive reflexology) and locomotion stages according to Vojta (0-7) in both groups every second month.
In another study, we classified 20 prematurely born 6 month old infants with developmental motor delay into locomotion stages according to their developmental age according to Vojta (0-7). Based on this classification, we placed 10 babies in an experimental group and 10 babies in a control group and paired them according to their corresponding locomotion stage at the time of the entry evaluation. The treatment and follow-up of both groups subsequently proceeded as in the first study.
We evaluated our results statistically in both studies using nonparametric tests (alfa = 0,05): Friedman, Mann-Whitney, Wilcoxon, Kruskal-Wallis.

RESULTS: In both studies the spontaneous motor activity, postural reactions, primitive reflexes, muscular tonus, and locomotion stages according to Vojta resulted in significant improvements in both groups, often after only two months of treatment.
The statistical results also indicated that the combination of two kinesiotherapy forms – Stimulating positioning on a horse and Vojta´s reflex locomotion – was statistically significantly more effective in the child´s psychomotor progress than solitary application of VRL.

DISCUSSION AND CONCLUSION: Currently, we still have a narrow spectrum of kinesiotherapy forms able to effectively and as early as possible influence the psychomotor development of high risk infants of CP. As our studies have shown, Stimulating Positioning on a Horse represents such a new, effective, and complex form of rehabilitation. The fundamental fact is that the SPHo can be combined with Vojta´s reflex locomotion and especially with Stimulating Positioning on a Human which has the same kinesiotherapeutic principles and also gives a feeling of security.

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Therapeutic Approach to Chronic Musculoskeletal Pain in an Adult With Goldenhar Syndrome: Case Report

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BACKGROUND: Goldenhar syndrome is a rare congenital syndrome, with the cause not fully understood but believed to arise from incomplete development of the 1st and 2nd branchial arches during pregnancy. The clinical manifestations have a wide spectrum with many systems involved. The most common findings are cranio-facial deformities, internal organs abnormalities and skeletal abnormalities. Musculoskeletal pain due to structural abnormalities are reported from nearly all people with Goldenhar syndrome.

AIM: To present the case of a 36 year old woman with Goldenhar syndrome and muscloskeletal pain and the approaches followed by our team for its management.

METHOD: The patient visited the outpatient department
of our PRM clinic, due to diffuse musculoskeletal pain and paraspinal muscle spasms in all regions of the spine due to scoliosis. She was also reporting pain in both upper limbs due to diagnosed thoracic outlet syndrome (neurogenic and vascular). The pain was affecting her
quality of life as well as her professional working abilities (percussion instruments player). Although she was independent in activities of daily living, she reported muscloscеletal pain when performing daily tasks and easy fatigue. Clinical examination revealed extensive muscle spasms in both paraspinal(following the scoliosis curvature) and scalene muscles with reduced range of motion in the rotating head movements. The pain was defined by using the VAS scale as well as using a body image drawing. In the first assessment, detailed recommendations were given regarding muscle stretching, activities of daily living, and ergonomic interventions for her profession. In addition, she was treated with acupuncture targeting the muscle spasm in paraspinal muscles(1-2 sessions per week).

RESULTS: In her first visit, the self-reported pain level was 8/10 in the VAS scale, while the patient was also taking 3gr paracetamol p.o. per day. The patient recieved a follow up treatment biweekly where acupuncture was performed, and the goals for stretching exercises and modifications in the daily living and profession were reassessed. One month later, she graded her pain as 6/10 (VAS scale) and required no analgesic medications. She also described better ability and endurance in performing activities of daily living.

DISCUSSION AND CONCLUSION: In rare syndromes with multiple systems affected, a multicentered and non pharmaceutical approach can improve the quality of life without burdening any comorbidities.

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Multidisciplinary Treatment Care of a Patient With Microduplication Syndrome in the Background of Neurodevelopmental Delay

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BACKGROUND: We present a patient with microduplication syndrome who underwent multidisciplinary treatment care (MTC) at our department. Microduplication syndrome is characterized by distinctive craniofacial features that are mostly minor and as such often unrecognizable; intellectual disability; developmental delay; neurological and behavioral abnormalities; musculoskeletal problems; ascending aortic dilatation, and a peculiar higher threshold for pain perception.

AIM: To enhance the importance of genetic testing of children with multiple difficulties and malformations of organ systems.

METHOD: Our patient is the second child of nonconsanguineous healthy parents born at 39 weeks gestational age by spontaneous vaginal delivery from an orderly course pregnancy. Shortly after birth, she received phototherapy for neonatal jaundice. Due to early-onset neonatal sepsis, she was transferred to the intensive care unit (ICU). Pediatric physiatrist examination, at the age of 4 months besides hypotonia and asymmetry, assessed she did not meet age-appropriate developmental milestones. Her subtle phenotypic characteristics of craniofacial dysmorphism consistent with published literature, included brachycephaly, broad forehead, straight neat eyebrows, deep-set eyes, broad nasal tip, low columella insertion. Ultrasound brain findings verified the condition after intracranial bleeding grade II. Magnetic resonance imaging (MRI) of the brain revealed dysplasia of the corpus callosum genu and rostral body. Motor, speech, and social skills were prominently affected domains and therefore intensive comprehensive inpatient and outpatient MTC was pursued. Habilitation encompassed the Vojta principle due to chronic constipation and neurogenic bladder, which required intermittent catheterization. She has regularly been under cardiac surveillance due to ductus arteriosus persistens and ascendant aorta dilatation which is a common congenital malformation (46%). Throughout her infancy and toddlerhood difficulty feeding, expressive and receptive language skills, and selective mutism were observed.

RESULTS: MTC gradually optimized her communication skills by converting nonverbal behaviors into discrete words. She conquered wide-based independent ambulation at the age of 20 months with the persistence of balance and coordination disturbances. She had a history of frequent falls secondary to hypotonia. At the age of two chromosomal microarray (CMA) revealed a duplication at 7q11.23. DNA analysis discovered duplication that affects 36 genes, where genes ELN and NCF1 are considered responsible. It has been diagnosed worldwide in just over 150 patients with a prevalence estimated at 1:7500 to 1:20 000. Both parents tested negative for this duplication, confirming de novo change in the proband. The patient made gradual progress with therapies and the family was made aware of the diagnosis, prognosis, and future complications that might occur.

DISCUSSION AND CONCLUSION: Our experience and current knowledge about this syndrome indicate the necessity of genetic testing. In Croatia it is conditioned by the previous finding of neural axis MRI. Among the challenges in overall diagnostic evaluation, we would like to highlight the benefit of neurodevelopmental stimulation to minimize long-term sequelae within the underlying genetic disease. Our patient achieved optimal obtainable gross motor status in 5 years follow-up.

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The Effects of Therasuit and Neurodevelopmental Therapy on Functionality and Balance in Children With Cerebral Palsy

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BACKGROUND: Cerebral palsy (CP) is a chronic non-progressive encephalopathy characterized by motor and postural dysfunctions. Neurodevelopmental therapy (NDT) and therapeutic suits (TS) are rehabilitative interventions used in CP.

AIM: Our aim is to examine the effects of TS and NDT on functionality and balance in children with CP.

METHOD: A total of 20 Gross motor function scale (GMFS) 3-4 patients diagnosed with CP participated in the study. Group 1 had NDT, and Group 2 had NDT and TS therapy for 30 sessions. Outcome measures were Gross motor function measure-88 (GMFM-88), WeeFIM, Berg scales.

RESULTS: Gender, age, GMFS levels were compared between groups and no significance was detected. An improvement was detected in the GMF-88, WeeFIM and Berg scores in Group1 and Group 2 after the treatment. There were no significant changes in GMFM-88 and Berg scores between groups, the change in WeeFIM score in Group 1 was higher (p:0.025).

DISCUSSION AND CONCLUSION: NDT and NDT+TS both have positive effects on functionality and balance in CP. In our results there were statistically significant increase in the GMF-88, WeeFIM and Berg scores both in Group1 and Group 2; but we found no significant difference in GMFM-88 and Berg scores between groups, suggesting that the suit did not contribute to the gains made. Studies investigating the effect of TS method measured mostly GMFM-88 or GMFM- 66. In our study we used GMFM-88, WeeFIM and Berg scale. This gives us a wider perspective in terms of functionality and balance. Rehabilitation of CP is complex. Type of therapy and its intensity, the option for a standardized or individually tailored approach, experience of the therapists may influence the results. Future studies must be done examining postural changes and gait efficiency in children with CP of varying functional abilities.

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Investigation of the Effects of Robotic Movement Learning on Coordination, Muscle Strength and Walking Ability in Pediatric Neurological Patients

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BACKGROUND: Pediatric patients with neurological diseases who require motor rehabilitation interventions must have tailored treatments that consider the symptom topography, ambulatory capacity, and age of the individual. Lower limb motor function plays a crucial role in daily activities like transferring, standing, walking, and maintaining balance. Lower limb motor coordination is essential for most daily motor tasks, including walking, running, climbing/descending stairs, and rising from a chair. Impaired coordination impacts the strength, speed, and precision of lower limb movement, thus affecting these functions.

AIM: This study on robotic movement learning is motivated by the need to assess the effectiveness of robot therapy in the rehabilitation of pediatric neurological patients. Our study aims to investigate whether robotic movement learning (RMT) is a more effective approach to improving coordination, muscle strength, and walking abilities compared to traditional training (CG).

METHOD: This prospective, randomized controlled trial involves 10 subjects in the experimental group and 10 in the control group. The experimental group undergoes 10 sessions of 30 minutes each of robotic movement learning training, while the control group receives 30 minutes of conventional therapy. All subjects are evaluated using the 2-Minute Walk Test (2MWT), 5-Meter Walk Test (5mWT), Timed Up and Go Test (TUG), Fugl-Meyer Assessment, and manual muscle testing (MMT) before (T0) and after treatment (T1).

RESULTS: Our hypothesis suggests that robotic movement learning will be an effective intervention for improving coordination, muscle strength, and walking abilities in chronic pediatric neurological patients over a 10-session training period. The RMT group is expected to show more significant improvements in walking endurance, motor ability, coordination, and gait performance compared to the control group. We anticipate observing greater improvements in the 2-MWT ($p=0.001$), 5mWT, TUG ($p=0.031$), Fugl-Meyer Assessment in the RMT group, at least 10% more than in the CG. These findings will indicate that RMT may offer benefits to neurological pediatric patients with gait disorders, potentially enhancing their prospects for an independent social life.

DISCUSSION AND CONCLUSION: Robotic movement learning appears to be a more effective treatment for neurological pediatric patients to enhance their coordination and muscle strength, particularly for those with severe walking disabilities. We hope that the results of this research will suggest that repetitive, intensive robotic movement learning offers a promising pathway to enhance the lives of neurological pediatric patients.

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Therapeutic Benefits of Swimming in Children With Psychomotor Development

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BACKGROUND: The Halliwick concept based on introduction to water, motor learning, holistic learning, awareness of abilities and achievements in water improving the quality of life and integrating children with disabilities.

AIM: The aim of this study is to identify effects of different therapeutic swimming models on motor activity in children with psychomotor development

METHOD: The study was conducted on 31 subject, children of both sexes, age span 10±6, with psychomotor disabilities (paraplegia, Down Syndrome, autism). In control group (G1) there was 10 subjects, both sexes, involved in a 10hour group inclusive swimming program. In experimental group (G2) there was 21 subjects involved, both sexes, involved in a 10hour therapeutic swimming program based on Halliwick concept.

RESULTS: T test independent sample results, in both groups showed that swimming program had positive impact on their motor skills in water. Concurrently, comparison of results between control and experimental group with T test independent sample method during final testing, showed that experimental program had more effectiveness in all variables: mental adaptation (MPR<.000); getting familiar with water environment (UVS<.000); balance and motion control (BKK<.000); floating and sliding (PIK<.000); water rotation (ROT< .000) and swimming (PLI<.012). Results suggest that Halliwick method as holistic concept and educational competence has more effectiveness for social and communicational improvement, cognitive tasks and therapeutical aspects for this population, confirming previously conducted research (Gresswell, 2006).

DISCUSSION AND CONCLUSION: Obtained results suggest that therapeutical swimming is effective model for motor skills improvement in children with disabilities, therefor confirming that inclusive Halliwick concept practice can be more effective than basic program.

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Pediatric Crps: Diagnostic and Therapeutical Proposal

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BACKGROUND: Algodystrophy is a complex regional pain syndrome (CRPS-I) that typically develops after an injury of a limb manifesting with disproportionate to the event itself [1]. While algodystrophy in adults is well-documented in the literature, there is no standardized diagnostic and therapeutic management for children and adolescents. We describe the case of a teenager with intense pain and functional limitation in the right upper limb that occurred following an infection with Herpes Simplex Virus 1.

AIM: Promote further research aimed at enhancing the understanding of this condition in younger patients to establish a shared diagnostic and therapeutic approach.

METHOD: A 14-year-old Caucasian girl in December 2022 developed pain in her right upper limb, leading her to consult a general practitioner. Laboratory tests revealed an HSV-1 infection (IgM 1.40) and vitamin D deficiency (15 ng/ml). She was treated with acyclovir, resulting in HSV-1 full recovery in January 2023, and received analgesics/anti-inflammatories for limb pain. However, she was unresponsive to analgesics. In January, she was referred to our Department of Physical and Rehabilitation Medicine. Medical history reported B-cell non-Hodgkin lymphoma diagnosed in 2015 and treated with chemotherapy. Clinical evaluation revealed swollen and erythematous right wrist and hand, with increased warmth to touch. Hyperalgesia (pinprick test), allodynia (light-touch), and paresthesia were also present. Physical examination showed severe limitations in active and passive range of motion (a-ROM and p-ROM) of the shoulder, elbow, wrist, and hand. A comprehensive assessment revealed a self-reported pain intensity of 8/10 (NRS), a QuickDash score of 88/100, and Handgrip strength test result of 0 Kg. Laboratory and instrumental evaluation, including ultrasound, electromyography, and MRI resulted negative. Although Budapest criteria are not validated for the pediatric population, our case met these criteria, suggesting a diagnosis of CRPS-I. Our proposed treatment included colecalciferol 10,000 IU (8 drops/day), neridronate at a dosage of 86 mg administered as a single intravenous infusion (2 mg/kg body weight), psychotherapy, and physiotherapy. However, the child's mother declined neridronate treatment due to concerns about the potential development of osteonecrosis of the jaw.

RESULTS: the most encouraging results were observed when physiotherapy was combined with psychotherapy. Regarding pharmacological therapy, neridronate has not yet been validated for the treatment of CRPS-I in children and adolescents.

DISCUSSION AND CONCLUSION: We suspect that HSV-1 infection, along with the psychological component, may have been triggering factors for the onset of CRPS-I in our patient. In line with our hypothesis, some studies in the literature have reported cases of correlation between HSV and algodystrophy. Psychological features also seems to play a predominant role in children/adolescents affected by algodystrophy.

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An Ellis-Van Creveld Syndrome Case Report: The Importance of a Multidisciplinary Approach

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BACKGROUND: Ellis-van Creveld (EVC) syndrome is a rare autosomal recessive disorder, characterized by cartilage and ectodermal dysplasia, short ribs, postaxial polydactyly, dysplastic nail and tooth anomalies, growth retardation, dwarfism with short distal extremities, and congenital heart disease.

AIM: We aimed to share an EVC case that we started to follow in the neonatal period.

METHOD: A case report

RESULTS: As the second living girl of a healthy 25-year-old mother, the baby, who was born by cesarean section at the 39th week after an uneventful pregnancy due to his size, was referred to our high risk infant outpatient clinic when she was 40 days old. It was learned that the mother and father were 2nd degree consanguineous marriages. There was a history of hospitalization in the neonatal intensive care unit for 14 days due to postnatal respiratory distress (not intubated). In the baby's 1st month physical examination, the baby's general condition was good, the baby was active, DTR's were normal, and her muscle tone was normal. There was bilateral symmetrical distal limb shortness, 6 fingers on the right hand and foot, 6 fingers on the left hand and foot. In skeletal radiographs, there was shortness of the ulna, radius and tibia in the distal extremities. Brain MRI and ultrasonography were normal. There was a secundum type atrial septal defect (ASD) on echocardiography. In the genetic analysis of the baby, a homozygous mutation was detected in the EVC-2 gene.
The baby's general movement (GM) evaluation was made. In the baby's 1st month evaluation, GM analysis was evaluated as Poor Repertoire (PR). General Movements Optimalitiy Score-Revised was 29 points (at the 75th percentile) evaluated as good PR. In the 3rd month (12th week) evaluation, the baby's Fidgety movements were present and Motor Optimality Score was 24 (within normal limits). The baby was called for her 6th month follow-up.

DISCUSSION AND CONCLUSION: Ellis-van Creveld syndrome (EVC), is a rare autosomal recessive congenital disorder. A disproportionate short stature is observed with significant shortness of the distal parts of the arms, hands and legs (1).
Skeletal dysplasias are more common in proximal limb shortness, but in our case, there was distal limb shortness. Musculoskeletal system anomalies; slumped shoulders, narrow thorax, genu valgum, lumbar lordosis, sausage-shaped fingers, wide hands and feet (2). In most patients, intelligence is normal, but sometimes central nervous system anomalies or psychomotor retardation may be observed (1).
EVC is an autosomal recessive genetic disease that causes multiple systemic involvement. Although there is no definitive treatment for EVC, symptomatic management is provided with a multidisciplinary approach. The role of the PM&R physician in multi-systemic genetic disorders such as the EVC in this case, is to early detection of possible developmental delay, early rehabilitation decision making and follow-up, and be aware about orthopedic problems that may develop, guiding and following up cases that require surgery.

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Fibrodysplasia Ossificans Progressiva (Stone Man Syndrome): A Case Report

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BACKGROUND: Fibrodysplasia ossificans progressiva, is an ultrarare autosomal dominant disorder and severely disabling syndrome, characterized by postnatal progressive heterotopic ossification of the connective tissue and congenital malformations of the big toes. It affects only about 2,500 people worldwide, or one in two million.

AIM: To describe the disease's clinical presentation and rehabilitation limitations.

METHOD: A 35-year-old man has been a patient of our institution for the last fifteen years. The disease began as a painful swelling on the left shoulder at the age of two. He was diagnosed with FOP a year later. On the last admission, he is immobile and can be brought into a semi-sitting position. Ankylosis of the temporomandibular joint and heterotopic ossifications of masticatory muscles resulted in the limitation of jaw movement and decreased mouth opening. Tooth extraction at age 19 caused disease flare-ups and worsened jaw mobility. Ossification of the jaw, head, and neck is affecting swallowing and speaking. The patient has a hearing impairment, a common feature of this disease. Severe kyphoscoliosis, and heterotopic ossification of intercostal and paravertebral muscles, contributed to the development of thoracic insufficiency syndrome. Chest expansion is limited and he relies on the diaphragm for inspiration. Joints of the upper and lower extremities are in ankylosis, except both hands' metacarpophalangeal, and proximal interphalangeal joints. There are numerous palpable ossifications in the muscles of the forearm and posterior lodge of both femur. A characteristic finding on feet can be seen -shortened big toes in the valgus position with multiple ossifications.

RESULTS: The patient´s final stage of disease limits rehabilitation. We used mild temperature thermo-mineral baths for the upper and lower extremities and active exercises for the MCP and PIP joints of the upper extremities. Adequate positioning is important to prevent bed sores. The patient was provided with an anti-decubitus mattress during previous visits. A rehabilitation center stay and a change of environment is beneficial for the patient's mental state, considering that he spends most of his time at home.

DISCUSSION AND CONCLUSION: FOP has no effective cure yet. Educating physicians, patients, and their families about the disease is important. The best approach is early diagnosis and prevention of injury to help them avoid flare-ups. Procedures predisposed to soft-tissue injuries, such as intramuscular injections, vaccinations, dental procedures, passive stretching, biopsies, removal of heterotopic bone, and all nonemergent surgical procedures should be avoided. In rehabilitation recommendations, hydrotherapy is beneficial.

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Children Admitted to a Pediatric Intensive Care Unit – Is an Early Rehabilitation Program Advisable?

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BACKGROUND: The main focus of care in a Pediatric Intensive Care Unit (PICU) is to resuscitate, stabilize and reverse the effects of critical disease. However, as result children are often sedated and confined to bed for prolonged periods due to perceived benefits of safety, leading to a multitude of consequences, such as ICU-acquired weakness, sleep disturbances, poor functional and psychosocial outcomes.

AIM: Identify the most recent evidence regarding the early mobilization (EM) and rehabilitation program (RP) applied in children admitted to a PICU and analyse the data regarding the patients that were admitted in a PICU at a Central Hospital from the past 3 years.

METHOD: A literature review was conducted using the main electronic databases, from the past 23 years. Additionally, we conducted a retrospective study to analyse which patients admitted to PICU were evaluated by Physical Medicine and Rehabilitation and followed up in consultation.

RESULTS: Using the methods described, 35 articles were retrieved, from which 9 were selected on the basis of applicability. 3 review articles and a systemic review showed that although sparse, the evidence suggested that it was beneficial for patients submitted to a PICU to be offered a RP in order to minimize the adverse effects of a PICU stay and for this it was essencial to optimize sedation and create a multidisciplinary team in order to obtain all the safety precautions. One retrospective study showed that EM of mechanically ventilated pediatric patients demonstrated improved function at admission to Inpatient Rehabilitation Unit compared to those who did not participate. One recent point-prevalence studies of mobilization practices in Europe reported only minor adverse events and that only a minority of patients received any type of RP. Two pilot trials using in-bed cycling + video games and in-bed cycling + additional RP showed that the use of in-bed cycling can enhance physical activity, and appears to be safe and feasible. The use of in-bed cycling + RP could facilitate greater duration of mobilization. Two protocol studies, showed that EA and RP is attainable in PICU population without serious adverse events, using a multidisciplinary approach and appropriate staff education. Regarding our data, 132 needed invasive mechanical ventilation at least for 48 hours in the PICU and PMR evaluation and orientation was only requested for 22,22% during their hospitalization and only 7.5% maintained follow-up.

DISCUSSION AND CONCLUSION: Although the evidence regarding rehabilitation interventions in a PICU is limited, there is a growing interest in applying rehabilitation and EM protocols in PICU in order to minimize the adverse effects of a PICU stay. Also, despite the majority of the results show that it is safe and feasible to conduct a RP in a PICU with positive outcomes, it appears that it is still not standardly implemented and this can also be seen in our data were only a minority of patients were submitted to a RP. To conclude, it is advisable to initiate a rehabilitation program in selected pediatric patients in the PICU, but this should always be implemented by a multidisciplinary team, including a PMR specialist.

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Rehabilitation for children with posterior fossa tumors

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BACKGROUND: Posterior fossa tumors are more common in children than in adults and represent the most common solid tumors in that population. 54 to 70% of all childhood brain tumors originate in the posterior fossa. Most common are medulloblastoma (30-40%), posterior fossa astrocytoma, brainstem glioma (20-25%) and posterior fossa ependymoma (10-15%).

AIM: the importance of rehabilitation for Children with Posterior Fossa Tumors

METHOD: experience from our Early rehabilitation department of Children´s Hospital P.&A. Kyriakou Hospital Athens, Greece

RESULTS: PFT are predominantly seen in children with a peak incidence in the first decade. The most common symptoms are raised intracranial pressure with headache and vomiting but also symptoms such as reduced or absent speech, irritability, hypotonia, ataxia and the inability to coordinate voluntary movements. Cerebellar mutism constitutes a considerable and possibly underestimated complication in a relatively large number of children that underwent a PF surgery for tumor resection, especially when it is located in the midline.

DISCUSSION AND CONCLUSION: Rehabilitation takes many months. Symptoms of posterior fossa syndrome always start within the first week after surgery. Symptoms range from mild to severe. Ongoing difficulties with balance, coordination, fine and gross motor control are common. Rehabilitation programs focus on executive functions, visuo spatial skills, cognitive functions, motor /ataxia problems, and vestibular rehabilitation exercises, behavioral and emotional disturbances. If rehabilitation progress takes longer to show signs of improvement, it is more likely that the child will continue to present sort of inability. A high proportion of children (>1 year) following surgery for PFT continue to present different degrees affected mobility, motor speech, cognitive and psychosocial functioning.
What Happens after Therapy? Quality of Life and Neurocognitive Functions of Children with Malignant Posterior Fossa Tumors after Adjuvant Therapy Ujwal Yeole, Shantala Hegde, Mohit Gothwal, AR Prabhuraj, Sampath Somanna, K Thennarasu, Dr Arivazhagan Arimappamagan Neurol India. Author manuscript; available in PMC 2022 Jul 23.Cerebellar mutism syndrome in children with brain tumours of the posterior fossa Morten Wibroe, Johan Cappelen, Charlotte Castor,BMC Cancer. 2017; 17: 439. Published online 2017 Jun 21
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Long-Term Outcome of Patient With Infantile Onset Pompe Disease – A Perspective of a Physical and Rehabilitation Medicine Specialist

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BACKGROUND: Pompe disease or glycogen storage disease type II is an autosomal recessive metabolic disorder caused by a deficiency of the enzyme acid alpha-glucosidase (GAA). The deficiency of GAA leads to the accumulation of glycogen in various tissues and consequent numerous pathological processes. There are two basic forms of the disease: infantile (IOPD) and late-onset form (LOPD). IOPD is characterized by progressive hypertrophic cardiomyopathy, progressive muscle weakness with a fatal course often in the first year of life, if untreated.

AIM: We present a fourteen-year-old girl with IOPD in whom the diagnosis was made in early infancy and enzyme replacement therapy (ERT) was started immediately after the diagnosis.

METHOD: After significant improvement of cardiomyopathy and satisfactory, although delayed psychomotor development, the patient developed slowly progressive skeletal muscle weakness, including distal muscle weakness characteristic for IOPD, despite regular ERT. The patient was able to walk independently in a paraparetic pattern, but over time, especially since the age of twelve years, weakness of lower extremities has progressed significantly with consequent inability to walk independently and need for wheelchair use. There was also a progression of contractures of the lower extremity joints, especially the knees and talocrural joints. The patient uses orthotics at night to prevent further contractures and appropriate high orthopedic shoes for the stabilization of ankles and feet. She also developed left-sided thoracolumbar scoliosis, for which she wears a corresponding TLSO orthosis and performs appropriate physical therapy.

RESULTS: ERT is the gold standard in the treatment of Pompe disease. In IOPD, the treatment should be started immediately after diagnosis to prevent early demise. Over time, although on ERT, patients experience greater or lesser progression of the disease and often develop changes in the musculoskeletal system: joint contractures, scoliosis, osteoporosis, and progressive muscle weakness leading to severe disability. Therefore, it is necessary to implement medical rehabilitation programs in the management of these patients in order to preserve and improve their clinical and functional status. Pulmonary rehabilitation and certain modalities of physical therapy with special emphasis on kinesitherapy are important factors in the management of patients with Pompe disease.

DISCUSSION AND CONCLUSION: With this paper, we wanted to present a patient with IOPD who had progression of myopathy despite ERT. Unfortunatelly, this is a well- known outcome of IOPD patients on standard ERT. Novel generations of ERT or gene therapy might improve the outcome. In addition to early diagnosis and treatment, continuous monitoring by the multidisciplinary team is necessary. A specialist in physical and rehabilitation medicine is a key pearson for the prescription of appropriate physical therapy and appropriate orthopedic aids. Rehabilitation plays a significant role in the management of these patients and therefore should be comprehensive and individualized for the specific needs of each patient.

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Management of Complex Regional Pain Syndrome in a Long-Term Chronic Stroke Patient: A Multimodal Approach with Ultrasound-Guided Nerve Blocks

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BACKGROUND: Hemiplegic shoulder pain (HSP) poses a diagnostic challenge, characterized by multifactorial origins, and often accompanied by reduced range of motion (ROM) and debilitating pain in distal upper extremity joints. [1] Differential diagnosis includes complex regional pain syndrome (CRPS), commonly seen as shoulder-hand syndrome post-stroke. Managing this complex entity demands a multifaceted approach. [2]

AIM: This case presentation outlines a treatment pathway for CRPS in a long-term chronic stroke patient, emphasizing the use of ultrasound-guided nerve blocks as part of the rehabilitation process.

METHODS: We assessed a 68-year-old man with a three-year history of ischemic cerebral stroke, referred to our outpatient department due to uncontrolled right upper limb (RUL) pain and progressive functional loss. His clinical history indicated challenging spasticity control, including two cycles of botulinum toxin injections, and ongoing physiotherapy sessions with unsatisfactory outcomes. Spasticity assessment using the Modified Ashworth Scale revealed grade 1-1+/4 spasticity in RUL muscle groups, along with painful active and passive joint movements, severely limited ROM, and skin color changes. Criteria for CRPS were met.

RESULTS: Following patient consultation, ultrasound-guided nerve blocks were performed on the right axillar, suprascapular, and pectoral nerves. The treatment included ropivacaine, piroxicam, and methylprednisolone, adjusted to account for the patient's high cardiovascular risk. One-week post-treatment, the patient reported reduced RUL pain, improved joint mobility, increased ROM, and enhanced spasticity control. Analgesic drugs for exacerbation periods were prescribed and the patient was integrated into a comprehensive rehabilitation program.

DISCUSSION AND CONCLUSION: Delayed recognition of HSP etiology may lead to overlapping pathologic processes, hindering rehabilitation. [3] A well-structured rehabilitation program is paramount in preventing HSP complications. Suprascapular nerve block has demonstrated safety and efficacy in long-term chronic stroke patients with HSP, yielding notable reductions in spasticity. [4] This case suggests that synergic nerve blocks could be beneficial as a precursor to physiotherapy in CRPS, as they interrupt nociceptive signaling and inhibit sympathetic activity, addressing the primary issue rather than merely addressing spasticity. Multimodal approaches, such as the one described in this case, offer promise for managing CRPS in post-stroke patients, underscoring the value of ultrasound-guided nerve blocks in Physical Medicine and Rehabilitation.

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Possible Association between Pseudoexfoliation Syndrome, Sarcopenia and Chronic Pain

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BACKGROUND: We hypothesized that if pseudoexfoliation syndrome (PEX) is a systemic disease of connective tissue, it may contribute to sarcopenia and chronic musculoskeletal pain through common pathways.

AIM: We investigated whether the rate of sarcopenia is higher in patients with PEX and if an association exists between PEX, sarcopenia parameters, and chronic musculoskeletal pain.

METHOD: A total of 96 enrolled patients were divided into two equal groups: PEX-positive and PEX-negative patients. The variables were demographic characteristics, sarcopenia parameters (SARC-F, hand-grip strength, chair-rise test, gait speed), and pain parameters (having any chronic musculoskeletal pain, pain regions, and Visual Analog Scale-pain).

RESULTS: Comparison of sarcopenia and pain parameters between the two groups showed that SARC-F ($p < 0.001$), chair rise test ($p < 0.001$), and Visual Analog Scale-pain ($p < 0.001$) scores were statistically significantly higher, while the gait speed ($p < 0.001$) score was significantly lower in patients who were PEX-positive than in patients who were PEX-negative. Patients who were PEX-positive (60.4%) had probable sarcopenia, and 83% had chronic musculoskeletal pain. A comparison of the two groups showed that the rate of sarcopenia ($p < 0.001$) and the rate of having chronic musculoskeletal pain ($p = 0.002$) was significantly higher in patients with PEX.

DISCUSSION AND CONCLUSION: Our study results showed that most patients with PEX had chronic musculoskeletal pain and probable sarcopenia.
In the literature, we could not identify any study regarding the relationship between chronic pain and PEX. One possible underlying mechanism may be that PEX affects peripheral nerves, especially sensorial nerve fibers. Coban et al. (1) compared electroneuromyographic findings between patients who were PEX-positive and PEX-negative, and sensorial nerve latency was observed to be longer. In contrast, sensorial nerve conduction amplitude and velocity were lower in patients who were PEX-positive.
Further both sarcopenia and PEX have similar pathogenetic pathways, including increased oxidative stress and vascular disorders, dysregulation of LOX family members, hyperhomocysteinemia, and altered function of calcium transport (2,3).
In summary, the findings of this study indicated that most patients with PEX had certain chronic musculoskeletal pain and probable sarcopenia. Although PEX and sarcopenia are both prevalent problems in the aging population, additional studies are needed to explain the pathogenetic mechanisms responsible for the elevated occurrence of sarcopenia and chronic pain among PEX patients.

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Diagnostic and Treatment Values of Transarterial Angiography in Patients with Complex Regional Pain Syndrome

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BACKGROUND: One of the hypotheses for the pathophysiology of complex regional pain syndrome (CRPS) is that the ascending autonomic nervous system can impact blood vessels through a phenomenon known as sympathetic coupling. Sympathetic coupling is an abnormal interaction between sympathetic nerves and blood vessels, resulting in the dysregulation of vascular tone and blood flow. This dysregulation can lead to vascular structural changes and alterations in temperature within the affected area.
In this study, angiography was performed in CRPS patients to evaluate vascular abnormalities and perfusion, and embolization or reperfusion was performed according to the angiography results.

AIM: The purpose of this study is to report the results of angiography, compare them with Digital Infrared Thermographic Imaging (DITI) and three-phase bone scan (TPBS) and evaluate the changes in symptoms after intervention in CRPS patients.

METHOD: Retrospectively, 5 patients who were diagnosed with Complex Regional Pain Syndrome (CRPS) according to the Budapest criteria and underwernt angiography, DITI and conducted TPBS were enrolled.

RESULTS: Based on the angiography results, three out of the five patients showed decreased vascular perfusion, while two patients showed increased staining.
Reperfusion using eglandin was performed in patients with poor vascular perfusion, and embolization with imipenem/cilastatin was performed in patients with increased abnormal staining. No significant changes in pain were observed in all patients before and after the procedure. Additionally, the comparison of the results from angiography, DITI, and TPBS did not show similar patterns.

DISCUSSION AND CONCLUSION: Abnormal staining and reduced perfusion were found in the angiography of CPRS patients, and there was no pain improvement by the intervention of angiography.

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Complex Regional Pain Syndrome During Rehabilitation: Diagnostic Dilemmas

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BACKGROUND: Management of a patient with Chronic regional pain syndrome (CRPS) requires comprehensive medical care. Authors describe the case history of a patient with multiple sclerosis (MS), who had also CRPS during the rehabilitation phase. Steps and difficulties of decision making are presented.

AIM: To find solutions so as to avoid diagnostic mistakes in case of CRPS considering „over" or "under" diagnosing such cases. At our Rehabilitation Unit we deal several patients with hemiparesis and day-by-day find subjects with a swallowed upper limb and also with sensation problems (paraesthesia, dysesthesia etc.), but most of them have no CRPS. Nevertheless, it is necessary to recognize those patients, who have this complication. Authors show handling this problem threw a certain case.

METHOD: The 46-year-old woman was admitted to the Neurological Department due to tetraparesis, vomitus, incontinence, consciousness disturbance. Her first MS episode was diagnosed. She received high dose steroid, without effect. Then she got plasmapheresis and alemtuzumab. She was transferred to the Rehabilitation Unit in a stabilized state. In the 4th week of the rehabilitation programme her left hand became swollen, livid, painful. According to the Budapest criteria CRPS was diagnosed.

RESULTS: By the 5th week of rehabilitation, the patient became able to walk without aid, regained the right upper limb function and executed activities of daily living independently. Nevertheless, the signs and symptoms of the left hand still existed. At our department it is a usual problem to differ "simple" upper limb swelling due to the palsy, or other cases, CRPS, sometimes deep vein thrombosis. Applying Budapest criteria for CRPS can help. In spite of the administration of non-steroids, bisphosphonate, Vitamin D3, Ca-pills, pregabalin and physiotherapy the required functional improvement could not be achieved. Due to the lack of improvement, she received a steroid cure per os, after it the oedema and pain decreased. The steroid was suspended and the previously described medication was continued. 3 months later taking medicines could be discontinued except for the Vitamin D3, Ca-pills and bisphosphonate. 6 months after the onset of the CRPS there were no symptoms or functional deficit in the left hand.

DISCUSSION AND CONCLUSION: Management of the CRPS requires individual solutions. To improve the therapeutic effect a short, intensive steroid cure is a considerable choice even nowadays. As for avoiding diagnostic mistakes, application of Budapest criteria is essential, as it is advised by the International Association for the Study of Pain (IASP) for several years.

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Extracorporeal Shockwave Therapy vs Physical Modalities in Myofacial Pain on the Upper Part of m.trapezius

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BACKGROUND: Myofacial pain is a chronic condition that causes pain in the musculoskeletal system. Myofacial syndrome in the
neck is most common in the upper part of m.trapezius. It can be treated with physical therapy and its modalities, extracorporeal shock wave therapy, dry needling, kinesitherapy and others.

AIM: The aim of this paper is to compare the treatments for myofacial pain in the upper m. trapezius with shock wave device with radial probe (2000 strokes, 2.5 bar, 10hz,cont) and stretching exercises and Physical modalities (tens, if 100hz, ultrasound 0.7 w / cm) and stretching exercises

METHOD: The study will involve 60 patients aged 35 to 60 years with myofacial pain in the area of m. trapezius, divided into two groups. The first group will be treated with a shock wave device with a radial probe and stretching exercises 4 times in a period of
two weeks. The second group will be treated with physical modality (uz, tense if, stretching exercises) for 10 days. At the beginning of the treatment they will be given a questionnaire for neck pain (Oswestry disability index (NDI)) and a visual scale for pain intensity (Visual Analog Scale). We will do the same tests after two weeks and after a month.

RESULTS: The results will show us which of these treatments will be more effective in the treatment of myofascial pain of upper M. trapezius in patients.

Key words: Myofacial pain, upper M. trapezius, shock wave device

DISCUSSION AND CONCLUSION: he myofascial pain is reduced with both applied methods, however there is a difference.When shock wave therapy is applied, the initial results, interms of pain reduction, are chieved faster compared to the physical modalities. Electrotherapy in combination with stretching exercises also works on long-term reduction of pain, but the effects are greater after 30 days.

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The Role of PRM Physician in Palliative Care for People with Lymphedema

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BACKGROUND: Accumulation of protein-rich fluid in the interstitium recognized as lymphedema, has become one of the world's biggest health problems due to its progressiveness, chronicity and incurability. Without adequate management with complex decongestive therapy lymphedema can have negative impact on physical and psychosocial functioning of affected individual.
Although less extensively diagnosed, treated, and researched, lymphedema is also a common feature of many chronic end-of-life conditions. In palliative care, a patient's lymphedema may develop long before death causing pain, discomfort, lymphorrhea, and infection, all of which lead to reduced mobility, functionality, reduced self-care activities and quality of life.
Due to the complexity of the patient's palliative care, a complex decongestive approach to the treatment of lymphedema is usually inappropriate and too extensive. Therefore, treatment should be individually tailored, carefully monitored, and directed at symptoms and impairments. The primary goals of treatment are maintenance, improvement of skin quality, function and quality of life, rather than limb volume reduction. Treatment of lymphedema in palliative care is demanding due to complexity of the disease process itself, but also because there is scarcity of available evidence on the most appropriate treatment. Moreover, health professionals' skills, knowledge or understanding of the diagnosis and approach to the treatment of palliative lymphedema are inadequate.

AIM: The emphasise the role of PRM Physician in Palliative Care for People with Lymphedema and need for proper care.
METHODS and RESULTS: Extensive search of Medline and PEDro databese was performed using MeSH keywords: lymphedema, palliative medicine and physical medicine and rehabilitation. Out of seventeen papers that match the search, 4 were dealing with cancer rehabilitation or lymphedema treatment but none of them was dealing with the role of PRM Physician in palliative lymphoedema care.

DISCUSSION AND CONCLUSION: PRM specialist could play a major role in lymphoedema treatment in palliative care settings since their main treatment focus is functioning improvement, impairment reduction and prevention of treatment complications.
Biopsychosocial model of care used by PRM specialist in treatment approach enables them to diagnose and manage the severity of health problems in lymphoedema. This holistic approach to patient care alongside with possibility to use variety of pharmacological, nonpharmacological and interventional treatments positions PRM specialist as most skilful health care professional for lymphedema treatment in multidisciplinary palliative care team.

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The Effects of Music Therapy in Neurorehabilitation With Persons After Brain Injury

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BACKGROUND: Music therapy at the Department of Rehabilitation Medicine, 1st Faculty of Medicine, Charles University and University Hospital in Prague has been an integral part of multidisciplinary neurorehabilitation of patients with acquired brain injury (ABI) since 1996.

AIM: To investigate the effect of music therapy (MT) on the perceived quality of life in individuals with ABI as part of a complex neurorehabilitation process. (Gerlichova, 2014)

METHOD: Quantitative part of the study on a group of 100 people who attended the Day Care Centre at the Department of Rehabilitation Medicine of the 1st Faculty of Medicine of Charles University and University Hospital in Prague. Input and output measurements according to the functional independence measure (FIM) methodology were carried out with these persons and next the data were statistically analysed (Kruskal-Waliss test) in relation to other evaluated parameters.

The qualitative part of the study processes the results of semi-templated interviews with 15 people (also participated in the quantitative study) while the perception of MT is evaluated by a procedure inspired by grounded theory.

RESULTS: The results of the combined research show that MT plays an important role in the rehabilitation process for persons with ABI. The effects of MT are not restricted to a certain category of persons. The results of the quantitative part prove the positive effects of MT in improving movement, communication and self-sufficiency especially depending on the number of music therapy sessions attended.

DISCUSSION AND CONCLUSION: The major contribution of MT in the perception of quality of life is a positive influence on communication, perception of movement, dynamics, self-perception, as well as gaining emotional stability and enhancing relaxation.

The contribution of MT in neurorehabilitation is significant (Thaut, M. & Hömberg V., 2014). The rate of progress in motor skills, communication and self-sufficiency increases with the number of MT sessions. Patients are very sensitive to their quality of life (Aldridge, D. & Gilbertson, S., 2008). They reflect on any progress in motor, communication and self-sufficiency, less so in cognitive abilities (Gerlichova, 2020). In addition to experimental experience, we can now draw on a range of research at the Evidence-Based Medicine (EBM) level (Thaut, M.H., Francisco, G. and Hoemberg ,V., 2021).

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Antimicrobial and Diagnostic Stewardship in a Severe Acquired Brain Injury Rehabilitation Unit

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BACKGROUND: Infections are a frequent concern among patients with severe Acquired Brain Injury (sABI), particularly in regions endemic for multidrug-resistant bacteria, including carbapenem-resistant Enterobacteriaceae (CRE) .Clostridium difficile infection (CDI) is a significant healthcare-associated infection often linked to inappropriate antibiotic use. These infections pose a common challenge for sABI patients in specialized rehabilitation units, increasing the risk of mortality and limiting rehabilitation opportunities. Consequently, many rehabilitation departments in Italy have implemented Antimicrobial, Infection Prevention, and Diagnostic Stewardship (AID) programs to prevent healthcare-associated infections, reduce the prevalence of multidrug-resistant pathogens, curtail inappropriate antibiotic use, enhance microbiological diagnostics, and improve clinical and rehabilitation outcomes (1)

AIM: This study aims to demonstrate the successful impact of implementing an AID program in the Intensive Rehabilitation Unit of IRCCS Don Carlo Gnocchi ONLUS in Florence in eliminating C. difficile infections and reducing CRE bacteremia

METHOD: The department consists of 32 beds designed to accommodate patients with prolonged hospital stays, significant comorbidities, invasive mechanical ventilation, artificial nutrition, intravenous antibiotic administration, and multiple medical devices. In 2019, the AID program included several measures: the introduction of a rapid point-of-care screening tool for CRE colonization upon patient admission, implementation of regional and national guidelines for containing CRE colonization and infections, decision support for complex antibiotic therapy choices, compilation of reports on antibiotic consumption, CRE infections, colonizations, alcohol gel usage, Clostridioides difficile infections, and auditing/training activities, and enforcement of restrictions on the placement of new invasive devices. Between January 2019 and June 2020, the number of Central Venous Catheters (CVCs) and Peripherally Inserted Central Catheters (PICCs) in use was monitored through monthly point prevalence analyses. Data on CRE bacteremia incidence were extracted from periodic reports issued by the Microbiology Laboratory and expressed as cases per 1000 patient-days. Statistical analysis of the incidence trend was conducted using linear regression analysis with the online GraphPad tool, with a significance threshold set at $p < 0.05$

RESULTS: During the study period, no cases of C. difficile infection were observed, and the incidence of CRE bacteremia progressively and significantly decreased. Specifically, it decreased from 2.6 cases per 1,000 patient-days in 2019 to 2.3 in 2020, 1.6 in 2021, and 0.4 in the first half of 2022 (p-value = 0.02). A drastic reduction was observed from 2021, coinciding with the introduction of restrictions on the placement of new invasive devices. Point prevalence data indicated a decrease from an average prevalence of 30% of patients with invasive vascular devices in 2019 to 4% in 2022

DISCUSSION AND CONCLUSION: Infections during rehabilitation lengthen hospital stays, worsen rehabilitation outcomes, and increase average patient care costs. Our results demonstrate that the implementation of Antimicrobial and Diagnostic Stewardship, including monitoring and restrictions on the

use of invasive vascular devices, as well as optimization of antibiotic therapy, can significantly reduce the incidence of CRE bacteremia and eliminate C. difficile infections

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Early Rehabilitation Prevents ICU-Acquired Weakness In Patient With Severe Traumatic Brain Injury (TBI): An Algerian Case Report

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BACKGROUND: ICU patients frequently develop neuropathy and/or myopathy referred to as ICU-acquired-weakness.Although pathophysiology's complex structural and functional changes are still not fully known, this condition frequently affects limb and respiratory muscles.

AIM: Early rehabilitation may reduce the incidence of this disorder in critically ill patients.

METHOD: we present a case of a 24 years old Algerian male who was a victim of a road accident, caused a severe brain injury; loss of consciousness with Glasgow inferior to 8 before the first 24 hours, diffuse cerebral contusion, and coma for 10 days. He benefited from early rehabilitation during his 2 months of hospitalization. 2 months after the accident, the patient referred to our rehabilitation center with flasque tetra paralysis. He carried out a daily physical, occupational, and speech therapy

RESULTS: A significant functional improvement resulted from the early rehabilitation.

DISCUSSION AND CONCLUSION: the current case report describes the importance of early rehabilitation in ICU patients to prevent ICU-Acquired weakness.

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Evaluation of the Integration of Patients With Traumatic Brain Injury in Their Home Environment After Rehabilitation

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BACKGROUND: Patients with head injury usually return to their home environment after completed rehabilitation, which is an additional challenge in the case of functional, motor or cognitive impairment.

AIM: In order to identify the problems that our patients face and to objectify their problems with integration, we used the Community Integration Questionnaire- Revised (CIQ-R). At the same time the validity of the questionnaire for the Slovenian language was checked.

METHOD: The CIQ-R was translated and patients were telephoned twice 14 days apart. In addition, they were assessed using the Functional Independence Measure (FIM) during the first call. The reliability of the CIQ-R in terms of internal consistency was assessed using Cronbach's alpha and Guttman's lambda-2. The reliability in terms of repeated measures was assessed using intraclass correlation (ICC). The association between FIM and CIQ-R scores was assessed using Pearson's correlation.

RESULTS: The inclusion criteria met 42 patients, of whom 15 were enrolled in the study. Internal consistency of the CIQ-R was high (α=0.8, λ=0.85) and a very high re-test stability of the overall CIQ-R score (ICC=0.95). The cognitive component of the FIM in the home environment was linearly associated with CIQ-R score (r=0.8, $p \leq 0.001$).

DISCUSSION AND CONCLUSION: In practice, the CIQ-R in Slovenian language could be used in follow-up examinations, where, in addition to the clinical and functional status, we could have a better insight into the patient's involvement and, in the case of poor involvement, advise on activities to improve socialization, perhaps by joining pathology-specific societies. The translation of the CIQ-R questionnaire into Slovenian has been successfully validated and we proved its potential suitability for clinical use. Good patient integration is important and should not be overlooked when preparing for a patient's discharge from a rehabilitation facility.

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Traumatic Brain Injury in Children, Multidisciplinary Approach – Case Report

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BACKGROUND: Traumatic brain injuries are among the most common causes of acquired disability in children. Because of its complexity, they require an interdisciplinary and transdisciplinary approach in treatment.

AIM: The main aim is to analyze the process of rehabilitation after traumatic brain injury and the importance of multidisciplinary follow up.

METHOD: In this report we analyzed the process of rehabilitation in a patient who was hospitalized in the Institute of Child and Youth Health Care of Vojvodina, Novi Sad, Serbia after suffering traumatic brain injury. His medical record was used for acquiring the following information: age, gender, duration of rehabilitation treatment and type of physical therapy modalities used in the rehabilitation treatment.

RESULTS: In the period of 18.08. to 06.11.2017. (81 days) an 16.5-year-old boy was hospitalized for treatment and rehabilitation. Early rehabilitation treatment had started on the 14th day of hospitalization in the Clinic for intensive care and children's surgery. The mechanism of injury was unknown, presumably falling from height. On admission to the hospital he was unresponsive, with periorbital haematoma, bilateral otorrhagia and dilated pupils. CT scan of the head showed epidural haematoma localized temporo-occipital on the right side and fractures of the base of the skull. At the initial examination of the physiatrist the patient was in the passive supination position, unresponsive to pain stimulus, with present initial flexion movement in the left knee and elbow joint, knee joints were extended and hip joints were in external rotation. Barthel index was 0. On the 25th day of hospitalization the patient was relocated to the Clinic for children's habilitation and rehabilitation. An
anti-decubitus program was conducted, so was positioning, kinesitherapy, electrotherapy and occupational therapy with multidisciplinary follow up. Upon discharge from the hospital the patient was able to walk independently, with a discreetly disturbed walking pattern in terms of hemiparetic type of walk on the left side, gross muscle strength of the lower extremities had improved and the patient was independent in daily life activities with Barthel index 100.

DISCUSSION AND CONCLUSION: Craniocerebral injuries in children represent a significant medical problem because of their complicated and uncertain course and outcome, with possible consequences and the need for long term rehabilitation. The rehabilitation process of this patient included a multidisciplinary team with implementation of kinesitherapy and other physical modalities. The patient should have firm support from its family and community, in order to go through the rehabilitation process and reintegration in the community with ease.

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Cheshire and Mersey Rehabilitation Network (CMRN) UKROC Analysis 2013–2022

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BACKGROUND AND AIM: To analyse the demography and rehab outcomes of patients admitted to CMRN Population and sampling:

METHOD: We analysed a total amount of 2639 patients who were admitted to our Cheshire and Mersey network from April 2013 to September 2022.
From The UK Rehabilitation Outcomes Collaborative (UKROC) which is collected and submitted regularly

RESULTS, DISCUSSION AND CONCLUSION: We analysed the data: number of patients, age, gender, diagnosis, sub diagnosis, length of stay,discharge destination, Tracheostomy status in relation to RCS and FIM+FAM

Results: An average of 97 patients are admitted to level 1 rehab annually and 167 patients for level 2. Majority of CMRN patients are acquired brain injury patients (71%) with stroke being the leading cause (46%), followed by trauma (35%). Large proportion of our patients are aged 51-70 (44%) and are males (59%) 9 out of 10 tracheostomy patients are successfully weaned and are discharged to other rehab units. Patients with the tracheostomy had a longer inpatient stay and lower RCS & FIM+FAM improvement score. 64% of PDOC patients remains in PDOC state on discharge, although 87% was weaned off
Tracheostomy Youngest age group of 18-30 generally have the shortest stay Majority of our patients are discharged home (57%) while many have transferred for ongoing rehabilitation and only small proportion of patients gone to care home. Patients with peripheral neurology has the highest RCS and FIM+FAM score improvement of 3 and 40 respectively. Patients with progressive conditions has the FIM+FAM score improvement of 20. Patients with brain injury has lowest RCS improvement of approx. 2 but a FIM+FAM score improvement of approx. 35.

REFERENCES
UKROC DATABASE

Specialist Rehabilitation Nursing Competency Framework

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BACKGROUND: Specialist rehabilitation practice makes it imperative that nurses have the capability to deliver safe, effective and quality care. The BSPRM (2009) recognise the need for a well-qualified workforce with specialist knowledge and experience; stating 1/3 of nurses should have specialist rehabilitation training.
Nurses train and work across rehabilitation settings and as such play a fundamental role in a patients' rehabilitation following traumatic injury or illness. Nurses need a broad range of knowledge and skills.
The Cheshire and Merseyside Rehabilitation Network recognised that there was a gap in nursing competencies. A Group was developed including membership across rehabilitation nurses, AHPs and medics to support development of domains and competencies.

AIM: The framework includes a set of essential behaviours and skills that can be measured to enable us to develop:

- A common language and benchmark – knowledge, skills and attributes that drive safe, effective and quality care.
- Clarity and a common ground around nursing practice - setting out the knowledge, skills and behaviours that are required at different levels and in different settings.
- Focus – emphasise the knowledge, skills and behaviours that are crucial for success, providing staff with a clear focus for professional development, leadership skill development for recruitment and retention.

METHOD: The Framework includes 16 key domains, developed through staff engagement and partnership working.
Implementation of the framework will involve working as part of the rehabilitation IDT to support patients' needs following traumatic injury or illness, through::

- self-assessment to identify areas of compliance and define areas for further development
- reflective practice
- career and workforce planning
- education and training programmes
- service /team evaluation
- recruitment and retention

RESULTS: Evaluation methods include: case studies; staff experience; application of practice and benefits; and key performance indicators.
Early feedback:

- It gives me an opportunity to increase my knowledge by flexibly working across the different competency levels where applicable to clinical role/practice
- It helps to shine a light on rehabilitation to highlight the specialty. The framework shows the full involvement and support with the IDT and helps our confidence within the specialty. It shows high standards of evidence based practice. Completing this framework will support us with our CPD and revalidation
- The framework is easy to follow and will help embed the relevant knowledge required to give the best quality of care to our patients on a day-to-day basis

DISCUSSION AND CONCLUSION:

Each competency includes a self-assessment and the assessor's assessment to review the learners existing knowledge, skills and experience and identify learning needs.

The framework is designed to be as flexible as possible whilst enabling a standard to be set. It is used by a variety of roles at different grades and different settings and the assessment evidence required reflects this.

Knowledge-based discussion competencies are assessed using evidence generated outside of the work environment, e.g., classroom, group learning or online.

Skills-based competencies are assessed using direct observation in the workplace during the learner's normal work activity.

REFERENCES:

Realiability and Validity of the Mini-BESTest in Czech Participants With Acquired Brain Damage

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BACKGROUND: There are several balance assessment tools available in clinical neurological and rehabilitation practice, but their use varies. One of the tests is the Mini-BESTest (the Mini-Balance Evaluation Systems Test), which is clinically easy to perform. It evaluates both the anticipatory and reactive postural components of stability and has corresponding psychometric properties. (Horak, 2009) Official Czech version of the Mini-BESTest (Mini-BESTestCZ) and recommendation for its clinical use was introduced in 2022 (Michalčinová, 2022).

AIM: This study follows up previous release of Mini-BESTestCZ (Michalčinová, 2022). We aimed to investigate selected psychometric properties of the Mini-BESTestCZ, such as inter-rater reliability, convergent validity, and the effect of floor/ceiling in a group of persons with acquired brain damage.

METHOD: 73 persons with acquired brain damage in subacute or chronic phase were assessed in this prospective, observational design study between years 2020-2023. All persons were patients of the Department of Rehabilitation Medicine of the First Faculty of Medicine, Charles University and the General University Hospital in Prague and were participants of specific, four-week rehabilitation program – the Day Neurorehabilitation Program. Mini-BESTestCZ evaluation was performed at the beginning and the end of the program. Each time two independent examiners evaluated Mini-BESTestCZ for interrater reliability – one at the time of assessment, the other one from a video recording. Convergent validity was investigated using Berg Balance Scale and Timed Up and Go Test. The effect of floor and ceiling was measured with the commonly used 15% threshold. Interrater reliability was assessed using a two-way mixed, consistency, average-measures ICC and convergent validity was assessed using Spearman´s rank correlation.

RESULTS: 63 participants were enrolled. The Mini-BESTestCZ demonstrated great interrater reliability (ICC = 0.985, $p < 0.001$, 95% CI = 0.978 – 0.989) and strong correlation with Berg Balance Scale (rho = 0.86, $p < 0.001$) and strong correlation with Timed Up and Go Test (rho = -0.74, $p < 0.001$) as well. Mini-BESTestCZ also demonstrated no floor effect (1,59 %) or ceiling effect (0 %).

DISCUSSION AND CONCLUSION: Mini-BESTestCZ showed great interrater reliability and strong convergent validity with no floor or ceiling effect and can be recommended for the use in research and clinical practice in persons with acquired brain damage in subacute and chronic phase. Further psychometric properties should be evaluated.

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Assessment of Dictus-Orthosis Use in a High-Level Athlete With Amyotrophic Lateral Sclerosis on Tofersen Therapy

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BACKGROUND: Amyotrophic lateral sclerosis is a severe neurodegenerative disease of the central nervous system whose current diagnostic-therapeutic management is still suboptimal. For patients with SOD1-associated ALS Tofersen gene silencing therapy is a new approach aimed at reducing the expression of pathological proteins.[1]

We present the case of a 29-year-old patient, a national powerlifting competitor, diagnosed with ALS with SOD1 mutation. His current main limitation was his foot drop, which prevented him from being able to reach places due to the aerobic requirement, thus limiting his social life. Therefore, he was fitted with the Dictus orthosis to internally improve his quality of life. Despite the frequency of foot drop, and the serious effect that it has on gait and general function, the literature provides little direction as to its use on patients suffering from ALS.[2]

AIM: To analyze whether the Dictus band type orthosis improves: function, activity and social participation[3] in a patient with ALS undergoing treatment with Tofersen (Qalsody).

METHOD: After signing the informed consent, function was measured with aerobic capacity using the 6-minute walk test associated with the Borg scale, heart rate and peripheral oxygen saturation, and the Up and Go Test. To measure activity and social participation, we used maximum walking speed and distance covered in the 6-minute walk test, participation in social gatherings with friends, weight-lifting performance, and quality of life. For everything, two measurements were made: with and without dictus.

RESULTS:
Scales without the dictus orthosis: T6M: (HR: 89 bpm at rest, 63 bpm post-exertion), SatO2(97% at rest, 99% post-exertion) and Borg scale (0 in dyspnoea at rest and post-exertion, 0 in fatigue at rest and 0 post-exertion). Total distance 394.5 metres, speed 65.75 metres/minute. TUG: 5.53 seconds.
Scales with dictus orthosis: T6M: (HR: 85 bpm at rest, 63 bpm post-exertion), SatO2(97% at rest, 98% post-exertion) and Borg scale (0 in dyspnoea at rest and post-exertion, 0 in fatigue at rest and 6 post-exertion). Total distance 436,5 metres, speed 72.75 metres/minute. TUG: 5.08 seconds.
Finally, the patient reports improved motor control and proprioception, which translates into increased participation in social activities and better adaptation to power-lifting, with a consequent increase in satisfaction and quality of life.

DISCUSSION AND CONCLUSION: These first results show that dictus orthosis may help improve the aerobic capacity and maximum walking speed of ALS patients treated with Tofersen. Future studies with more patients are necessary to obtain significant results and to establish the most appropriate treatment of the foot drop in ALS patients treated with Tofersen.

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n

Single Case Report of Parsonage-Turner Syndrome After COVID-19 Infection

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BACKGROUND&AIM: Shoulder pain is a common cause of consultation in the emergency room and outpatient clinics with a wide variety of clinical forms and underlying pathologies, and its differential diagnosis is extensive and rarely includes the Parsonage-Turner syndrome (PTS). PTS, also known as an acute neuritis of the brachial plexus, is characterized by severe upper arm pain and weakness preceded by a triggering event, such as surgery, post-infection, post-vaccination, strenuous exercise, autoimmune disorders, between others.
We found that PTS can occur post-covid 19 vaccination. However, there is only one case reported of PTS in the setting of a recent infection with Covid-19.

METHOD: We describe a case of marked unilateral scapular weakness and pain associated with unilateral winged scapula in a 31-year-old patient, previously healthy, in the setting of a recent viral illness (Covid-19)

RESULTS: The patient received 2 doses of covid-19 vaccine in the left deltoid in June and October 2021 causing shoulder pain and fever lasting <48 hours.
Months later, in mid-January 2022, he suffered a covid-19 infection with the appearance of symptoms at the cervical level and left paravertebral musculature that limited themselves in weeks.
In mid-October 2022, he suffered a new covid-19 infection and a week later he began to feel a loss of strength in his shoulder and paresthesias up to his left elbow. Left periscapular muscle amyotrophy appears.
Then he consults with a specialist who requests an ultrasound (US) of his left shoulder and a a complete blood test to rule out rheumatism and other shoulder pathologies. Later he was studied with an electromyogram (EMG) and nerve conduction study (NCS) that showed a slight deficient recruitment pattern of motor units in the left trapezius and serratus anterior compatible with possible sequelae of a mild degree PTS.
The patient received medium doses of anti-inflammatories and began physiotherapy treatment, which he maintains to this day.

DISCUSSION AND CONCLUSION: Reviewing the existing literature and the many possible etiologies of PTS in this patient, we are faced with two plausible causes of the referred clinic: on the one hand, the high load of physical exercise, habitual in the patient's lifestyle; and on the other hand, the recent covid-19 infection as responsible for the syndrome presented.
The differential diagnosis of PTS should be taken into account when faced with a painful shoulder in a patient with a recent history of covid-19 vaccination, as reflected in previous studies. And, as a few studies report, the symptoms presented after the covid-19 infection should also be taken into account as possible responsible for the PTS, after ruling out other more plausible causes.

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Poster Session G

Cadaveric Study of Thread Trigger Finger Release Using Newly Developed Thread

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BACKGROUND: Thread trigger finger release (TTFR) is a percutaneous first annular (A1) pulley resecting technique using resecting thread under ultrasound guidance without skin excision. It can be performed in two ways, distal and proximal approaches according to the direction of procedure.

AIM: This cadaveric study was conducted to examine the operational usefulness and feasibility of TTFR with newly developed domestic thread (Smartwire) and verify which approach is safer and more effective in TTFR by comparing the results between the distal and proximal approach.

METHOD: TTFR with Smartwire and 20G Tuohy needle was performed on 12 fresh cadaveric hands (12 thumbs, 48 other fingers) by two different experts with equal assignments. The distal and proximal approach were equally performed in 6 hands each. After TTFR, the anatomical analysis was performed by a blinded anatomist. The completeness resection of the A1 pulley and the presence of damaged nearby structures were assessed.

RESULTS: The complete A1 pulley resection rates were 83.3% in the thumb and 100% in other fingers with the distal approach and 50.0% in the thumb and 83.3% in other fingers with the proximal approach. There were no injuries to the digital nerves and flexor tendons except 1 minor partial flexor tendon injury in the left 4th finger with the proximal approach.

DISCUSSION AND CONCLUSION: TTFR with smartwire is the safe and effective procedure for resecting the A1 pulley, especially with the distal approach.

REFERENCES:

Differences in the Performance of the Standardized Nine Hole Peg Test in the Clinical Practice of Czech and Slovenian Occupational Therapists

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BACKGROUND: The Nine-Hole Peg Test (NHPT) is a reliable tool used to objectively assess hand dexterity (1). The task of the tested person in the NHPT is to place as many pegs one by one as possible into the holes in the test board and then return them to the container in the same way with each hand separately. Its use in practice requires giving the verbal instructions written in the manual, including the demonstration of a practical example of the required task by the test administrator, always in a completely identical way. However, neither the Czech nor the Slovenian manual for it was published at that time of collecting data for this project.

AIM: The aim of the project was to find out whether occupational therapists from the Czech Republic and Slovenia react to selected commonly occurring situations when performing NHPT in the same way.

METHOD: Short video recordings were made in which a healthy person demonstrated five pre-selected situations arising while performing the NHPT. These were subsequently incorporated into the questions of an electronic questionnaire addressed to occupational therapists from the Czech Republic and Slovenia (identical version in Czech and Slovenian). Both language versions of the questionnaire were distributed through the Czech and Slovenian Association of Occupational Therapists from 3-8/2021.
Data obtained from 87 Czech and 67 Slovenian occupational therapists (OTs) were analyzed using descriptive statistics.

RESULTS: If the pegs fell into the tested person's lap and he/she grabbed one peg with the tested hand and the other with the non-tested hand, 86% of the Slovenian OTs would repeat such an attempt again. Only 56% of Czech OTs would react in the same way.
Similarly, OTs' opinions differed in the situation where the peg fell into the person's lap, but the person promptly grabbed it with the tested limb and continued smoothly. 44% of Czech and 37% of Slovenian OTs would immediately end such an attempt. 22% of Czech and 30% of Slovenian OTs would not count it, while 22% of Czech and 33% of Slovenian OTs would, on the contrary, consider it valid.
58% of Czech and 71% of Slovenian OTs would immediately stop testing if the peg fell to the ground. 26% of Czech OTs would let the person complete such an attempt, while only 7% of Slovenian ones would.

DISCUSSION AND CONCLUSION: The results confirm that Czech and Slovenian occupational therapists fundamentally differed in their ways of reacting to commonly occurring situations during using standardized NHPT and that they also drew completely contradictory conclusions from them. They lacked clear rules in the existing instructions for NHPT for a uniform method of solution at the time of data collection.
The outputs from this project were subsequently used in the creation of the Czech extended version of the manual for NHPT (1).

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The Influence of the Use of Mobile Phone on the Dexterity of the Hands of Healthy Czech Adult Population

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BACKGROUND: Using a mobile phone has become an integral part of daily life. Thanks to the fine motor skills of our fingers, we write text messages or watch videos on our mobile phones. Fine motor skills can be objectively assessed by occupational therapists using the Nine Hole Peg Test. In this standardized test a tested person is asked to put nine pegs into holes one after another and put them back as fast as possible by dominant hand and then by nondominant hand. A Czech extended manual was created for it in the Czech Republic (1).

AIM: The aim of the project was to find out whether there is a causal relationship between the use of mobile phone and performance in the Nine Hole Peg Test in healthy Czech adult population aged 20 to 64.

METHOD: A total of 208 Czech healthy people aged 20 to 64 years were tested with the Nine Hole Peg Test (NHPT) according to the Czech Extended Manual for the Nine Hole Peg Test after they filled out a questionnaire. The questions were focused on how often and in what way they use a mobile phone. Pearson's chi-square test was used to determine the dependence between the investigated phenomena.

RESULTS: It was found that there is a significant relationship between the way of holding and touching the mobile phone and the performance of the dominant hand in NHPT at the set significance level $\alpha = 0.05$ (P-value = 0.006722). The relationship was also found between the time spent using mobile phone by women and their performance of the dominant hand at the set significance level $\alpha = 0.10$ (P-value = 0,099641).

DISCUSSION AND CONCLUSION: The analysis of the responses of the test subjects shows that they most often hold their mobile phone in their left hand and write with their right hand or hold it with both hands and write with both thumbs. The way you operate a mobile phone can be related to its size, weight and button placement (for instance for the volume control). Left-handed people prefer to hold the mobile phone with both hands and operate mainly with both thumbs, which may be related to the design of phones, which is adapted for comfortable operation with the right hand due to the high representation of right-handed people in the population. (2)
The proven high dependence of the way of the using the mobile phone on the results of the dominant hand in the Nine Hole Peg Test can be related to the greater frequency of involving the thumb of the dominant hand in ways of using the mobile phone.

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Elastofibroma Dorsi: A Case Report of Bilateral Occurrence

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BACKGROUND:Elastofibroma dorsi (EFD) is an uncommon, slowgrowing, noncapsulated, benign fibroblast/ myofibroblast originated tumor without well-defined boundaries. It is commonly located in the infra- or periscapular area.

AIM: We report a case of EFD as a rare differential diagnosis of back pain.

METHOD: 61-year-old female presented with dorsal pain. The patient was symptomatic with the arm movements and presenting pain bilaterally in the subscapular region associated with tumoral mass. Thoracal computerized tomography revealed a well-defined, bilateral tumoral mass with alternation of the muscular and fatty tissue.

RESULTS: Due to its symptomatic occurrence we referred the patient to thorax surgery.

DISCUSSION AND CONCLUSION: EFD most frequently shows a slow growth pattern and there is no reported malign transformation. Parratt et al showed that surgical treatment can reduce the pain. Local tumor recurrence has been reported after incomplete excision.

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Application of Ozone Therapy in Subacromial Impigment Syndrome

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BACKGROUND: Ozone therapy is the application of an oxygen (O2)-O3 mixture that is prepared by converting pure O2 into O3 using special medical generators. O3 is used in the treatment of several pathological conditions of the musculoskeletal system.

AIM: The aim of the study is to show the effect of ozone in the treatment of pain in subacromial impingement syndrome.

METHOD: Patients with shoulder pain and diagnosis of subacromial impingement syndrome were included in the study. The (O2)-O3 mixture of 20 ml was injected into the region of pain in 4 points on the day of the examination, and the second dose after 7 days. We monitored the intensity of pain using a numerical analogue scale (0-10), the range of motion- flexion and abduction in the shoulder (from 0-180 degrees) on the zero day (before receiving the first dose of ozone- NAS-0, AF-0, ABD-0), after 7 days from the first dose (NAS-1, AF-1, ABD-1) and after 7 days from the second dose of O3 (NAS-2, AF-2, ABD-2). In the same time intervals, the Hawkin (HW-0, HW-1, HW-2) and pain arc (PA-0, PA-1, PA-2) tests were monitored, evaluated as positive/negative.

RESULTS: The results of 13 patients (5 men - 38.46% and 8 women - 61.54) with an average age of 49.08 ± 11.54 were statistically processed. By comparing NAS-0, NAS-1 and NAS-2, statistically significant differences were found. The mean values of NAS-0 (7.46±1.76) and NAS-1 (2.85±1.34), ($t=8.783$, $df=12$, $p<0.001$) and also, the medians of NAS-1 (3;0-5) and NAS-2 (0;0-2), ($V= 78$, p-value= 0.002). By comparing the range of motion, the following significant difference were found: in the medians of AF-0 (105;5-180) and AF-1 (170;20-180), ($V= 0$, p-value= 0.004) and between the medians of AF-1 (180;110-180) and AF-2 (170;20-180), ($V= 0$, p-value= 0.0215, $p<0.05$). There are also statistical significances in terms of increased abduction, in the medians of ABD-0 (76;10-180) and ABD-1 (180;25-180), ($V= 0$, p-value= 0.0038), and in the medians of ABD-1 (180; 25-180) and ABD-2 (180;130-180), ($V= 0$, p-value= 0.03552, $p<0.05$). HW-0 is positive in 12 patients (92.31%), and HW-1 is positive in 7 (53.85%) (McNemar chi-square = 5, df = 1, p-value = 0.0253). HW-1 was positive in 7 (53.85%) and HW-2 in 1 (7.69%) (McNemar chi-square = 6, df = 1, p-value = 0.0143). PA-0 is positive in 12 (92.31%), PA-1 in 7 (53.85%) (McNemar chi-square = 5, df = 1, p-value = 0.0253). PA-2 is positive in 1 (7.69%), so by comparing with PA-1 there is statistical significance (McNemar's chi-squared = 6, df = 1, p-value = 0.0143).

DISCUSSION AND CONCLUSION: In patients with subacromial impingement syndrome after receiving O2-(O3) injection therapy, there is a significant improvement in pain intensity, range of motion and provocation tests. This improvement continues even after receiving the second dose of the O3 mixture.

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Review of Mobility Outcomes for Transfemoral Amputees at West Midlands Rehabilitation Centre

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BACKGROUND: Due to multiple factors associated with above knee amputations (level of energy expenditure, balance issues and co-morbidities), the prospects of walking with a prosthesis after transfemoral amputation (TFA) are limited and rehabilitation takes longer compared with the amputations at lower levels. Previous studies have shown an overall 30-day mortality rate of 4.6% for all lower limb amputations(1). First year mortality rate of 30.3% and five-year mortality rate of 63.6% in patients with TFA(2).

AIM: We wanted to know the status of functional walking with prosthetic leg in long term for patients who have had TFA. We also wanted to see how other variables like age, gender and underlying health condition impact these functional outcomes and mortality.

METHOD: This was a retrospective study. Data was collected for 95 patients referred to West Midlands Rehabilitation Centre. Variables included age, gender, health condition leading to amputation.
Inclusion Criteria:
Patients who had TFA from 1st of January 2017 to 31st of December 2017.
Outcome measures:
1) Special Interest Group in Amputee Medicine (SIGAM) grades at 2 and 5 years.
2) Mortality at 5 years.

RESULTS: Amongst a total of 95 there were 60 male and 35 female patients. 12 patients progressed to the stage of receiving prosthesis. At the end of two years 1 patient was graded SIGAM-B, 5 patients SIGAM-C, 5 patients SIGAM-D, and 1 patient SIGAM-E. At five years 4 patients were graded SIGAM-A, 4 patients SIGAM-C, 2 patient's SIGAM-D, 1 patient SIGAM E and 1 patient SIGAM-F. Prosthetic mobility outcomes were better in the 10 non-vascular patients compared to vascular. All the patients who achieved SIGAM-D were non-vascular.
46 patients had died out of a total of 95 by 27th of April 2023 making overall mortality 48.42 %. Mortality at 1 year was 21.05% (20 patients) and 43.15% (41 patients) at 5 years.
Overall mortality in dysvascular patients was 56.52 % (39 patients died out of 69) and in non-vascular was 26.92 % (7 patients died out of 26).
5 years mortality for male and female patients was 43.33 % (26 patients) and 42.85 % (15 patients) respectively.
Overall mortality for patients 60 years of age and below was 22.22% (6 patients died amongst 27) and for patients 61 years of age and above was 58.82% (40 patients died amongst 68).

DISCUSSION AND CONCLUSION:
Our study showed that only a small number of patients were able to achieve functional walking using prosthesis after TFA. The study also showed that mortality and prosthetic mobility outcomes were better in non-vascular patients compared to dysvascular patients.

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Mesotherapy for Selfie Elbow

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BACKGROUND: While taking a selfie, the person is in a position where the arm is fully extended or sometimes slightly bent and maintained until the image of choice is set in the camera frame. One person has to hold the phone firmly to hold it and click. When the process is repeated for several photos, it causes a repetitive strain injury, leading to a variety of signs, including pain in the elbow joint, which has now been dubbed "selfie elbow." By using mobile phones for photography, in a special way, we encountered a new diagnosis, the so-called. "Selfie elbow". When taking a selfie, the hand is stretched while simultaneously tightly squeezing the hand, which causes microinjuries to the tendons, causing them to become inflamed. For the treatment of "Selfie elbow", all methods of classical physical medicine and rehabilitation, and regenerative medicine, as well as operative methods, are recommended. In the stages when the pain is pronounced, and with the aim of faster analgesia, as well as anti-inflammatory therapy, pain mesotherapy is increasingly being used, as a special way of administering NSAIDs.

AIM: The first aim was to present an old clinical entity caused by a new etiological factor, and excessive use of the mobile phone, which due to the "pandemic" of mobile phone use is becoming an increasingly common cause of lateral epicondylitis. Second aim was to show that pain mesotherapy is a good way to treat pain caused by "Selfie elbow".

METHOD: Presentation of the case of a female patient treated at the Fizikal Centar by SMA office in the City of Sabac.

RESULTS: A 20-year-old female patient, with pain in the forearm and the outer part of the lateral epicondyle on movement and touch, on VAS scale = 8/10, diagnosed by echosonography of the soft tissues of the right elbow and forearm, with a clinical and ultrasound picture of subacute lateral epicondylitis, was treated with Ketorolac mesotherapy, once application per week, in three weeks. After one month, there was a complete regression of the clinical picture, with ultrasound heterogeneous entheses on the lateral epicondyle. After this, PRP concentrate was applied to the patient.

DISCUSSION AND CONCLUSION: Although already in use as a term, „Selfie elbow" implies a well-known overuse injury - lateral epicondylitis. In stages when the pain is pronounced, mesotherapy can be the first choice in analgesia due to all its advantages, after which, depending on the ultrasonographic image, one of the methods of regenerative physical medicine can be used.

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Soloelastography Measurement of the Post-repaired Rotator Cuff: A Systematic Review

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BACKGROUND: Surgical repair of torn rotator cuffs is a common procedure, but the risk of retears and associated consequences are significant. Sonoelastography, an imaging modality that evaluates tissue mechanical properties, holds promise in this regard.

AIM: This systematic review aims to summarize peri-operative sonoelastography data on repaired rotator cuffs.

METHOD: A comprehensive search of PubMed, Embase, and Cochrane databases was conducted, covering studies published until June 19, 2023. The Newcastle-Ottawa Scale was used for quality appraisal. Information extracted from each study included injury and surgery type, sonoelastography mode, follow-up duration, and main findings.

RESULTS: A total of 11 eligible studies comprising 355 patients were included. All studies focused on the supraspinatus muscle, with arthroscopic repair performed in every patient. Post-operative month 1 to 6 showed an increase in supraspinatus muscle stiffness, while the stiffness of the ipsilateral deltoid tended to decrease. Failure of supraspinatus muscle elasticity recovery was indicative of potential tendon retear. However, conflicting findings were observed regarding whether the supraspinatus tendon stiffens or softens after surgical repair. Pre-surgical stiffness of the supraspinatus did not correlate with post-surgical tendon integrity or function.

DISCUSSION AND CONCLUSION: In two-thirds of the studies, supraspinatus tendon stiffness increased after repair. Discrepancies in patient positioning, tear type, repair technique, and measuring site likely contributed to these variations. Tendon healing involves inflammation, proliferation, and a subsequent two-year remodeling phase, coinciding with increased post-operative supraspinatus tendon stiffness.

A recent meta-analysis highlighted various risk factors for retears post-arthroscopic rotator cuff repair, including advanced age, diabetes, lower body mass index, larger tear size and retraction, and longer symptom duration. Fatty infiltration of rotator cuff muscles, particularly involving the infraspinatus muscle, was a poor prognostic factor. These risk factors could exert opposite influences on tissue elasticity. Expecting sonoelastography to predict outcomes might be overly optimistic, given its focus on the ultimate mechanical property post-repair.

While previous research notes general functional improvement post-rotator cuff repair, controversy surrounds the necessity of anatomical integrity for this enhancement. Our observations on post-surgical tendon stiffness underscore the disconnection between pain relief and structural improvement after tendon repair.

The limitations of this review should be addressed. First, sonoelastography measurement regimens were diverse, from the timing, scanning location and patient positioning. This heterogeneity precluded a meta-analysis. Second, the robustness of the findings was hindered by small sample sizes in some studies. Finally, there was scarce data about the stiffness differences of the repaired supraspinatus in relation to tear sizes or surgical techniques.

In conclusion, successful rotator cuff repairs improve supraspinatus muscle stiffness. Pre-surgical sonoelastography has limited impact on outcomes. Post-surgical assessment of supraspinatus stiffness may offer insights into retear likelihood.

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Rehabilitation of Patients After Shoulder Injuries and Defects in Slovenian Natural Spas

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BACKGROUND: Rotator cuff damage includes: injury, tendinopathies, partial tears, and complete tears (1). There is a lack of good evidence on optimal rehabilitation after shoulder surgery (2).

AIM: The purpose of the research is to determine the effects of rehabilitation after shoulder joint operations in patients who were in Slovenian spas from January to June 2023. We were interested in the outcomes of rehabilitation and if there were a statistically significant improvement in the assessment of functional tests, mobility and pain.

METHOD: The patients were evaluated twice, at the beggining and at the end of the 14-day treatment. Patients reported the level of pain, filled out questionnaires about problems with the shoulder joint. This was followed by functional testing and mobility measurements.

RESULTS: We obtained answers from 5 Slovenian natural spas for 139 patients who underwent rehabilitation from January to June 2023.
We monitored the following patient data: sex, age, occupation, passive and active mobility of the operated shoulder, pain level and UCLA score before and after rehabilitation.
We found that it was statistically significant: active and passive mobility improved (except for anteflexion), pain decreased, shoulder function improved.

DISCUSSION AND CONCLUSION: An important factor in recovery after shoulder surgery is the prescribed rehabilitation protocol (3). In patients whose data were included in the analysis, we demonstrated high-quality treatment.
Patients come to our spas 6-8 weeks after surgery. Moffatt et al. found that it is important that rehabilitation is carried out, even later (4). It is important that it is performed under the supervision of a physiotherapist, as described by Multanen et al (5).

We note that studies have also been carried out elsewhere in the world, which show that after surgery on the shoulder joint, this joint can be well rehabilitated. The patient's condition needs to be assessed objectively, and coordination between all rehabilitation centers is also needed as to which functional scales to use, in addition to mobility measurements and pain assessment. It would also be necessary to introduce innovations and additional techniques and to conduct research on how these affect rehabilitation.

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Traumatic Injury of the Cubital Nerve

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BACKGROUND: We present the case of an 18-year-old patient referred from Traumatology due to symptoms of lack of mobility of the right hand, paresthesias in the first, fourth and fifth fingers of that hand, ulnar aspect of the forearm and pain in the arm after diaphyseal fracture of the right ulna and radius with section of the ulnar nerve due to a traffic accident. She underwent emergency surgery with osteosynthesis with LCP plates in the ulna and radius, epineural suture, nerve transposition and reattachment of epitrochlear muscles.
On examination, clinical manifestations of paresis, mobility difficulties, atrophy, superficial sensory disorder, hyporeflexia, pain and feeling of tightness in the scar are observed.

AIM: Ulnar neuropathy is caused by damage to this nerve, which is susceptible to injury in various anatomical locations. Symptoms may include: pain, tingling, burning, numbness of the fourth and fifth fingers of the hand, loss of strength and coordination in the fingers, deformity of the hand and claw wrist.

METHOD: We requested electromyography, which showed very severe sensory and motor axonal neuropathy of the right ulnar nerve.
The patient underwent rehabilitative and pharmacological treatment with favorable evolution in terms of mobility but with persistence of paresthesias and pain.
It was decided to apply an 8% capsaicin patch (Qutenza®) to the scar on the right elbow and the clinical course and adverse effects were reviewed.

RESULTS: The patient reports significant improvement in pain and dysesthesia, going from a value on the VAS scale of 9 points to only 1 point.

DISCUSSION AND CONCLUSION: We highlight the difficulty in approaching this type of neuropathy. The importance of early post-traumatic management, since it is closely related to the quality of functional results. And an adequate rehabilitative treatment that must be individualized and focused on pain control and improving functionality as it is a not uncommon pathology and often results in incomplete motor recovery after initial nerve repair.
And finally, highlight the effectiveness of capsaicin patches in cases of neuropathic pain due to nerve injuries, indicated when oral medications have not achieved the therapeutic objective since it provides adequate analgesia and reduces the need to use other analgesics, improving quality of life of the patient.

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Right Brachial Monoparesis

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BACKGROUND: Right brachial monoparesis refers to injuries that range in severity and cause. The effects may can often lead to severe social and financial hardships and greatly affecting quality of life.

AIM: Increasing the functionality and ability of the affected upper limb by stimulating the paralysed muscle tone and maintaining normal muscle tone.

METHOD: A 37 year old patient,after a motorcycle accident was diagnosed with a trauma fracture to the right arm causing a total impotence of the right upper limb. The tratament plan included physical therapy, lymphatic drainage,venolymphatic and musculotrophic massage, right shoulder dipoles and exponential currents. EMNG: Complete axonal injury of the right radial nerve in the proximal portion of the complete axonal injury of the right musculocutaneous nerve; severe axonal lesions of the median and right ulnar nerves. Right brachial plexus MRI the increase in diameter and appearance in T2 hypersignal of all the nerve roots of the brachial plexus, especially C5, C6, C7 with the significance of edema at this level, which extends to the level of the trunks, divisions and emergent nerve threads included under examination. No interruptions of the nerve pathways are evident on the pathways included in the examination
RESULTS: There is a decrease in pain intensity, decrease in edema, no possible voluntary movements of flexion or extension at the level of the elbow, passive movements possible within the limit of pain tolerance, the possibility of performing a slight voluntary flexion at the level of the right radio-carpal joint with the impossibility of performing pronation or supination of the forearm. At the level of the hand, abduction and adduction of the fingers is possible, but the opposing movement of the wrist is impossible.

DISCUSSION AND CONCLUSION: Considering the slowly progressive evolution of the recovery and the risk of the complications that he will present later, especially the trophic complications that may occur due to the vascular-nutritional disorders within the complete lesions of the right radial nerve and right musculo-cutaneous nerve, physical therapy is recommended continue, and consult the plastic surgeon in order to reconstruct the right radial nerve.

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Assessment of Handgrip Strength in Supine Position: An Accuracy Study Using the Southampton Protocol As the Reference Test

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BACKGROUND: The assessment of handgrip strength is essential in the functional evaluation of many patients referred to Rehabilitation. Handgrip strength is an indicator of good health, serves as an estimation of overall upper limb strength, and is a predictor of survival in a wide range of diseases. Among the different tools available for assessing handgrip strength, the JAMAR® hydraulic dynamometer and its digital version, the JAMAR® Plus Hand Dynamometer are the most recommended and widely used in clinical practice. The use of standardized measurement protocols, such as the Southampton or the American Society Hand Therapists protocols, are strongly recommended when assessing handgrip strength; both of which clearly specify the positioning (seated position) of the subject to be assessed.

AIM: To assess the performance of handgrip strength assessed with a standardized protocol designed for bedridden patients unable to maintain the seated position in older patients admitted to a post-acute rehabilitation unit.

METHOD: Diagnostic accuracy study conducted in consecutive older patients admitted to a post-acute rehabilitation unit. Sensitivity, specificity, accuracy, likelihood ratios, predictive values, and area under the Receiver Operating Characteristic curve were retrospectively calculated for the protocol that assessed handgrip in the supine position (index test) and compared with the Southampton protocol (reference standard). The index test to assess handgrip strength was made with the patient lying down at a 45º angle and the elbow flexed at 90º. The reference standard test was performed according to Southampton protocol. Statistical analysis included a student t-test for independent samples and intraclass correlation coefficient (ICC) to compare values of handgrip strength between both tests.

RESULTS: Fifty-two participants (mean age 80.6 years; 59.6% women) were assessed. The mean difference in maximum handgrip between protocols was 0.13 Kg (CI 0.79 to 1.04) in men and 0.12 Kg (CI 0.43 to 0.67) in women. The ICC was above 0.9 in both sexes. The prevalence of low strength using the reference test was 61.5%. Sensitivity and specificity of the index test were 96.9% and 90%, respectively.

DISCUSSION AND CONCLUSION: Considering the Southampton protocol as the reference standard for handgrip strength assessment, the new protocol addressed to bedridden patients shows an excellent agreement and has good performance properties for diagnosing low muscle strength.

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Serious Games With Haptic Feedback for Upper Limb Rehabilitation

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BACKGROUND: The burgeoning popularity of serious games in rehabilitation medicine is driven by their potential to enhance clinical conditions in various age groups. (1-5) These games facilitate therapeutic strategies, focusing on mobility and cognitive-behavioral aspects, while also offering real-time feedback and progress monitoring. (1,2,5) The immersive quality of these games, combining visual, tactile, and auditory stimuli, enhances the interpretation and response to sensory inputs. (1-5)

AIM: This study aimed to develop a computerized system for hand and upper limb rehabilitation using a Haptic Joystick to operate through different and specifically created serious games, incorporating visual, auditory, haptic and force feedback for an immersive experience.

METHOD: The system main physical component is a Haptic Joystick Touch, made by 3D Systems, and it utilizes multiple softwares like Visual Studio 2022, OpenHaptics® SDK, Unity, and other related plug-ins. Two serious games were developed, involving labyrinths with touch-sensitive balls and a shape sorter with haptic feedback. The practical testing of the system developed by the engineering team was done by the medical staff and selected volunteer patients.

RESULTS: Results indicated the potential clinical applications of serious games in rehabilitation, with specific populations identified: children with developmental pathologies (e.g., cerebral palsy, autism) benefitting in motor skills, coordination, attention, and social interaction; and adults with conditions like stroke, traumatic brain injury, multiple sclerosis, Parkinson's Disease, spinal cord injury, balance/vestibular disorders, and dementia.

DISCUSSION AND CONCLUSION: This interdisciplinary project offers technical and conceptual foundations for targeted rehabilitation in specific pathologies. Collaboration across diverse fields enriches medical rehabilitation, making serious games a promising avenue for therapeutic interventions within medical rehabilitation.

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Transverse Sliding Distance of Median Nerve in Carpal Tunnel Syndrome With Release Operation

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BACKGROUND: Transverse sliding distance (TSD) of median nerve is considered as one of the ultrasonographic parameters in evaluation and diagnosis of carpal tunnel syndrome (CTS) (1, 2). This has been calculated by measuring the difference in the shortest distance between the median nerve and the ulnar artery at carpal tunnel outlet level in the wrist neutral and wrist extended positions.

AIM: The aim of this study is to find out the change in TSD of median nerve with CTS patients after carpal tunnel release operation

METHOD: In this study, 21 newly diagnosed CTS wrists were recruited. Their diagnoses were based on electromyography. We measured the TSD of median nerve at carpal tunnel outlet level with ultrasonography before operation and 3 weeks after operation. We tried to figure out the significant difference between measured parameter before and after surgery.

RESULTS: The result showed that the TSD of median nerve at carpal tunnel outlet level was significantly increased after surgery ($p=0.048$). Also, the transverse distance between median nerve and the ulnar artery in wrist neutral and extended position were significantly increased after surgery, respectively ($p=0.023$, $p=0.002$).

DISCUSSION AND CONCLUSION: In this study, we found that TSD of median nerve at carpal tunnel outlet level was significantly increased after carpal tunnel release operation.

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This work was supported by
- the MSIT(Ministry of Science and ICT), Korea, under the ICT Creative Consilience program(IITP-2021-2020-0-01819) supervised by the IITP(Institute for Information & communications Technology Planning & Evaluation)
- the Institute of Information & communications Technology Planning & Evaluation (IITP) grant funded by the Korea government(MSIT) (No.2021-0-00731)

Early-applied and Prosthetics Rehabilitation in Children with Congenital Amputation and Upper limb Agenesis: an Italian Longitudinal Study

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BACKGROUND: The management of children with upper limb agenesis or congenital amputation presents unique motor and psychosocial challenges. Timely prosthetic intervention is crucial for optimal quality of life and healthy development. However, longitudinal studies evaluating the outcomes of such interventions are scarce. Our study aims to fill this gap, providing a comprehensive understanding of early prosthetic intervention in pediatric patients.

AIM: Our study's dual objective is to evaluate the efficacy of early prosthetic intervention on motor function and quality of life in children with upper limb agenesis or amputation. We aim to quantify direct benefits in terms of motor strategies and dexterity, assessing the impact of prosthetic device and satisfaction of rehabilitation and related services.

METHOD: We enrolled 29 children, with a mean (SD) age of 6.70 (2.71) years, with unilateral upper limb agenesis or amputation. A longitudinal design was employed, starting with a multidisciplinary rehabilitation team composed by a MDs specialized in Physical and Rehabilitation Medicine, Occupational Therapists (OT), Physical Therapists (PT) and Prosthetic & Orthotics Technicians. Other than clinical examination, the Child Amputee Prothetics Project - Prosthesis Satisfaction Inventory (CAPP-PSI), and the Unilateral Below Elbow Test (UBET) were used.

RESULTS: All 29 childrens were assessed in hand function and motor performance using the UBET, showing a total mean score of 25,00 (SD 7.09) out of 36. Considering qualitative aspects, many children without wearing prosthesis tended to use the stump with a passive approach reducing hand function in specific tasks and in every day life activities. Children who wore prostheses were 12, they obtained a total score of 23,67 (SD 6,10). Despite the prosthesis was recently prescribed, differences in hand function were observed, in fact children-wearing prosthesis used an active approach for grasping or maintaining objects. A significant number of participants showed progress in the use of the prosthesis over time after appropriate motor training. In particular, children improved their dexterity and adaptability in the use of prosthetic limbs following an intensive training with OT and PT. Overall satisfaction with rehabilitation and related services showed high values with a mean score of 18.67 out of 24, as measured with the CAPPSI.

DISCUSSION AND CONCLUSION: Our study emphasizes that early upper limb prosthesization is not just about timing but also involves a comprehensive approach integrating proprioceptive and motor training. Initial reactions to prostheses can be of estrangement or frustration, but over time, with appropriate training and adaptation, children can perceive the prosthesis as a functional tool rather than an obstacle. Preliminary evidence from our study highlights the significance of a multidisciplinary approach in the early application of prosthetics in upper limb agenesis or congenital amputation. Future research will focus on consolidating the temporal implications of prosthesis prescription and evaluating the efficacy of rehabilitative strategies and psychological interventions to establish standardized treatment protocols.

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Multidisciplinary Approach to Upper Extremity Replantation: A Possible Functional Outcome Optimizer?

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BACKGROUND: Traumatic upper arm amputation is a catastrophic event, with a prevalence, during occupational activities, of 11.6/100.000 individuals in Europe (1). It significantly impacts on patients' quality of life in terms of activities of daily living (ADLs) and work capacity. Several studies suggest that replanted appendages have few possibilities to regain normal function, strictly depending on the amputation level (2).

AIM: We report the case of a 24-year-old right-hand-dominant man with complete amputation of the left forearm due to high energy trauma during occupational activity, who underwent successful replantation and complete functional recovery.

METHOD: Upon patient stabilization, our trauma team (including plastic, orthopaedic and vascular surgeons) performed limb replantation. After surgical debridement of all superficial anterior forearm muscles and a 0.5 cm osteotomy on the ulnar and radial extremity, temporary bone stabilization was achieved initially using K-wires, then permanent reduction and fixation was completed with plates and screws 15 days later.
Vascularisation was restored after a total ischemia time of 4.20 hours. Median, ulnar, and radial nerves were managed by epi-perineurorrhaphy. Muscles were readapted while tenorrhaphy was performed for each tendon.
At day 20 Physical and Rehabilitation medicine (P&RM) team evaluated the patient and the rehabilitation program drawn up.
At day 25 the patient was discharged home.

RESULTS: Rehabilitative intervention included: 120 min/week of physiotherapy, 60 min/week of occupational therapy, 60 min/week of psychological support and daily autotraining.
Initial objectives of rehabilitation program were:
- prevention of immobilization damages;
- wounds management;
- pain control;
- sensitivity stimulation.

Initially no active movement was possible and passive range of motion (pROM) was limited at wrist metacarpophalangeal joint level, a rest orthosis in extension with free fingers was customized.
Daily electrostimulation and sensory stimulation were part of therapy.
4 months after, partial active movement at wrist level was present, therefore a relative motion wrist-free orthosis and an anteposition thumb splint were customized. No dysesthesia was reported. Daily active muscle strengthening at wrist level continued, along with sensory stimulation.
Progressive improvements led to rehabilitation program adaptation with focus on active functional training.
2 years after injury the rehabilitation program concluded with extraordinary improvements in terms of strength, aROM, sensibility and function.

Disabilities of the Arm, Shoulder and Hand (DASH) Outcome Measure has been administered at T0 (100/100) and at T1-end of rehabilitation (52,5/100); Chen's criteria have been used to monitor functional improvements.

DISCUSSION AND CONCLUSION: This case report highlights the rewarding surgical and functional results that upper limb replantation can achieve, despite low statistical rates.
Short time limb reperfusion along with the earliest and prolonged rehabilitation have been essential to avoid long term functional sequelae, maximize the quality of life and return to work. Multidisciplinary approach (surgical + P&RM) has been the keystone.

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Functional Impact of the Hero Arm Myoelectric Hand Prosthesis in Children With Congenital Below-Elbow Deficiency: Feedback From a French Physical Medicine and Rehabilitation Department

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BACKGROUND: Congenital malformations of the upper limbs are rare, with an incidence of between 16 and 21.5/10,000 live births. The most common are located below the elbow. The proposed prosthesis must meet the child's need to improve his or her quality of life, with a functional, aesthetic or social objective. The HeroArm (HA) bionic prosthesis is the first to be reimbursed by the French social security system for children in France.

AIM: This study aimed at evaluating the children's functional expectations of wearing the HA prosthesis. . The specific objectives were to measure the children's performances on systematized tasks with the prosthesis using the Canadian Occupational Performance Measure (COPM) and the Disabilities of the Arm, Shoulder and Hand Questionnaire (DASH).

METHOD: During the occupational therapy training, an assessment was performed with COPM, DASH, ARAT, 400-point assessment and a qualitative questionnaire in 7 children (6 girls, 8.5-14.9 years old) who were fitted with an HA prosthesis between December 2020 and March 2022.

RESULTS: Significant difficulties on the COPM were related to leisure activities in 48.4% of cases. Prior to the fitting of the HA prosthesis, the children performed activities of daily living without prosthesis. The total ARAT score was 54/57 [52.5-54]. In the 400-point test, test 3 was completed in 299 s with the prosthesis (vs 57 s with the healthy hand). The score for test 4 was 80% [78.15-85]. The overall score for the HA prosthesis was 9/10 [9-9.5].

DISCUSSION AND CONCLUSION: The HA prosthesis is mainly required for personalized activities chosen by the patients themselves. They are highly motivated to wear this prosthesis, which can provide functional improvements in this context, even though they do not feel limited without prosthesis in daily life activities.

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Evaluation of Fatigue in People With Duchenne Muscular Dystrophy Using a Dynamic Arm Support – A Pilot Study

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BACKGROUND: Due to progressive muscle wasting and weakness, the upper extremity function of patients with Duchenne Muscular Dystrophy (DMD) decreases and fatigability increases, negatively affecting the quality of life. To reduce physical fatigability, assistive technology such as dynamic arm supports (DAS) might be useful.

AIM: To assess whether the novel DAS of Yumen Bionics reduces fatigability, we aim to measure physical fatigability and subjective fatigue in DMD and healthy controls (HC) while using the DAS.

METHOD: Five DMD patients who were about to start using the DAS of Yumen Bionics and five HC were included. Two submaximal tests (simulating drinking and reaching for 2 minutes) with and without the DAS were performed by DMD at T0 and T1 (at 0 and 6-9 months, respectively) and once by the HC. Physical fatigability was measured by the number of repetitions and changes in sEMG root mean square (RMS) and median frequency (MDF) over time of biceps (BB), triceps (TB), deltoid (DA) and trapezius (TR) muscles. Additionally, sEMG starting amplitudes with and without DAS were compared to gain insight into the required muscle activity for the task before fatigue sets in. Finally, subjective fatigue was monitored during the tests with the Borg Scale (6-20) Rate of Perceived Exertion.

RESULTS: DMD participants were able to perform more repetitions with DAS in almost all cases (average number of drinking repetitions with DAS = 29 [range 19-38] and without = 18 [range 5-34], average number of reaching repetitions with DAS = 24 [range 6-35] and without = 13 [range 2-34]). HC showed equal repetitions in drinking and equal or more repetitions in reaching with DAS. sEMG results varied, but indicators of fatigability were present in several cases, both with and without DAS. For drinking, the relative starting amplitude in BB and TB was lower in 3/10 measurements in DMD and 3/5 measurements in HC with DAS. For reaching, lower starting amplitudes were seen in DA and TR in 7/9 DMD measurements and in 4/5 HC measurements when using the DAS. Subjective fatigue was lower with DAS compared to without DAS in both DMD and HC. In DMD average Borg scores for drinking were 13.9 (without) and 11 (with) and for reaching 14.3 (without) and 12.6 (with). In HC average Borg scores for drinking were 14.2 (without) and 11.8 (with) and for reaching 17.4 (without) and 14.8 (with).

DISCUSSION AND CONCLUSION: The effect of the arm support (i.e. more repetitions and lower starting amplitude with DAS) was most evident during reaching in both DMD and HC, as the DAS primarily supports shoulder movement. To evaluate physical fatigability, better standardization of the tests is needed to improve the interpretation of the sEMG data. Interpreting the longitudinal data is difficult due to the natural progression of the disease.
Using the DAS decreases subjective fatigue and physical fatigability in most DMD and HC. The variable sEMG results indicate the importance of individual tuning of the Yumen Arm in DMD.

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A Modified Elbow Flexion Assistive Orthosis With Airplane Splint: A Case Study

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BACKGROUND: The elbow flexion orthosis has a limitation for patients with weak shoulders.
We modified elbow flexion assistive orthosis with airplane splint for improving patients Activities of Daily Living (ADL) with shoulder and arm weakness.

AIM: By using elbow flexion assistive orthosis with airplane splint. , improvement in personal hygiene and eating in daily life can be expected.

METHOD: A 40-year-old female with no significant medical history had sudden upper extremities weakness and numbness. The next day, she had aggravating upper extremities weakness with newly occurred lower extremities weakness. Cervical spine magnetic resonance imaging (MRI) confirmed cervical 3/4/5 acute spinal cord infarction. Incomplete spinal cord injury at the C3 level was confirmed using the American Spinal Cord Injury Association Impairment Scale (ASIA) D classification.
We evaluated the patient's motor grade with Medical Research Council (MRC) scale. Both shoulder motor power was grade 2, both elbow flexors grade 1, both elbow extensors grade 3, both wrists and fingers grade 3, and all lower extremities grade 4. The patient was able to walk independently, and move her hands and wrist freely. But she had difficulties in eating, grooming such as tooth-brushing and washing her face due to weakness in both shoulder and elbow flexor muscles
An elbow flexion assistive orthosis with airplane splint was prescribed to assist with elbow flexion. The orthosis has 3 parts (trunk, upper arm, lower arm) which are made of plastic components. The joint between the trunk and upper arm is made of a metal plate. The joint between upper arm and lower arm is attached by metal joint which allowed elbow joint move freely. Tensile rubber bands were connected to the forearm and back to assist elbow flexion, and a detachable triangular sponge was applied to the armpit to maintain shoulder abduction while elbow flexion was performed.

RESULTS: After using the orthosis, the patient was able to perform eating, grooming such as tooth-brushing and washing her face, and Modified Bathel Index was improved from 58 to 67.

DISCUSSION AND CONCLUSION: An elbow flexion assistive orthosis with airplane splint can be an effective rehabilitation intervention for improving ADL. The patient demonstrated significant improvement functional ability after using the orthosis. The use of orthotic devices is helpful as a viable option for facilitating recovery and improving functional outcomes in patients with shoulder and elbow weakness.

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A Case Study on Dupuytren's Contracture: Exploring Effective Treatment Protocols and Innovative Splint Combination

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BACKGROUND: Dupuytren's contracture, a fibromatosis-related hand condition, gradually constricts palm connective tissue, impairing thumb and finger mobility. Our female client had undergone surgery for Dupuytren's contracture but continued to experience restricted thumb mobility, which limited her engagement in activities of daily living. Traditional physiotherapy and occupational therapy, provided minimal relief. To address this challenge, a unique splinting regimen was introduced.

AIM: To explore the effects of a novel splinting solution in treating a woman with Dupuytren's contracture.

METHOD: The client used a combination of static and dynamic splints. The static splint was worn at night. The traction of the static splint was adjusted daily by the client, according to perceived pain. Additionally, a dynamic splint was worn during activities such as watching TV, reading and socializing. The traction force of the dynamic splint was systematically increased once a week. To analyze the progress, we measure passive range of motion, muscle strength testing, grip strength, Disabilities of the Arm, Shoulder, and Hand (QuickDASH) and The Southampton Hand Assessment Procedure (SHAP).

RESULTS: This novel splinting approach proved highly effective. Scar tissue softened and finger mobility increased substantially. After just two months of treatment, the patient successfully engaged in all activities of daily living, including work.

DISCUSSION AND CONCLUSION: This case study indicates possible effectiveness of the innovative combination of static and dynamic splints, tailored to the patient's specific needs in treatment of Dupuytren's contracture. With our client, this approach played a pivotal role in softening scar tissue and enhancing thumb mobility. This approach provides a promising solution for occupational therapy treatment of Dupuytren's contracture, offering an important contribution to the existing literature and practice on this condition.

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Barriers of Return to Community for Amputee

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BACKGROUND: Returning to community refers to the process of helping people recover mentally, socially, economically, and vocationally, and refers to holistic and effective interventions and management that help people adapt to society. It is important for policy development to analyze changes in economic, social awareness, and transportation system related to the community return of persons with amputees.

AIM: The purpose of this study is to compare changes over 10 years in perceived economic class, leisure life satisfaction, perception of discrimination against persons with disabilities, factors that interfere with going out, and transportation system between amputee and people with disabled.

METHOD: The cross-sectional, descriptive secondary data analysis was designed using Korea Survey of Disability Data from 2011 to 2020 years. For a sample of approximately 7000 people, weighted data were used to estimate the total number of disabled people at approximately 260,000. Among data, participant with amputee was selected 190,122 in 2014, 171,533 in 2017, and 175,315 in 2020. We analyzed the 10-year trend change of socio-economic barriers such as perceived economic class, leisure life satisfaction, perception of discrimination against persons with disabilities, factors that interfere with going out, and transportation system. Descriptive statistics (frequency, %) were performed using EXCEL program.

RESULTS: Of total, 67.1% in 2011, 71.6% in 2014, 61.6% in 2017, and 68.4% in 2020 of the amputees recognized themselves as economically underprivileged, similar to other disabilities. Respondents who responded that they were very satisfied with their leisure life were 4.1% in 2011, 5.1% in 2014, 3.5% in 2017, and 2.9% in 2020, lower than those with disabilities. In social discrimination, 83.3% in 2011, 68.1% in 2014, 80.5% in 2017, and 66.9% in 2020 answered “YES”, higher than other disabilities. Those who answered that they did not go out at all were 1.0% in 2011, 2.8% in 2014, 2.3% in 2017, and 4.3% in 2020, showing a higher frequency of going out than other disabled people. The biggest barriers to not being able to go out were 'uncomfortable' and 'no one to help me when I go out' for 10 years. The number of respondents who answered that transportation is difficult increased to 14.0% in 2011, 17.9% in 2014, 19.0% in 2017, and 23.5% in 2020.

DISCUSSION AND CONCLUSION: Amputees faced economic hardship due to low income levels and high share of food/housing and medical expenses. Despite the need to improve social discrimination for social return and guarantee transportation for going out, it was found that they experienced high difficulties with a similar frequency for 10 years. Policy efforts are needed to raise awareness of discrimination against people with amputees and enable them to engage in economic activities.

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The Impact of Comorbidities on Walking With a Prosthesis After a Lower-Limb Amputation

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BACKGROUND: Most lower limb amputations are due to vascular diseases (peripheral arterial disease and diabetes), and are performed in elderly patients, which often have multiple comorbidities that can negatively affect their physical and mental abilities, in turn affecting their ability to walk with a prosthesis.

AIM: The aim of our research was to determine the relationship between the number of comorbidities, assessed by the Functional comorbidity index (FCI) value, and the functional outcome of rehabilitation, defined as successful use of prosthesis after a lower limb amputation.

METHOD: 216 patients who underwent primary rehabilitation after lower limb amputation in 2019, were included in the study. The FCI values were compared to the age of the patients, the level of amputation and according to whether or not a prosthesis was prescribed by the end of the rehabilitation.

RESULTS: In the majority of patients (83%), the cause of amputation was vascular disease (PAD or a complication of diabetes). The most common comorbidity in patients was arterial hypertension (73%), followed by diabetes (57%) and PAD (53%). The mean FCI value was 3.1, and the value increased with age, indicating that older patients have a greater number of comorbidities. According to the level of amputation, no significant differences in the mean FCI value were observed. A significantly higher FCI value was found in patients who were not prescribed with a prosthesis than in patients who received a prosthesis by the end of the rehabilitation.

DISCUSSION AND CONCLUSION: By using the FCI, we showed that a greater number of comorbidities is associated with a poorer rehabilitation outcome after a lower limb amputation.

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Profile of Lower Limb Amputees Attended at the Rehabilitation Service of the ISCMSP

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BACKGROUND: Recent data from the Brazil Unified Health System (SUS) showed a high volume of amputation surgeries, primarily affecting individuals with diabetes and mainly involving lower limbs. Additionally, studies from São Paulo highlighted a trend of vascular-related amputations in older men. Peripheral Vascular Disease (PVD) and trauma remain leading causes of lower limb amputations, with notable implications for patients' quality of life, socioeconomic status, and increased morbidity and mortality. Understanding demographic and etiological factors, like age, gender, and the cause of amputation, is crucial for tailored treatment and rehabilitation strategies. This comprehensive knowledge aids in improving functional independence for individuals post-amputation. Epidemiological insights not only provide data but also inform preventive measures and enhance therapeutic outcomes, significantly impacting healthcare practices overall.

AIM: To outline the epidemiological profile of lower limb amputee patients treated at the Rehabilitation Service of the Irmandade da Santa Casa de Misericórdia de São Paulo (ISCMSP) from January 2021 to December 2022.

METHOD: Samples were collected from medical records and found gender, age, etiology, amputation level and laterality of amputation. Data were analyzed descriptively and statistically and variables were presented by percentage and average.

RESULTS: Predominant clinical and epidemiological variables were male gender (64,21%), mean age 63 years; 44,18% transfemoral and 41,17% transtibial; 71,89% amputation due to vascular etiology and similar prevalence of left (46,44%) and right (44,08%) lower limb amputation.

DISCUSSION AND CONCLUSION: This study elucidates the epidemiological characteristics of lower limb amputations, primarily observed in older men with a prevalent association with vascular complications, notably transfemoral amputation on the left side. The male predominance aligned with vascular issues suggests lower healthcare seeking behavior and increased exposure to risk factors like smoking and obesity. Vascular causes dominated the amputation frequency, consistent with international studies, indicating a shift from trauma to vascular issues post-60 years, often associated with comorbidities like diabetes. Trauma predominantly affects young males, particularly in the 21 to 40-year-old age group, with similar cases observed until 70 years, signaling a potential increase in traffic accidents among economically active middle-aged individuals. The study revealed comparable proportions between transfemoral and transtibial amputations, hinting at a change in surgical practices towards lower limb preservation. Regarding laterality, while our findings showed a balance between right and left-side amputations, divergent results in a diabetic clinic study might be attributed to the absence of foot dominance data in patient records. Highlighting the clinical and epidemiological profiles of lower limb amputees is critical for early risk factor identification and preventive interventions. The role of physiatrists is pivotal in mitigating the adverse impacts of amputations by collaborating with multidisciplinary teams to improve patient functionality and facilitate successful societal and vocational reintegration.

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One Year of Agenesis Data at an Amputee Consultation in a Universitary Hospital

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BACKGROUND: Limb loss due to agenesis is a low incidence and prevalence condition. It requires, however, optimized medical care to achieve the best functional outcome.
This impairment is commonly followed by Physical and Medicine Rehabilitation (PMR), particularly at an Amputee's consultation. These patients are much different than
amputees, therefore requiring specific and individualized care.

AIM: To characterize the population of patients with agenesis followed at the PMR Amputee consult at a Universitary Hospital during one year, specifically: demographic characterization, type of agenesis, professional and social status, functional status, success of rehabilitation and follow-up. The authors also intend to evaluate the
percentage and distribution of these patients at the Amputee consult, whether they were submitted to surgery and if prosthetics were provided.

METHODS: We performed data retrieval through patient's electronic clinical files for all patients followed at the PMR Amputee consult between 1 st December 2022 and 30 th November 2023.
We collected all data considered valuable for the investigation intended according to the previous item. Given that some patients had more than one consult during this
period we also registered the total number of Amputees and agenesis consults, number of patients overall and number of patients with agenesis.
Statistical analysis was performed using SPSS (version 27).

RESULTS: During the referred period there was a total of 377 amputees consults at our hospital. 8% of them (n=31) were agenesis consults, representing a total of 26 patients.
54% of patients with agenesis are women (n=14). 77% of patients have lower limb agenesis (n=20), 11,5% upper limb (n=3) and the rest (11,5%, n=3) have combined deficiencies. The majority of them were transverse deficiencies.
Mean age of patients at the time of data retrieval was 37,54 ± 17,79 years. All patients have one prosthetic, and at least 6 of them have more than one, including water resistant prosthetics and other technical aids. 11 patients are currently employed, 2 are unemployed and 6 are retired. Data retrieval
was not possible for the rest. 69% of patients (n=18) have at least a 60% disability. No casualties were reported.

DISCUSSION AND CONCLUSION: Despite being a rare diagnosis, the number of patients with agenesis is responsible for a significant number of consults at our hospital. This may be due to the fact that we're at a university hospital and provide care for many people in various cities.
Regarding prosthetics we sometimes find challenges when trying to provide the best prosthetic for our patients – the high cost, the outsourcing rather than having technicians working with and for us, and the delays currently found in our national health system are a key role in these difficulties.
We aim to keep providing our patients with the best possible care, offering innovative and technologically advanced solutions, but always maintaining what characterizes our
care the best – a solid and trusting doctor-patient relationship.

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Perspectives of an Adult with Congenital Absence of Lower Limbs: Prosthetics, Functionality and Quality of Life

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BACKGROUND: In Portugal, congenital limb malformations have an incidence of 2.16/10,000 births. The etiology is unknown in about 60 to 70% of cases, and upper limb involvement is more prevalent compared to lower limbs, with a ratio ranging from 2:1 to 3:1. Additionally, bilateral involvement is even less frequent. Individuals with these conditions require a multimodal rehabilitation team to enhance quality of life and functionality.

AIM: The perspectives of people with these physical conditions are an underexplored field that can provide valuable insights to improve clinical practice.

METHOD: A patient with complete bilateral longitudinal deficit of the femur, tibia, and fibula (according to ISPO) was selected for the study. A semi-structured telephone interview, videography, and clinical record research were conducted. The user also completed two adapted OPUS (Orthotics Prosthetics Users Survey) questionnaires: the Lower Extremity Functional Status (LEFS) and the Health Quality of Life Index (HRQOL) to assess lower limb functionality and perception of quality of life, respectively. Raw scores were converted to Rasch for better interpretation, ranging from 0 to 100, where higher scores indicate better outcomes.

RESULTS: 52-year-old male teacher diagnosed with idiopathic congenital absence of lower limbs with two rudimentary feet attached to the pelvis; otherwise healthy with no relevant personal and/or family history; has a global permanent disability of 88%; practises swimming; first prosthetics at the age of 2; currently uses an endoskeletal prosthesis with a Canadian-type socket, uniaxial mechanical hip, polycentric mechanical knee, dynamic SACH foot, tubular duralumin skeleton, and cosmetic foam covering; functional capacity level K3; uses the prosthesis for 10 hours/day; walk-through gait with crutches; drives an adapted vehicle. Obtained a LEFS Rasch score of 47.04/100, which menas that walking on uneven terrain is very difficult and is unable to use escalators and stairs without a handrail. In HRQOL, scored 61.55/100, emphasizing that his physical condition considerably affects his ability to perform tasks and hobbies.

DISCUSSION AND CONCLUSION: During the interview, the patient shared a perception of high functionality and active participation in society, especially with the use of the prosthesis, developing a set of strategies to increase autonomy in activities of daily living. However, the LEFS score reflects reduced functionality, mainly due to the significant difficulty in moving on uneven, inclined terrain or under adverse weather conditions. Regarding quality of life, he scored relatively higher in HRQOL, with task execution, work capacity, and pursuit of hobbies identified as the most affected areas. The congenital nature of the malformation contributes to greater acceptance of his disabilities. Therefore, rehabilitation should be task-oriented, emphasizing the facilitation of hobbies to promote better personal fulfillment. Integrating an understanding of these dimensions can accelerate positive functional outcomes, expanding the definition of our role as physiatrists in the holistic approach of these patients. These conclusions are based on the individual experience of this clinical case, and a larger sample is needed for validation.

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Efficacy and Safety of a New Offloading Brace in the Management of Knee Osteoarthritis. A Randomized Controlled UNIBRACE Study

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BACKGROUND: Knee osteoarthritis is one of the most common joint disorders. The pooled global prevalence of knee OA was 22.9% in individuals aged 40 and over. Correspondingly, there are around 654.1 million individuals (40 years and older) with knee OA in 2020 worldwide (1). Guidelines for OA management all recommend that treatment be based on a combined patient-centered pharmacological and non-pharmacological approach. The use of an offloading knee brace has proven to be a safe, cost-efficient treatment option for reducing pain and improving function (2).

AIM: The aim of this study was to compare the efficacy of the UniReliever (Thuasne), and Unloader One X (Ossür) knee braces in combination with usual care to that of usual care alone, after a 6-week treatment period.

METHOD: 60 patients (mean age: 69.62±9.57 years, 34 male and 26 female) with symptomatic medial knee osteoarthritis (Kellgren-Lawrence grade II-IV) were randomized into 3 groups: UniReliever group (a new semi-rigid knee brace for OA), Unloader One X group, and Control group (absence of brace). In addition, all the patients followed recommendations on analgesic management associated with lifestyle advice and physical exercise. Primary endpoint was the pain-free walking distance. Pain (VAS), function (Lequesne index), analgesic consumption, compliance and safety were also assessed after 6 weeks of treatment.

RESULTS: After 6 weeks, a significant increase in the pain-free walking distance was observed for patients of both bracing groups as compared to the absence of brace ($p<.0001$). As compared to patients from control group, patients having worn an offloading knee brace for 6 weeks also presented a significant decrease in exerting pain ($p<.0001$), and a significant decrease in the Lequesne index score ($p<0.01$ for UniReliever and $p<0.05$ for Unloader One X). According to the PGIC questionnaire, 80 to 85% of patients from the bracing groups reported an improvement in their condition after 6 weeks. In contrast, all the patients from control group reported no change or almost the same condition. There was no statistically significant difference between both braces regarding clinical outcomes. But significantly less patients from the UniReliever group reported knee complaints or discomfort while wearing the brace and compliance to the brace was significantly higher in the UniReliever group ($p=0.042$). In addition, the proportion of patients who reported the use of analgesics during the study was significantly lower in the UniReliever group only, as compared to the control group ($p=0.004$). No adverse effect was reported for both braces.

DISCUSSION AND CONCLUSION: Combining UniReliever knee brace with usual care is a powerful non pharmacological therapeutic strategy to handle medial knee osteoarthritis. Both offloading knee braces significantly improved pain-free walking distance, algofunctional Lequesne index score, exertional pain and global patient condition. Compliance with the UniReliever brace was significantly higher with a lower number of patients reporting discomfort.

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Man's Two Feet: Are They Really Symmetrical?

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BACKGROUND: When viewed superficially, the human foot appears anatomically distributed in perfect symmetry between the right and left. However, a careful examination comparing the two feet can highlight some morphological differences (1)

AIM: This work aims to search for points of morphological difference between the right foot and the left foot among an Algerian population.

METHOD: This is a comparative study involving young male adults considered healthy. The participants underwent a careful clinical examination of both feet. The plantar impression taken by the electronic podoscope was analyzed by calculating the Chippaux Smirak Index (CSI) and measuring the Alpha (α) angle of hallux valgus and the Beta (ß) angle of quintus varus of both feet. In the end, we carried out an intra-individual comparative analysis looking for asymmetries and points of difference between the right foot and the left foot.

RESULTS: 426 people participated in this study; the age range varies from 18 to 21 years with an average of 19.5 ± 0.89 years. For the dominant foot, 88% are right-handed. The comparative analysis highlighted several points of difference between the right foot and the left foot in the same person. Asymmetries consist either of a dimensional difference, for example, the width of the foot, or a morphological difference, for example, the unilateral existence of a deformity of the foot. These differences are statistically significant in terms of MTP perimeter ($p = 0.030$), Beta angle of quintus varus ($p = 0.000$), and rearfoot orientation ($p = 0.001$). Although statistical analysis did not identify a significant difference for the rest of the variables, pairwise comparisons detected significant proportions of subjects with asymmetrical feet.

DISCUSSION AND CONCLUSION: The intra-individual comparison demonstrated the existence of several points of morphological difference between the right foot and the left foot, which confirms that the two human feet are not perfectly symmetrical(2). This morphological asymmetry of the foot could be linked to functional asymmetry, that is to say to the dominant side and to the physical performance of the lower limbs(3). These foot asymmetries tend to be exaggerated with exercise. This can influence the person's postural balance and increase the risk of injury. For these asymmetrical feet, wearing conventional symmetrical shoes will certainly induce impingement pathologies. This further justifies the growing demand for bionic shoes, the principle of which is based on customized shoes.
Keywords: Foot morphology, Foot shape, customized shoe, Asymmetry, Algeria

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Foot and Shoe Size Mismatch in an Algerian Population

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BACKGROUND: A mismatch problem between the shoe and the foot can cause many foot disorders.

AIM: to study whether the shoe we wear corresponds to our foot size in terms of length and width in an Algerian population

METHOD: It is a descriptive study with a comparative aim, carried out among healthy subjects. To study shoe £t in terms of length, we £rst recorded the shoe size worn by the participant. Then, we performed an objective measurement of foot length using a graduated pedimeter.
Subsequently, we compared this measured size with that of the shoe worn.
To analyze shoe £t in terms of width, we measured the MTP perimeter using a tape measure. It is the circumference at the metatarsophalangeal (MTP) joint which represents the widest part of the forefoot. Subsequently, we compared the width of the foot to the width of the shoe worn. For the width of the shoe worn, we took the 7th width as a reference for each corresponding size. To analyze the £t of the shoes in terms of width, we measured the MTP perimeter using a tape measure. It is the circumference of the metatarsophalangeal (MTP) joint which represents the widest part of the forefoot. Subsequently, we compared the width of the foot to the width of the shoe worn. For the width of the shoe worn, we took the 7th width as a reference for each corresponding size, because this is the width marketed for men's shoes.

RESULTS: 426 people participated in this study; the age range varies from 18 to 21 years with an average of 19.5 ± 0.89 years. We noticed that the shoe size is too small compared to the foot dimensions.
In terms of length, 65.9% of subjects wear incorrect shoe sizes. The average difference between foot and shoe length was 1.6 ± 3.27 mm. This difference in length is statistically signi£cant (p- value = 0.002).
Most participants (83.9%) wore inappropriate shoes in terms of width, the average difference between the width of the shoe and the width of the dominant foot was 1 ± 10.68 mm. Although this difference is statistically insigni£cant, it is not far from the signi£cance threshold (p-value = 0.067).

DISCUSSION AND CONCLUSION: Like other populations, wearing the wrong size remains a fairly widespread phenomenon among the Algerian population (1).
Wearing a shoe with an extra size promotes pathologies of instability and friction (blisters and retrocalcaneal bursitis). Otherwise, a shoe whose size is too small will offer less space for the foot, this overload triggers several pathologies such as capitometatarsal syndrome, metatarsal fatigue fracture, claw toes, and reactive hyperkeratosis (2).
The solution is to develop local calceology by determining the last to be used for mass production.

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The Potential of Applying Thermographic Imaging in CAD/CAM Design and Fabrication of Orthotic Insoles

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BACKGROUND: The application of CAD/CAM technology in orthopedic aids manufacturing is becoming standard. Utilizing various data sources for designing enhances the qualitative aspects. Current methodologies primarily use 3D foot surface scans, foam foot impressions, or plaster foot molds. Additional digital data from pedobarographic platforms contributes to improving orthotic design.

AIM: This study explores the practical application of thermographic imaging, captured using available IR cameras, to enhance foot orthotic design and function.

METHOD: Utilizing the FLIR ONE® Gen 3 IR camera connected to a mobile phone, we captured temperature changes ranging from -20 to +120 degrees Celsius in real time. We developed a standardized methodology, considering parameters such as room temperature, foot positioning, and the use of IR markers for geometric distortion correction.

RESULTS: Measurements on a diverse group of volunteers without health issues yielded significant findings. Environmental changes affected the recording process, with successive recordings exhibiting a 12% average temperature variation. Optimal results were observed when the foot was in contact with the surface for approximately 20 seconds.

DISCUSSION AND CONCLUSION: The use of IR images facilitated the correction of geometric distortion and conversion to the metric system, ensuring reliable data for CAD navigation. However, challenges in capturing direct plantar foot surface thermal images remain. Future investigations might focus on specialized materials or grid-like surfaces to overcome this limitation.
Thermographic imaging presents a viable option for enhancing orthotic design, considering the complex interplay between foot temperature variations and pathological conditions. Standardized procedures and algorithms are vital for accurate data processing and analysis, guiding the future development and implementation of this technology in orthotic design and evaluation.

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Case Report: Charcot's Foot. Influence of Precise Manual Palpatory Diagnosis on Treatment Outcome

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BACKGROUND: Neuropathic foot is a common complication of diabetes. The pathogenesis of Charcot's foot includes repeated microtraumas of the foot in a situation where sensitivity is compromised and neurovascular changes are caused by pathological innervation of blood vessels. In most cases, the changes are the result of a combination of both pathophysiological factors (K. Trieb, The Charcot foot: pathophysiology, diagnosis and classification, Review
Bone Joint J. 2016 Sep;98-B(9):1155-9.doi: 10.1302/0301-620X.98B9.37038.).
Charcot's foot is a condition that is extremely resistant to therapy and has a tendency to recur.

AIM: Show the importance of a thorough, permanent, repeated manual examination of the treated region by a PRM specialist for the course of treatment, the choice of treatment methods, the outcome of treatment and the duration of remission.

METHOD: Patient R. M. turned to Natalija Solovjova, MD, MD, on November 1, 2019, as he had previously received all the spectrum of therapies intended for the treatment of Charcot's foot in Belgrade, including hyperbaric oxygenation with all the findings confirming the diagnosis of Charcot's foot.

RESULTS: In the therapy, the following were applied: the technique of central lymphatic drainage, of all diaphragms, visceral therapy of the organs of the stomach and chest cavity, i.e. all in order considering that the patient was threatened with amputation of the leg. Lymphatic hypotonus was established with venous blood being thrown into the ductus TH. With regular treatments, the condition only got stabilized. Of course, the patient continued to receive insulin therapy and other prescribed medications, and during each therapy, a precise manual diagnostic thin tissue palpation was performed according to the indications and goals of the therapy, and mandatory - the tissues of the right ankle joint and foot as a whole, as well as each examination, were singled out soft tissue elements for a special precise examination. Thus, during 10 examinations and treatments, the presence of small, needle-shaped bone fragments was found that had become lodged in the capsule of the talocrural joint from the inside through the synovial and fibrous membrane and that deformed the joint capsule and around which there was inflammation. Repeated examinations and manual treatments resulted in gradual resorption bone fragments, establishment of normal architecture of the joint capsule. Following the examination, after the last bone spur was eliminated, it was noted that all inflammatory elements had completely retreated today.

DISCUSSION AND CONCLUSION: In the modern approach to solving the problem of Charcot's foot, there are many recommendations. But the recommendation to regularly and systematically do a precise manual examination got lost, which in this particular case led to locating the cause of the condition and solving it in a situation when all the possibilities of modern medicine were exhausted. I welcome the development of modern medicine, the introduction of protocols in the treatment of diseases that are of inestimable importance for primary health care, but a precise, patient, systematic manual objective examination by a doctor who is constantly improving and progressing cannot be replaced by anything.

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Results of Surgical Treatment of a Patient With Primary Lymphedema

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BACKGROUND: The congenital or acquired damage to the peripheral lymphatic system causes lymphedema. The treatment requires a complex approach: first of all, the complex physical oedema therapy (which includes manual lymphatic drainage, bandaging, movement in bandages and careful skin care), and secondly, it includes lifestyle, psychological and dietary counselling.

AIM: Due to several factors (the nature of the underlying disease, inadequate patient compliance), conservative treatment often does not bring the desired results. This is especially common in case of extremely large primary lymphedema, which also causes movement difficulties. In such cases, it is possible to perform different types of lymphatic surgery.

METHOD: The 36-year-old male patient has primary lymphedema on the left lower limb since birth. The patient has been regularly receiving complex lymphatic therapy since 1997. Although the intensive treatments were always effective (volume loss was 6800 ml on average, body weight loss was 7.7 kg on average), overall, the volume and circumference of the limb (from 28700 ml in 2014 to 68400 ml in 2022), and the patient's body weight increased continuously (from 124 kg to 200 kg). This caused significant movement limitations and continuous joint complaints (lower back pain and left knee pain). Heavy leg on a 10-point visual analogue scale increased from the initial 6 to 10, and the 6-minute walk test decreased from 410 m to 200 m. Previously, he worked full time, but from October 2022 he was no longer able to do his job and perform his hobbies.

RESULTS: Due to the lack of opportunities in Hungary, Charles procedure was performed on the patient in Vienna in January, 2023. After removing 53 kg of excess soft tissue and covering the left leg with its own skin graft, a lympho-venous anastomosis was performed on the left leg based on lymphangiography. As a result of the operation and the following complex lymphatic therapy, the volume of the left leg decreased to 30000 ml, the body weight decreased to 155 kg, the heavy leg decreased to 0, and the 6-minute walk test increased to 315 m. On the SF-36 quality of life questionnaire, compared to the situation in the fall of 2022, an improvement can be observed in all answers in the spring of 2023. The patient is working full-time again.

DISCUSSION AND CONCLUSION: In case of insufficient effectiveness of conservative methods in the treatment of lymphedema, modern lymphatic surgical procedures are indicated. An essential condition for a good result is the patient's proper cooperation, regular self-treatment, and lifestyle change. The development of protocols for the effective combination and timing of surgical procedures (which are still considered new in Hungary) and conservative methods (that have been used for a long time) and patient follow-up are currently underway.

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Disseminated Hydatid Disease With Musculoskeletal Dissemination

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BACKGROUND: Musculoskeletal form of hydatid disease secondary to pelvic hydatidosis is a rare presentation of endemic zoonosis. The pathological anatomy and
Radiological findings confirm the diagnosis. The possibility of hydatidosis, although a rare finding, should be included in the differential diagnosis of a soft tissue mass of uncertain origin located in the pelvic organs and thigh.

AIM: Demonstrate the importance of correct differential diagnosis and early rehabilitation in patients with endemic disease.

METHOD: We discuss the case of a 57-year-old patient with no relevant previous history with pain in the right thigh, with a casual finding of secondary disseminated pelvic hydatid disease confirmed by CT (with bone affection, appreciating osteolysis of the right ischiopubic ramus, reaching the parasymphyseal region with residual fibrosis, with cysts in the foot, inner calf, mouth, lung and liver), PET-CT (Osteomuscular hydatidosis with persistence of active lesions in the lung, right jaw, SID, ischium/ischiopubic branch/musculature right adductor, right biceps femoris muscle and left foot) and pathological anatomy confirming the initial finding.
The informative searches have been carried out in the data sources of Pubmed. Descriptors: hydatid disease, dissemination, musculoskeletal, electrotherapy

RESULTS: Assessed by the Rehabilitation Service after several surgical interventions through marginal resection in adductor compartment, posterior compartment and external compartment of the right hemipelvis/thigh. In the initial examination, the joint balance of right bottom limb is complete, but there are sequelae in muscle balance: weakness at the level of the hip flexors, the hip extensors with limitation at the level of the dorsiflexors, in addition to residual hypesthesia at the inner edge of the lower extremity with bright edema in the affected limb. The patient presents a paralysis of the external popliteal sciatic and obturator nerve (ENG: severe partial axonotmesis of the sciatic
major and obturator) in the affected limb that alters the gait pattern: right foot drop with unstable gait in the swing phase. After a scheduled treatment with hydro- and electrotherapy (12 sessions of ET ENDOMED F IV on the head of the fibula + dorsum of the foot for the purpose of gait pattern recovery, quadriceps toning and dorsiflexion recovery) and a anti-equinus orthosis type Foot-Step, an improvement in the muscle balance is observed: decrease in level weakness of the hip flexors, knee extensors and ankle dorsiflexors. A slow and unstable progress is being observed despite using the antiequinus orthosis with 1 crutch.

DISCUSSION AND CONCLUSION: An early approach by the Rehabilitation Service is essential for improving functionality, through recovery of the gait pattern, toning of the hip flexors and knee extensors, and recovery of dorsiflexion. It is important to institute treatment with exercises to improve the muscular balance of the operated pelvis and thigh to improve its functionality.

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Extensive Ossification of the Achilles Tendon: A Case Report

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BACKGROUND: In our department, we attended a 52-year-old woman with pain onset in the posterior region of the leg after a casual fall 1 year ago. She reported a history of childhood surgery to the Achilles tendon.

AIM: The purpose is to describe the presentation, risk factors and management options of this rare condition.

METHOD: An exhaustive search was conducted using PubMed, MEDLINE and Cochrane databases. The search terms used to find the related literature from all databases included: “Achilles ossification,” “calcification”, “calcific tendinitis,” “extensive ossification”. Between all the results, we found a scoping review, that was conducted from November 2020 to May 2021, and included 54 articles published from 1932 to 2021 about our selected topic.

RESULTS: Ankle X-rays of the patient showed extensive ossification of the Achilles Tendon, defined as ossification within or surrounding the Achilles Tendon that comprises at least roughly one-third of the affected tendon, with the formation of lamellar bone within the body of the tendon. (see image attached) A Magnetic Resonance Imaging was ordered to assess the integrity of the tendon and the adjacent soft tissues, and it also revealed partial fatty infiltration of fifty per cent of the soleus muscle fibers.

DISCUSSION AND CONCLUSION: All articles included in the scoping review were analyzed and the main findings were that:
-It affects men twice as much as women.
-The etiology is likely to be multifactorial and it often results from previous trauma, tendon rupture or surgery involving the tendon decades before.
-It may be an incidental finding after acute trauma to the ankle. An acute fracture of the ossification may occur, presenting with pain and occasionally an audible “pop”.
-Diagnosis is confirmed with plain radiographs and is characterized by the presence of one or more segments of ossified masses within the tendon.
-Treatment consist of either conservative or surgical options. The decision about which treatment approach to initiate is typically determined by factors such as pain, the extent of ossification, and whether the ossified segment of tendon has fractured.

In conclusion, many ossified Achilles Tendons are silent for decades and may or may not result in an acute fracture of the ossification, so clinicians should be aware of the typical presentation and management options in order to provide the best clinical care practice.

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A Rare Cause of Posterior Knee Pain: popliteal Artery Aneurysm

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BACKGROUND: Knee pain is a common presenting complaint with many possible causes. Knee pain more commonly presents in the anterior, medial, and lateral aspect of the knee and less often in the posterior aspect of the knee.A precise understanding of knee anatomy, the physical examination, and of the differential diagnosis is needed to accurately evaluate and treat posterior knee pain. The differential diagnosis for posterior knee pain is broad and includes pathology to the bones, musculotendinous structures, ligaments, nerves, vascular components, and/or to the bursas.Popliteal artery aneurysm is a rare cause of posterior knee pain.

AIM: We aimed to share a case of popliteal artery aneurysm presenting with posterior knee pain.

METHOD: Case report of a patient with popliteal artery aneurysm and posterior knee pain

RESULTS:

CASE: A male patient, 83 years old was admitted to our outpatient clinic with a posterior knee pain. He has been suffering from this pain for a month. His pain increased with walking and also had pain at night.The patient's medical history included coronary artery bypass graft surgery (CABG) and hypertension. During our clinical examination, we found swelling and increased temperature in the left popliteal fossa. Knee flexion was painful at the end of the range of motion (ROM). No effusion was detected in the joint. No abnormal findings were found in the blood analyses and plain knee x-rays. Magnetic resonance imaging showed a cystic lesion with macrolobulated contour extending medial to the popliteal fossa with a size of 58x51x120 mm in the posterior part of the knee and soft tissue ultrasound scan was recommended. Soft tissue ultrasound scan showed an aneurysmatic appearance of the left popliteal artery and measured 4.5 cm. The patient was referred to cardiovascular surgery for further examination and treatment plan.

DISCUSSION AND CONCLUSION: There are various differential diagnoses for causes of posterior knee pain. Popliteal artery aneurysms (PAAs) are the most common peripheral artery aneurysms. [1] They are frequently symptomatic and are associated with high rates of morbidity and limb loss. Symptomatic patients present with a pulsatile painful mass in the popliteal fossa, claudication, leg swelling and pain. [2] A physician needs to be aware of the common causes, such as musculotendinous injury,disorders or Baker's cyst, and also of the rare causes of knee pain such as bone tumors, damage to peroneal nerve and vascular pathologies.

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Frequency of Hip and Knee Arthroplasty in Patients Suffering From Rheumatoid Arthritis

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BACKGROUND: Rheumatoid arthritis is an autoimmune disease characterized by symmetrical peripheral polyarthritis (1). The inflammatory process leads to bone and cartilage destruction, functional deficits and deformities (2), and in more severe cases, the need for hip or knee arthroplasty (implantation of a total endoprosthesis).

AIM: examine the frequency of hip and knee arthroplasty in patients with rheumatoid arthritis.

METHOD: The research was conducted as a retrospective cross-sectional study at ZZFMR "Dr. Miroslav Zotović" at the Department of Medical Rehabilitation and Balneology in the period from 01.01 to 29.12.2022 and included all patients with diagnosed rheumatoid arthritis who were rehabilitated inpatient. Patients were stratified into 2 groups: in group A there were 132 patients with diagnosed seropositive RA and in group B 35 patients with diagnosed
seronegative rheumatoid arthritis.

RESULTS: In group A, out of 132 patients with seropositive rheumatoid arthritis, 32 patients had an endoprosthesis implanted in one or more joints. The average age structure of patients who underwent hip or knee arthroplasty was 60.5±3.5, of which 4 were male patients (12.5%), female 28 (87.5%). Out of 32 patients, arthroplasty of only one hip was performed in 5 patients (15.62%), only one knee in 9 patients (28.12%), and in 18 patients 2 or more joints (56.62%). In group B of 35 patients with seronegative rheumatoid arthritis, 5 patients had an implanted hip or knee endoprosthesis. The average age structure of the patients was 66±4.3; 29 (82.85%) patients were female, and 6 (17.14%) were male. 1 hip endoprosthesis was implanted in 2 patients (5.7%), 1 knee in 3 patients (8.57%) and endoprosthesis of 2 or more joints 1 patient (2.85%). Pearson's correlation test yielded a value of 0.99, which shows a statistically significant association between hip and knee arthroplasty and diagnosed rheumatoid arthritis.

DISCUSSION AND CONCLUSION: In long-term rheumatoid arthritis, one or both hips or knees are affected in 90% of cases (2). In 25% of patients with RA, during their lifetime, arthroplasty - installation of a total endoprosthesis (TEP) is required (1). The need for operative treatment in the form of total endoprosthesis installation occurs when drug therapy can no longer control the underlying disease. The risk of hip and knee arthroplasty is twice as high in patients with rheumatoid arthritis than in the general population (3). Patients suffering from rheumatoid arthritis are more likely to have hip or knee joint deformity leading to arthroplasty, in the group of seropositive patients this probability is higher, as well as in women.

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The Association Between the Timed Up and Go Test and Real Road-Crossing Velocity in Hip Fracture Patients Admitted to a Sub-acute Rehabilitation Setting

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BACKGROUND: The timed Up & Go (TUG) score was found to highly correlate with gait time as well as with functional capacity as measured by the Barthel Index, the Functional Independence Measure (FIM) instrument and the Berg Balance Scale(1-5). However, no data were found on the relationship between the score on the TUG test and the ability of people with hip fracture to safely cross a road.

AIM: To assess whether the TUG test, performed in a controlled environment, is a good indicator of functional performance in real-life scenarios such as road-crossing.

METHOD: A retrospective study of 100 hip fracture patients admitted to a sub-acute rehabilitation ward between 2019-2023. The outcome measures scores collected included: Functional Independence Measure (FIM), motor FIM gain according to Montebello Rehabilitation Factor Score (MRFS), TUG, and road-crossing velocity. Clinical, demographic, cognitive, and fracture-related variables were also collected. The Pearson's correlation test assessed the significant correlations between continuous variables and gait velocity; the T-test assessed the relationship between categorical variables and gait velocity. Multiple linear regression identified significant predictive variables for gait velocity after controlling for sociodemographic characteristics and chronic diseases. P-value for all statistical tests was set at <0.05.

RESULTS: Mean TUG score was 24.6±9.26 sec; mean road-crossing velocity 0.34 ±0.12 m/sec. Only one patient achieved a road-crossing velocity of >0.8 m/sec. Road-crossing velocity was correlated with age (p=0.017), pre-fracture and admission functional level (<0.001), TUG score (<0.001), admission cognitive score (0.009), length of stay (0.004), associated with male gender (0.043), intracapsular fracture type (0.026), fracture of the right leg (0.003) and hypertension (0.015). Multiple linear regression revealed that fracture side, admission functional score, and TUG score were independent predicting factors for gait velocity.

DISCUSSION AND CONCLUSION: The TUG test performed in a controlled environment is a good indicator of road-crossing velocity in hip fracture patients upon discharge from sub-acute rehabilitation. However, it does not accurately reflect their safety in performing actions such as road-crossing in real life.

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Use of Cm-Chitosan in Patients With Gonarthrosis

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BACKGROUND: Knee osteoarthritis (OA) poses a substantial health challenge, particularly in its severe manifestation, causing considerable functional impairment and diminished quality of life. There are now many therapeutic strategies in these patients, and among the most effective ones is the use of hyaluronic acid-based injectable solutions with a viscosupplementation function.

AIM: The objective of this study is to evaluate the efficacy of intra-articular injections of CM-chitosan in alleviating pain, improving joint function, and enhancing overall well-being in individuals with severe knee osteoarthritis and monitor its effect over time.

METHOD: Participants diagnosed with severe gonarthrosis (Grade IV of the KL classification) who came to the outpatient physical medicine and rehabilitation clinic with indications for conservative viscosupplementative treatment, who had had poor response to previous treatment with hyaluronic acid, and with no contraindication to chitosan were enrolled. The treatment protocol included an initial evaluation before the infiltrative procedure, treatment with a single injection of the cm-chitosan solution and follow-up at 1 month , 3 months and 6 months. Assessments were made by administering generic pain scales (VAS) and knee-specific scales (KOOS).

RESULTS: Preliminary findings reveal a statistically significant improvement in pain scores and functional outcomes among participants treated with cm-chitosan solution especially after the first month. In addition, results show a return to initial values of scale scores at six months after infiltrative treatment.

DISCUSSION AND CONCLUSION: The positive outcomes observed in this study prompt discussions on the potential mechanisms underlying the therapeutic effects of CM-chitosan. Chitosan exhibits promising anti-inflammatory properties and may play a crucial role in preserving joint integrity. In conclusion, this clinical trial suggests that intra-articular injections of a cm-chitosan solution hold promise as an effective intervention for severe knee osteoarthritis no more responsive to hyaluronic acid. The encouraging results warrant further research with larger cohorts and extended follow-up periods to substantiate these findings and establish the broader applicability of CM-chitosan in clinical practice.

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Poster Session H

Clinical Characteristics and Functional Independence of People With Post-COVID Sequelae

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BACKGROUND: Continuous studies that describe the clinical profile, prognosis of functional recovery and prediction of the course of this health condition are necessary, in order to map the possible sequelae after Covid-19 1.

AIM: To describe the clinical characteristics and level of functional independence of participants with post-Covid-19 sequelae during a physical rehabilitation program.

METHOD: It was a descriptive and retrospective study, using 17 physical and electronic medical records. Medical records of participants who: tested positive for Covid-19 (diagnosis by RT-PCR) and attended the Lucy Montoro Santos Rehabilitation and Physical Medicine Center during the pandemic period from January/2020 to February/2022 were included. To collect data, sociodemographic and clinical information was obtained. To describe functional capacity, the assessment instrument Functional Independence Measure (MIF) was used, referring to the domains of activity and participation of the International Classification of Functioning (ICF). Data were extracted at two moments: admission (participant's initial assessment) and discharge from the rehabilitation program. In the statistical analysis, the data were evaluated to verify their normality, with the variables (high X evaluation) compared using the ANOVA – Friedman test. The effect size was calculated using the Cohen method and a significance level of <0.05 was adopted.

RESULTS: The average age of the participants was 61 years old (52.9% female and 47.1% male). Upon admission, 23.5% presented complications with progression to limb amputation, 5.9% acquired brain injury and 70.6% post-Covid-19 fatigue syndrome. The prevalence of comorbidities, prior to Covid-19, were: Systemic Arterial Hypertension – SAH (58.8%), respiratory disorders, asthma and COPD (17.6%) and diabetes/dyslipidemia (11.8%). Only 17.3% did not present any comorbidity. Functional independence, through the FIM, showed a significant improvement (p=0.001) in the initial score (at admission) in relation to the final score (discharge from the rehabilitation program).

DISCUSSION AND CONCLUSION: Recent studies have highlighted the strong correlation of underlying health conditions with Covid-19 infection and its impact on functional status. It included baseline outcomes related to comorbidities such as diabetes, systemic arterial hypertension and respiratory diseases 2,3. Regarding functional independence, changes in their abilities can be suggested after the physical rehabilitation intervention program, even though the purpose of the study was not to evaluate the effectiveness of the rehabilitation program.

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Low-Volume Plasma Exchange as Adjuvant Therapy for COVID-19-Associated Guillain-Barré Syndrome: A Case Report

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BACKGROUND: Low-Volume Plasma Exchange (LVPE), a minimally invasive and safe procedure utilizing innovative nanomembrane-based technology, represents a novel approach to blood purification. It eliminates toxic and inflammatory blood components and is increasingly employed in detoxification treatment for a wide range of chronic and acute diseases. Therefore, LVPE may be an effective adjuvant treatment for Guillain-Barré syndrome (GBS) as a possible complication of Coronavirus Disease 2019 (COVID-19).

AIM: Our aim was to present a case report of a 60-year-old female patient who developed GBS as a post-acute complication of COVID-19 infection and underwent five cycles of LVPE treatment, along with complex physical therapy.

CASE REPORT: Patient RK, a 60-year-old female, was referred for physical therapy and rehabilitation to the "Dr. Simo Milosevic" Institute in Igalo, Montenegro, due to her condition following acute polyradiculoneuritis. Two months earlier, she had been hospitalized at the Clinical Center of Montenegro due to a sudden onset of weakness in her lower extremities and tingling in her hands and feet. A diagnosis of GBS was established, and she received intravenous immunoglobulins followed by early rehabilitation.
Upon admission, the patient complained of tingling sensations in her fingertips and mild discomfort, along with slight instability while walking, with the ability to cover a distance of up to 500 meters. Joint mobility within functional limits in both upper and lower extremities, with satisfactory muscle trophism and strength. Muscle strength, assessed using the manual muscle test (MMT), was 4/5 in the upper extremities and 4-/5 in the lower extremities, except for the left iliopsoas, which measured 3/5. Absent reflexes. Tinetti Balance Test score was 13/16. Hughes Functional Scale score was 1.
During the three-week stay, a comprehensive physical therapy regimen was prescribed, comprising individual kinesiotherapy, hydrokinesiotherapy, breathing exercises, Epsom salt baths, manual massage, and lymphatic drainage. Additionally, adjuvant therapy involved 5 cycles of LVPE, administered every other day. To account for her body weight of 100 kg, approximately 1000 ml of plasma was safely removed during each cycle, replaced exclusively with a saline solution.
At the time of discharge, improvement in muscle strength in both upper and lower extremities was observed, with an increase of one level according to the MMT. The patient significantly increased her walking distance, now covering 2 to 3 kilometers. The Tinetti Balance Test score improved to 16/16, and the Hughes Scale score was 0.
CONCLUSION: This case report highlights the potential benefits of LVPE as an adjuvant therapy for GBS, particularly in the context of COVID-19-related complications. The comprehensive rehabilitation approach, in conjunction with LVPE, resulted in significant functional recovery. These findings underscore the importance of early intervention and a multidisciplinary approach to managing GBS, offering hope for improved outcomes in similar clinical scenarios.

The Effects of Diaphragmatic Mobilization on Respiratory Function in Patients After COVID-19 Infection

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BACKGROUND: More than eight hundred thousand cases of Covid-19 were recorded in Latvia during 2020-2022. In most cases the disease was asymptomatic or mild (80%), the rest had moderate or severe disease (15% and 5%)[1]. The most common complications following COVID-19 infection were concerned with respiratory system[2].

AIM: To evaluate the effects of diaphragmatic mobilization manipulation on respiratory function in patients after COVID-19 infection.

METHOD: The quantitative study took place at the National Rehabilitation Centre "Vaivari". Criteria for inclusion in the study: Patients with a history of COVID-19 infection for at least 3 weeks but not more than 7 months; The medical condition of the patients is stable and corresponds to functional class I or II according to the results of the 6-minute going test; The total number of patients included do not exceed 18; The control group included 9 patients. Exclusion criteria: Unstable medical condition; Functional class III or IV according to the results of the 6-minute going test; Acute mental illness/cognitive impairment. After the examination peak flow measurement was performed in both groups, but only in case group was performed diaphragm mobilization and repeated peak flow mesaurement.

RESULTS: Mean age of control group and case group was 60,11 ± 3,91 and 62,00 ± 2,47, respectively. Both groups showed statistically significant improvement in peak flow measurement result during rehabilitation course, PFR 4,05 x10-5 and 3,98 x10-2.
In the control group the median ΔPF is 30.00 L/min with an interquartile range (IQR) of 5.00 L/min, and in the case group the median is 60.00 L/min with IQR of 70.00 L/min. The obtained differences between the groups at the median are statistically significant, PMV = 3.38 x10-4. The relationship between ΔPF and presence of diaphragmal mobilization technique in case group is moderately close, η= 0.66.
At the all three measurements before and after the mobilization technique, the peak flow measurement results are statistically reliably different, which indicates the additional effect of the treatment (PPT: 3,38 x10-4, 2,38 x10-3, 1,31 x10-4).

DISCUSSION AND CONCLUSION: Many patients require rehabilitation to return to work and restore their previous level of functioning. It is crucial to identify additional options and treatment technologies that would help to improve functioning abilities and quality of life as quickly and qualitatively as possible.More extensive research into the effects of osteopathic treatment is needed to accurately identify osteopathic effects on patient health. This would allow to improve the care provided after the infection with COVID-19 and possibly the development of rehabilitation technologies provided in the future.
Pulmonary rehabilitation program helps to improve respiratory function of patients after Covid-19. Peak flow measurement results increases more rapidly if the patient received diaphragm mobilization in addition to the rehabilitation course.

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Physical Condition and Psycho-Emotional Status of Patients Hospitalised for Early Post-acute Phase Rehabilitation After COVID-19: A Retrospective Analysis

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BACKGROUND: COVID-19 patients present many clinical problems, including respiratory failure, excessive immunological response and clotting disorders, renal failure, myocarditis and neurological problems. Different settings of rehabilitation programme are used (Wade, 2020). Less attention has been paid to mental health aspect together with physical capacity decline during the epidemics of severe acute respiratory syndrome (SARS)-CoV associated with social isolation. It was noted, that nearly 35% of people had mental health impairment during an early recovery phase (Wu et al, 2005; Mak et al., 2009).

AIM: The aim of the present study was to evaluate functional capacity and psycho-emotional status in patients suffering from COVID-19 after the acute phase of illness.

METHOD: The participants were 81 patients after acute COVID-19 phase who received treatment during at least 10 days in in-patient department of medical rehabilitation of East Tallinn Central Hospital in period from 4.01.2021 to 1.05.2022. Walking distance, 6-minute Walking Test (6MWT) distance, hand grip strength, estimation of needs for assistive devices, blood biochemical data as well as assessment of psycho-emotional condition by Emotional Health Questionnaire (EEK-2; Aluoja et al, 1999) were studied. Data of 60 patients (63% women) included all tests results, have been taken for future analysis.

RESULTS: As accompanying diseases before COVID-19, bronchial asthma had 13% of patients, obstructive pulmonary disease 7%, diabetes mellitus 23%, hypertension disease 75%. Damage of lungs due to COVID-19 estimated by CT of 26-50% had 53% of patients and more than 50% - 30% of patients. Additional oxygen treatment needed 80% of patients in day of beginning of treatment and 10% at the end of 10-day period staying in hospital. Walking ability of patients in day of entrance to department was low – 8% were not able to walk, distance up to 100 m could walk 73%, and more than 100 m – 18% of patients. After treatment, walking distance increased by 422%. At beginning of treatment, 52% patients had anemia, and 33% had Vitamin D less than 50 nmol/L. Also, in the beginning of treatment 33% of patients needed the walking ability aids, and after treatment only 10%. As results of physiotherapy and occupational therapy hand grip strength increase by 10% (mean 2,7-3,2 kg). Patients demonstrated asthenia signs in 45%, sleep disorders 26%, depression 13%, anxiety 10% cases.

DISCUSSION AND CONCLUSION: Complex medical rehabilitation in early post-acute phase after COVID-19 improved patients´ physical capacity. More attention would be paid to the therapy for psycho-emotional condition in future studies. For patients with severe pulmonary diseases Sit-To-Stand test is recommended as an alternative to the 6MWT (Kohlbrenner et al., 2020).

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Implementation of Key Points for Rehabilitation Programs for Persons With Post COVID-19 Condition in Germany

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BACKGROUND: Post COVID-19 condition is a complex disease pattern involving a myriad of symptoms and multiple functional losses.1 So far there is still no definitive pathological mechanisms, nor specific diagnostic tests and foremost no causative treatment. Post-COVID as remained a syndrome of exclusion. For rehabilitation clinics further problems arise when patients arrive without adequate diagnostic work up prior to arrival at the clinic.
Standard rehabilitation programs should take these multitude of overlapping functional capacities/abilities into account. Equally challenging are treatments for functional losses in various organ systems which are not always covered by every clinic e.g., pathological breathing together with cognitive impairment.
With those complexities of post COVID-19 rehabilitation programs need to adjust to the circumstances especially to the fluctuations in functional ability of patients.

AIM: With the experience of assessing over 100.000 people for occupational exposure to SARS-CoV-2 and experience in rehabilitating people suffering from post COVID-19 we had consensus rounds to defining essential requirements and put down key points for the rehabilitation of post COVID-19 patients as well as for social medical assessments for instance regarding return to work.

METHOD: We established consensus rounds with relevant experts of rehabilitation clinics with experience of treating post COVID-19 patients to develop key points of rehabilitation programs for those patients.

RESULTS: The main specialties involved in rehabilitation of Post-COVID-19 patients are various specialties of medicine (cardiology, pneumology etc.), neurology and neuropsychology as well as psychosomatic medicine.
Beside a manual to evaluate the anamnesis, firstly, a minimum diagnostic set of tests, needed to sufficiently exclude alternative diagnosis, was agreed upon. Especially fatigue requires be assessed to gauge patient's ability2 to follow the agreed schedule. Post exertional malaise (PEM) need to be recognized and the program adjusted accordingly if the patient was able at all to take part in rehabilitation.
The consensus also established the prerequisite for interdisciplinary co-operation to get additional input from various specialties as per patient's specific needs.
Rehabilitation programs are following the bio-psycho-social model and current guidelines for treatment of Post COVID-19 condition 3,4,5
Rehabilitation schedules should be individualized and flexible to cater to the patient's varying abilities at different points of time.

DISCUSSION AND CONCLUSION: A multistakeholder process in achieving consensus in agreeing key points of requirements for clinics to offer Post Covid-19 rehabilitation programs is essential to get good outcomes and support the process of returning to work.
The requested duration of rehabilitation might need to be adjusted according to the patient's ability to follow the program.
A new interdisciplinary and individualized approach to Post COVID-19 rehabilitation seems to offer a better approach to the needs of Post COVID-19 patients and outcome of the rehabilitation program.

Adherence to the key points of this approach should be assessed in further Quality control measures.

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Impact of Recreational-Physical Activity on QoL Through Adapted Bicycle, in Children/Adolescents With Intellectual-Motor Disabilities: From COVID Related Restrictions to Nowadaysp

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BACKGROUND: The Coronavirus pandemic has disrupted the daily lives of the entire world population: isolation of people, restrictions on contact and the associated economic crisis have led to a complete change in the psychosocial environment. These measures pose a significant risk to the Quality Of Life (QoL) and mental health of children and adolescents especially those with a disability.
From the literature it emerges that recreational-motor activity is effective in improving the QoI of disabled subjects and, in this context, Adapted Dynamic Cycling (ADC) has proven to be a pleasant tool for social integration and physical exercise in children with disabilities.

AIM: Scope of this preliminary observational retrospective Study, is to evaluate the impact of physical activity, performed using Adapted Bicycles (AB) on the QoL in children/adolescents with physical and intellectual disabilities during SARS-COV 2 Pandemic.

METHOD: Since December 2020 to September 2022, 144 children and adolescent with intellectual-motor disabilities were enrolled in Adapted Sport Unit of Neurorehabilitation in Bambino Gesù Children Hospital to try Adapted Bicycles (AB).
In September 2022, 61 patients have already been using the adapted bicycle for at least 3 months.
Of these we selected a sample of 30 patients diagnosed with Cerebral Palsy, Down's Syndrome, Prader Willi Syndrome and who had been cycling for at least 3 months(21 CP, 4 SD, 5 PWS).
The primary outcome is the QoL of children/adolescents (PEDSQL), secondary outcomes are evaluation of the aid and the social impact of the use of the device (PIADS and the QUEST 2.0 form), evaluation of adherence to cycling in everyday life and maintenance of an active lifestyle through telephone interviews and a "Bicycle Diary" for patients, trunk control level via Level of Sitting Scale.
These outcomes were evaluated in children with CP, DS and PWS, having the AB from at least 3 months.

RESULTS: The scores relating to QoL and trunk control showed a statistically significant difference between the mean values of T0 and T1 ($p=0.00072$ and $p=0.0058$). The difference of mean values was higher in children with more severe GMFCS. Evaluation of the impact of the device showed a higher improvement in “Happiness”, “Quality of Life” and “Ability to Participate” Items.

DISCUSSION AND CONCLUSION: From our preliminary results, Quality of Life was extremely improved. Another important finding was the improvement of trunk control. In PIADS test the items Happiness, Well-being, Ability to participate and Quality of Life had the most important improvement.
QUEST scores showed an overall high satisfaction towards the assistive device and the service correlated. According to the preliminary results of this study, the use of AB ameliorates QoL of children with disabilities, promoting functional outcomes, it improves the child's harmonious development, his communication and relationship skills, his social inclusion, reduces the level of stress of the family unit and improves the QoL of the child and his family, favors the maintenance of an active lifestyle.

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Gait Analysis in Post COVID-19 Subjects

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BACKGROUND: SARS-CoV-2 infection (COVID-19) causes not only respiratory disorders but can also be manifested with neurological impairment, which includes peripheral nervous system disorders. Such complications were frequently reported in post-critical COVID-19 patients [1].

AIM: The aim of this study was to use gait analysis to identify the walking pattern in subjects with a history of admission in the intensive care unit secondary to COVID-19.

METHOD: Twelve control subjects (CS) (age=63,2 ± 6,2 years, BMI=25,6 ± 3,0 kg/m 2) and twelve Post covid subjects (PC) (age=66,6 ± 6,9 years, BMI=27,8 ± 5,2 kg/m2) were acquired with a 6-cameras motion capture system (100 Hz, Vicon), synchronized with 2 force plates (1000 Hz, AMTI) and an 8-channels surface electromyographic system (1000 Hz, Aurion) that recorded bilaterally the activity of 4 muscles: Tibialis Anterior, Medial Gastrocnemius, Vastus Medialis and Biceps Femoris. Retroreflective markers were placed according to CGM 2.3 marker set [2]. Kinematic and kinetic data were processed using Polygon (v3.5.2, Vicon) and Matlab (v2021a). Sagittal plane kinematics of hip, knee and ankle, pelvic obliquity, intra-extra foot rotation, spatiotemporal parameters, plus hip, knee and ankle power and the ground reaction forces were extracted. The spatiotemporal parameters were statistically analyzed by means of Wilcoxon test ($p<0.05$, Matlab), the kinematics and kinetics data were analyzed through Student's nonparametric t-test ($p<0.05$, SPM1D v0.4.6) [3]. Surface electromyographic signals were filtered and the envelope computed (50 Hz notch and fourth-order Butterworth filters with passband between 20-400 Hz, ProEMG v2.1.1.0, Matlab).

RESULTS: Kinematics, kinetics and spatiotemporal parameters revealed statistically significant differences between the two populations. An altered muscle activation timing was also detected in PC group.

DISCUSSION AND CONCLUSION: COVID-19 has been a significant contributor in increasing the number of admissions in intensive care unit (ICU) mainly for respiratory failure [4]. Persistent neurological impairments after Covid19 infection have been also reported leading to different types of morbidity [5], including peripheral nervous system disorders [6] . Different mechanisms have been suggested to justify how Covid19 may result in peripheral neuropathy, some authors suggested an immune reaction or vascular disorders [7], others related it to the neurotoxic side effects of drugs used to treat the symptoms of COVID-19 and, to a lesser extent, due to the compression of peripheral nerves resulting from prolonged bedding in the ICU [8]. However, a diagnostic test for COVID-19 specific neurological syndromes and its impact on walking pattern remains unclear.
Our study successfully demonstrated through gait analysis an altered walking pattern in critical COVID-19 survivors with a history of admission in Intensive care; the changes detected were in spatiotemporal, kinematic, kinetic, and EMG parameters. most of these changes were correlated positively with the duration of stay in ICU.
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Long COVID & Pain: 4 Years Since the Pandemic – What Do We Know So Far?

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BACKGROUND:4 years after the beginning of the SARS-CoV-2 pandemic, millions have been afflicted with WHO raising the prevalence of Long Covid patients in Europe over 17 millions1. Pain has been early on described as a main feature of persistent symptoms alongside fatigue, cognitive dysfunction and dysautonomia2

AIM: In this study we aim to describe the prevalence of pain in long covid patients and it's management

METHOD: A review of the literature with a special focus on systematic reviews and meta-analyses

RESULTS: Pooled prevalence of muscle pain has been estimated at 13,3% (95% CI: 7,48- 23,67%), joint pain 28,25% (95% CI: 14,76- 54,05%) and headache 10,45% (95% CI: 5,34- 20,47%)3. The new onset of pain can be further complicated through sleep disorders if it reaches chronic pain definition3. Reactive arthritis has also been described mostly self limiting through conventional measures4 and neuropathic pain has also substantiated both the direct viral invasion and indirect mechanisms5 with a pooled prevalence of 34,3% (95% CI: 14,3- 62%)6. Further on chest pain has been described to persist over a year at 8% (95% CI: 6-13%) and gastrointestinal pain at 6% (95% CI: 3-10%)7.Fibromyalgia, although less well studied has been found between 31-40% in another systematic review, pointing to the significant overlap between long covid and myalgic encephalomyelitis/ chronic fatigue syndrome8. Pain management is based on the nociceptive, neuropathic or nociplastic backround of the symptom presentation9 as well as the simultaneous treatment of mast cell activation syndrome, autonomic nervous system impairment and ME/CFS10,11

DISCUSSION AND CONCLUSION: The available literature points towards increased evidence of pain prevalence in long covid patients. The need for multidisciplinary interventions as well as adequately addressing comorbidities through dedicated long covid clinics cannot be stressed enough

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The Rehabilitation of Physical Deconditioning in Patients With Post-COVID-19 Syndrome

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BACKGROUND: Millions of people worldwide have experienced ongoing symptoms after recovering from COVID-19, known as long-COVID. These symptoms can range from fatigue and breathlessness to cognitive impairment and pain, significantly impacting daily life and independence.
While there is no definitive cure for long-COVID, various interventions are being explored to manage symptoms and improve quality of life. Outpatient rehabilitation, often led by specialized healthcare professionals like sports medicine physicians, has emerged as a potential solution.

AIM: This Algerian study adds valuable insights to the understanding of outpatient rehabilitation for long-COVID. By looking at pre- and post-rehabilitation data in a group of 22 patients, it investigates the potential benefits and limitations of this approach.

METHOD: This retrospective study evaluated the effectiveness of a 12-week outpatient rehabilitation program for 22 long-COVID patients. Led by a sports medicine physician, the program consisted of two weekly sessions (60 minutes each) targeting three key areas:
Exercise training: Incorporating both aerobic and resistance exercises to improve functional capacity, muscle strength, and endurance.
Education on long-COVID management and Self-management strategies .
Patients with severe cardiovascular comorbidities were excluded .
The Barthel index (including pre-COVID-19 infection value), the 6-minute walk test, comorbidities, clinical signs, and cardiorespiratory parameters were measured pre- and post-rehabilitation.

RESULTS: At the consultation, 54.54% of the patients were men, the age was 60.54 years old, the mean time of symptom onset was 20.4 ± 10 days, the body mass index was 27.0 ± 7.2 kg/m², 54.54% had hypertension, and 72.72% had diabetes. From pre- to post-rehabilitation, the Barthel index increased from 60.7 ± 23.7 to 92.5 ± 20.5 ($P < 0.001$), without returning to baseline values (95.4 ± 16.2; $P < 0.001$). A 13% decrease in post-test respiratory rate (30.7 ± 12.6 to 26.6 ± 6.1). In both preand post-rehabilitation, Barthel score correlated with the 6-minute walk test.

DISCUSSION AND CONCLUSION: The study focuses on a specific population (long-COVID patients) and a targeted intervention (outpatient rehabilitation).The inclusion of pre- and post-rehabilitation measurements allows for objective assessment of improvement. The first Algerian study uses validated tools like the Barthel index and 6-minute walk test. Relatively large sample size for a retrospective study. The important role of sports medicine physicians in managing long-COVID. The cost-effectiveness of outpatient rehabilitation for long-COVID.
But the Retrospective design limits the ability to establish causal relationships. and Ethical considerations in research involving patients with long-COVID limited a comparative study.The need for further research on effective rehabilitation strategies for long-COVID.

CONCLUSION: Outpatient rehabilitation for long-COVID patients was associated with substantial motor, respiratory, and functional improvement, especially in severe cases, even though there was a slight persistent loss of autonomy at discharge.

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Mental Health Outcomes up to 2 Years in Patients Hospitalized for COVID-19; the CO-FLOW Study

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BACKGROUND: Patients' mental health has been profoundly impacted by hospitalization for COVID-19, but the long-term extent of these effects remains uncertain[1].

AIM: We aimed to evaluate the trajectory of cognitive failures, posttraumatic stress disorder (PTSD), anxiety, and depression in patients recovering from COVID-19 up to 2 years after hospital discharge. Additionally, we aimed to identify predictors for the most persistent symptom.

METHOD: In this multicenter prospective cohort study adults hospitalized for COVID-19 in the mid-west of the Netherlands were included. Patient-reported outcomes were collected at 3, 6, 12, and 24 months after hospitalization for COVID-19. The main outcomes included cognitive failures assessed with the Cognitive Failures Questionnaire, PTSD evaluated with the Impact of Event Scale-Revised, anxiety and depression measured with the Hospital Anxiety and Depression Scale. Linear generalized estimating equations were used to assess trajectories of continuous outcomes over time, and to identify predictors – demographics and clinical characteristics at admission – for the most persistent symptom.

RESULTS: In the CO-FLOW study, 650 patients were enrolled with a mean age of 59.7 (SD 11.4) years and 449 (69%) were male. At 3 months, mean scores were for PTSD: 14.1 (13.9), anxiety: 5.3 (4.3), depression: 5.0 (4.1), and cognitive failures: 29.7 (19.2). Over the 2-year period, mean scores for PTSD (mean difference –3.40 (95% CI –4.33 to –2.47), p<.001), anxiety (–0.66 (–0.98 to –0.34), p<.001), and depression (–0.41 (–0.74 to –0.08), p=.004) improved over time, but not for cognitive failures (1.00 (–0.27 to 2.27), p=.16). At 2 years, 7% of patients reported symptoms of PTSD (cutoff≥33), 10% anxiety and 10% depression (cutoff≥11), and 23% reported cognitive failures (cutoff>43) which was the most persistent symptom. Moreover, outcomes were significantly intercorrelated (Pearson's r: .54-.71, p<.001) at 2 years. Females (7.54 (4.10 to 10.98), p<.001), younger patients (–0.22 (–0.39 to –0.05), p=.01), and patients with pre-existing pulmonary diseases (7.60 (4.32 to 10.88), p=<.001) reported higher cognitive failures score.

DISCUSSION AND CONCLUSION: While symptoms of PTSD, anxiety, and depression improved over time, recovery of cognitive failures lagged behind, with a substantial proportion of COVID-19 survivors continuing to report cognitive failures at 2 years. Females, younger patients, and patients with pre-existing pulmonary diseases were at higher risk for cognitive failures, underscoring the need for targeted support in these at-risk groups to optimize recovery. Furthermore, given the observed correlations among outcomes, addressing PTSD, anxiety, and depression may also play a role in the overall recovery process of mental health.

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What Are the Contraindications to Diving?

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BACKGROUND: Diving carries inherent risks, demanding stringent physical and mental fitness for safe participation. Divers undergo regular medical examinations to assess their suitability for this physically demanding activity. The National Center for Medical Expertise of Aircrew (NCMEA) plays a crucial role in Algéria diving safety by evaluating these examinations and determining a diver's fitness for continued activity. Understanding the most common reasons for diving unfitness identified in NCMEA can inform targeted interventions and improve diver safety protocols.

AIM: This study aims to:
Analyze data from diving fitness medical examinations conducted in Algeria.
This comprehensive analysis will provide valuable insights into the health of divers in the region .
Identify the leading causes of permanent diving unfitness declared in Algeria. Understanding the most common reasons for disqualification can inform targeted interventions and preventive measures to ensure divers' health and fitness for safe underwater exploration.
Compare the findings with existing international literature. By benchmarking against established data, the study can identify any unique trends or deviations in the pattern of unfitness reasons specific to the Algerian context.
Highlight the potential consequences of diving unfitness, such as decompression sickness and diving accidents, to emphasize the importance of rigorous medical evaluations and adherence to safety protocols. By raising awareness of these risks, the study can encourage responsible diving practices and contribute to preventing diving-related accidents.

METHOD: A retrospective study of the electronic records of diving fitness medical examinations conducted at the NCMEA for over 9 years. The electronic files of divers who passed through the NCMEA for admission, control, or revision visits were consulted, and all the files of divers declared definitively unfit for diving were studied to assess the reasons for unfitness.

RESULTS:
- Over the 9-year period studied, 12,013 diving fitness examinations were conducted for either control or revision purposes.
- The 97.17% (11673) of divers were deemed fit to continue diving. Only 2.83% (340) were declared unfit.
- Examining the reasons for unfitness by medical specialty, dental issues topped the list at 19% (64). Interestingly, both ophthalmology and the musculoskeletal system contributed equally at 15% (51) each. Notably, cardiovascular reasons for unfitness were relatively lower at 9% (30).

DISCUSSION AND CONCLUSION: Our results align with the literature in showing a high overall rate of diving fitness (97.17%).However, we observed a higher proportion of divers deemed unfit due to dental issues (19%) compared to the literature average. This higher rate could be partially attributed to micro- Dysbaric Osteonecrosis, a bone condition potentially exacerbated by diving activities. Further research is needed to explore the specific role of this condition and other dental factors in diving unfitness. Additionally, our findings suggest a need for more focused dental screening and preventive care strategies.

Conclusion: The interest of this study lies in the large size of the population studied and its strong homogeneity, given the very selective admission criteria for divers. This study confirms most of the known data in the literature, in particular a high rate of normal diving fitness examination.

Plantar Pressure Distribution and Injury Risk in Soccer Players – Preliminary Results

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BACKGROUND: Soccer is an asymmetric sport that presumes different lower limb loads during kicking, jumping and other sport-specific movements.

AIM: The aim of the study was to assess plantar pressures and possible differences between preferred and non-preferred foot in soccer players.

METHOD: Twenty-one soccer players (11 males and 10 females; aged between 18 and 32 years) were included in the study. The preferred limb for kicking was the right one. Plantar pressures were assessed using the P-walk platform (BTS Bioengineering) in static and dynamic conditions. In the static condition, average and maximum pressure, plantar surface, forefoot, middle foot and rear foot weight loading for each foot were assessed while subjects stood upright on the platform for 20 seconds. In the dynamic condition, subjects walked barefoot at a self-selected speed, with an average of 2 - 3 steps before stepping on the platform, for step normalization. Three normal steps on each foot were recorded. Average and maximum plantar pressure, plantar surface for each foot, as well as the load on the front, middle and rear part of each foot, normalized by body weight (%) were recorded. Players are observed over a season.

RESULTS: Significant asymmetries were recorded only in the static condition, for average pressure, weight loading on each foot, plantar surface, and for the load on the rear foot, with significant greater values on the left limb. Same differences were observed both in male and female players.

DISCUSSION AND CONCLUSION: Plantar pressure measurements revealed greater values in the static condition for the non-preferred leg in soccer players, probably as an adaptation to soccer specific demands. Studies are needed to further investigate the impact of these adaptations on injury risk.

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Evolution of Prefrontal Activity During Dual-Task Walking in Subacute Stroke

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BACKGROUND: Stroke is associated with walking impairments such as reduced gait speed (1). This gait speed is further impacted when walking is coupled with a secondary task (dual-task, DT). DT situations require more executive resources, reflected by increased prefrontal cortex (PFC) activation in DT compared to ST in chronic stroke patients (2). Yet, increased PFC activity in DT has not been observed in subacute stroke (3) and no study assessed the evolution of PFC activation during subacute phase.

AIM: This study assesses the evolution of PFC activation and gait speed during ST and DT in subacute stroke patients.

METHOD: Twenty-five (11F) subacute stroke patients (74±6 years, 41±16days post-stroke) in rehabilitation with ability to walk without human assistance performed 2 sessions at 15 days apart, consisting of a single walk task (ST), a cognitive task (n-back task) and a dual task (walk + n-back). Cerebral oxygenation of left and right PFC was measured using a functional near-infrared spectroscopy system (fNIRS, Portalite, Artinis Medical Systems). Gait speed (cm/s) was measured using a GAITRite walkway (GAITRite, CIR Systems, Inc).

RESULTS: Results did not show significant difference in PFC activation between ST and DT for both sessions or between both sessions. Patients exhibited reduced gait speed in DT compared to ST in both sessions. In addition, patients significantly increased their gait speed in ST (53 to 67 cm/s) and DT (47 to 58 cm/s) in the first session compared to the first session.

DISCUSSION AND CONCLUSION: These results suggest that despite motor recovery after 15 days reflected by an increase in gait speed in ST and DT, PFC activation did not differ between ST and DT. The absence of increased activation even with the addition of a secondary task might imply a ceiling effect on PFC activation, suggesting an important executive control of gait despite ongoing functional recovery.

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Strength Imbalances and Prevention of Hamstring Injury in Professional Soccer Players

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BACKGROUND: Preventing injury implies the identification and understanding of the factors leading to that injury. Such an approach could allow the development of the most appropriate strategy for reducing the risk. In spite of a great number of possible causes postulated in the literature, the relationship between muscle injury and strength disorders remains a matter of controversy.

AIM: Professional soccer players performed a preseason isokinetic testing aimed at determining whether strength variables could be predictors of subsequent hamstring strain and normalization of strength imbalances could reduce the incidence of hamstring injury.

METHOD: A standardized concentric and eccentric isokinetic assessment was used to identify soccer players with strength imbalances. The testing protocol included concentric exertions of both hamstring and quadriceps muscle groups at 60 deg/s (3 repetitions) and 240 deg/s (5 repetitions) angular speeds. Afterward, hamstrings were subjected to eccentric angular speeds of 30 deg/s (3 repetitions) and 120 deg/s (4 repetitions). After the preseason isokinetic testing, players were prospectively observed for hamstring injury for 9 months through the subsequent competitive and training season. Subjects were classified among 4 subsets according to the imbalance management content. Recording subsequent hamstring injuries allowed us to define injury frequencies and relative risks between groups.

RESULTS: Of 87 players isokinetically tested in preseason, a complete follow-up was obtained in 62 players, for whom 25 hamstring injuries were recorded. The rate of muscle injury was significantly increased in subjects with untreated strength imbalances in comparison with players showing no imbalance in preseason (relative risk = 4.66; 95% confidence interval: 2.01-10.8). The risk of injury remained significantly higher in players with strength imbalances who had subsequent compensating training but no final isokinetic control test than in players without imbalances (relative risk = 2.89; 95% confidence interval: 1.00-8.32). Conversely, normalizing the isokinetic parameters reduced the risk factor for injury to that observed in players without imbalances (relative risk = 1.43; 95% confidence interval: 0.44-4.71).

DISCUSSION AND CONCLUSION: The outcomes showed that isokinetic intervention gives rise to the preseason detection of strength imbalances, a factor that increases the risk of hamstring injury (1). Restoring a normal strength profile decreases the muscle injury incidence (2).

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Influence of Diving on the Quality of Life of People With Physical Impairments: Review of the Literature

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BACKGROUND: The World Health Organization defines the quality of life as individuals' perception of their position in life in the context of the culture in which they live and in relation to their goals, expectations, standards and concerns (1). People with physical impairments often have limitations in every day living, related to place of residence, educational background, duration of disability, age or marital status, architectural barriers, presence of devices facilitating communication, financial resources, employment, quality of contacts and relations with family and other close people, possibility to develop one's interests and carry out physical activity (2).

AIM: The aim of study was to find studies about influence of diving on quality of life of people with phyical impairments.

METHOD: In databases PubMed, Medline, UpToDate, COCHRANE key words diving, physical impairments and quality of life were used.

RESULTS: Four articles were found. Henrykowska and colleagues used survey of the potential therapeutic benefits of scuba diving for the mental and physical health of 240 people with physical impairments and reported significant increases in self-esteem, self-confidence and improvement in the ability to engage in social interactions in the group of scuba divers with physical impairments compared to individuals with physical impairments not practicing diving (2).
In the other study of Henrykowska and colleagues the aim of the study was to assess quality of life related to mental and physical health among 240 divers and non-divers with physical impairments, using the SF-36 questionnaire (Short-Form Health Survey) and authors' survey (3). There found a significant difference ($p < 0.05$) in the self-assessment of the quality of life (physical functioning, social functioning, mental health, and vitality) between the examined diving and non-diving groups (3).
Carin-Levy and a colleague studied psychosocial benefits of scuba diving for individuals with acquired physical impairments and concluded, that diving is a challenging, enjoyable activity that enhances their quality of life through enriched social experiences and improved self-concept (4).
Santiago Perez and colleagues found out, that scuba diving has a positive social identity that provides people with physical impairments with meaning, purpose, and belonging (5).

DISCUSSION AND CONCLUSION: Diving seems to influence quality of life of people with physical impairments in many positive ways. Further studies would be advised, with more participants.

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Usability and Feasibility of Digitalized Self-Tests of Physical Function in Older Adults

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BACKGROUND: As user-centered health management using mobile health technology is rapidly trending, recent studies using mobile app-based self-tests of physical function for the elderly have shown promise for use at home (1, 2). Because aging occurs slowly over decades, functional-based assessment is important to maintain physical function or prevent such decline.

AIM: We newly developed a mobile app connected with inertial measurement units (IMUs) for testing comprehensive physical function in the elderly, which is called OASIS Fit. Any usability issues must be validated prior to delivery to end users. Ensuring the usability of the mobile app is a significant basis for behavior change based on goal-setting (3). Thus, this study aims to investigate the usability of the OASIS Fit to the elderly over 65 years of age and determine its reliability and validity.

METHOD: Thirty older adults (23 female, 70.9 ± 5.8 yrs) who can use the Android phone were enrolled. In lab settings, participants performed a standard physical function test by the assessor without the use of the app, and a self-test using the OASIS Fit independently without any instruction. The order of tests was randomly assigned. The Short of Physical Performance Battery, 30-s chair stand test (30CST), Timed up and go test (TUG), one-leg standing test (OLST), and 2-min step test (2MST) were measured. While participants used the OASIS Fit, the assessor asked them to try it by themselves and recorded their performance results, and errors with supervision for participants' safety. Usability, acceptance, and feasibility were evaluated by the System Usability Scale (SUS), the User Version of the Mobile App Rating Scale, and a self-developed questionnaire. Parallel form reliability was analyzed by comparing participant self-tested scores with assessor scores using a t-test. Correlation analysis was used to examine the validity of mobile-based self-tests.

RESULTS: Most participants were highly educated, female, healthy or with existing comorbidity diseases, and high fall efficacy. The mean SUS score was 69.0 points (SD 14.8). Almost all participants (97%) rated positively on the usefulness of OASIS Fit. Most reasons were that it would be useful to check physical health and perform exercise according to health condition. Moreover, 83% (24/29) of participants thought that it could be usable in their own homes. The TUG, OLST, and 2MST by using OASIS Fit were not significantly different between self-tested scores and assessor scores. In addition, there were moderate correlations in TUG and 2MST scores self-tested using OASIS Fit with those of standard tests (r = 0.445 and 0.567 respectively).

DISCUSSION AND CONCLUSION: Despite potential reliability and validity, precise corrections are needed considering slow reaction times in the elderly, errors in the IMU's stand-up counting, accurate assessment criteria by experts, etc. In conclusion, older adults positively perceived the importance and usefulness of self-physical function tests, and such assessments were expected to be potentially practicable in the home with such advantages.

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The Role of Virtual Reality in the Management of Football Injuries

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BACKGROUND: Injuries represent a serious concern for football players with a significant loss in terms of sport participation and long period of rehabilitation. Injuries are usually associated with high workloads and reduced recovery periods. According to the 2019/20 UEFA Élite Club Injury Report, the average incidence of injuries during training is 2.8 injuries per 1000 hours of training, with an average absence from training of 20 days. In this case, prevention plays a key role in reducing the modifiable risk factors.
In the last years, the technologic development has provided new tools in rehabilitation. In particular, virtual reality (VR) has shown interesting results in the treatment of neurologic and orthopaedic pathologies.

AIM: Aim of this review is to evaluate the role of VR in the management of injuries of football players.

METHOD: PubMed, Scopus and Web of Science were searched from inception to July 2023 to identify eligible articles concerning the use of VR in the rehabilitation and prevention of football injuries. We utilized the following search terms: ("injury" OR "rupture" OR "lesion") AND ("virtual" OR "virtual reality" OR "mixed reality" OR "extended reality") AND ("soccer" OR “football”).

RESULTS: Out of 131 articles identified, 8 were finally included. We analysed data of 417 (206 females, 211 males) football players of different age groups. The injury articles involved the treatment of musculoskeletal and ACL injuries through head mounted displays, markers and software created ad hoc to reproduce the football field.
Among the studies considered, four used VR to identify potential biomechanical deficits that predispose athletes to ACL injuries, bridging the gap between the demands of a real game and laboratory environments, improving the accuracy of research and injury prevention strategies during sport-specific movements.
Two studies employed VR as training tool, to improve neuromuscular control and plan a tailored injury prevention program suggesting the possible role of VR into athletes' training.
Furthermore, VR was utilized as a rehabilitation tool implementing standard rehabilitation with a highly immersive virtual environment. This approach demonstrated an increased motivation on the part of athletes, highlighting its potential in improving rehabilitation outcomes.
Moreover, VR has been utilized for mirror therapy, as a part of rehabilitation protocol for female football players recovering from ACL injuries. Compared to the control group undergoing conventional rehabilitation alone, the VT group showed a higher perception of alertness and a lower perception of pain, underlining the positive impact of MT on rehabilitation outcomes.

DISCUSSION AND CONCLUSION: In conclusion, VR has showed interesting result in both prevention and rehabilitation. In particular, VR can be utilized to analyse the technical gesture of the athletes to identify the biomechanical risk factors of ACL injury; moreover, compared to the conventional rehabilitation, VR can be considered a useful approach to improve the compliance to the rehabilitative plan.

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Assessment of Park Paths and Trails To Promote Physical Activity Among Wheelchair Users in Saudi Arabia

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BACKGROUND: Individuals with mobility disabilities are less likely to meet physical activity standards and are at a greater risk of developing non-communicable chronic diseases at earlier ages.1 Public parks are an essential resource for participation in physical activity. However, environmental factors may limit the participation of wheelchair users.2-4 Furethermore, Given that the current focus of urban planning in Saudi Arabia includes the development of open spaces to promote population well-being, the assessment of existing parks is timely, and can shed light on existing recreational resources and their potential gaps

AIM: The objective of this study was to evaluate the feasibility of using the Path Environment Audit Tool (PEAT) and to explore the wheelchair accessibility of five public parks in Saudi Arabia through descriptive analysis.

METHOD: A descriptive study design was implemented to evaluate wheelchair accessibility features of five public parks in Riyadh, Saudi Arabia, using the Path Environmental Audit Tool (PEAT),5 a tool developed to assess paths and trails for features that increase physical activity participation. An assessment of process, resource, and management were also conducted. Phone GPS-App Strava was used to track the segments and measure their distances.

RESULTS: Audits in multiple parks using PEAT were time-consuming despite being user-friendly. The descriptive analysis of paths and trails across the five parks showed some positive features, such as adequate bollard/gate clearance, but the path slope and condition of the path surfaces were more variable.

DISCUSSION AND CONCLUSION: This is the first study to examine wheelchair accessibility in public parks in Saudi Arabia. Preliminary audits of paths/trials in five public parks revealed the strengths and weaknesses of accessibility and features that promote physical activity participation for wheelchair users. Moreover, further attention should be paid to development of new parks and green spaces to ensure that they are accessible to persons with disabilities (PwD), as recent national survey data showed that more than half a million Saudi citizens reported the presence of disabilities.6 These findings can guide future use of PEAT in large-scale studies and inform environmental modifications.

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Phase Angle as a Marker of Muscle Weakness in Candidates for Kidney Transplantation Referred to Prehabilitation

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BACKGROUND: The ESPEN guidance for assessment of the muscle mass phenotypic criterion for the Global Leadership Initiative on Malnutrition (GLIM) diagnosis of malnutrition recommends prioritizing the use of quantitative methos such as bioelectrical impedance analysis (BIA) for muscle mass evaluation [1]. The guideline also highlights the potential role of the phase angle (PhA), a BIA-derived parameter, which is gaining attention as a marker of muscle mass and strength [1,2].

AIM: To determine the utility of the PhA as a marker of muscle weakness in candidates for kidney transplantation (KT) referred to prehabilitation.

METHOD: Cross-sectional study of diagnostic accuracy. Sensitivity, specificity, positive and negative likelihood ratios (LR+ and LR-, respectively), and the area under the receiver operator characteristics (ROC) curve for diagnostic effectiveness were calculated for the PhA (index test) measured by electrical bioimpedance as a marker of muscle weakness. Muscle strength was assessed by maximal voluntary isometric contraction (MVIC) of the hand flexor muscles (handgrip, HG) (reference test) and the dominant-side quadriceps. Muscle weakness was considered present when HG was <80% of the reference population and/or quadriceps MVIC was <40% of body weight. Statistical significance was set at ≤0.05.

RESULTS: Of the 63 included patients (62.9 years; 76.2% men), HG and quadriceps MVIC were decreased in 17 (27%) and 39 (61.9%) patients, respectively. The PhA threshold with the highest diagnostic accuracy was ≤4.95° (sensitivity 82.4%, specificity 60.9%, LR+ 2.20, LR- 0.51). The area under the ROC curve was 0.724 (95% CI 0.587-0.861, p= 0.007). In a multivariate logistic regression analysis, the unadjusted odds ratio (OR) for muscle weakness of the hand flexor muscles was 10.3 (95% CI 1.2 to 90.2, p=0.005), and the adjusted OR was 4.9 (95% CI 1.1 to 21.3, p=0.042) after adjusting for age, frailty, and hydration status. The same analysis was repeated using quadriceps MVIC as the reference test, yielding similar results for the diagnostic properties of the PhA.

DISCUSSION AND CONCLUSION: BIA is a simple, non-invasive, and low-cost technique that, like isometric dynamometry systems, can be readily available in Rehabilitation units. Furthermore, performing BIA is common in dialysis centres for the estimation of body fluids. The use of muscle weakness as the reference test, PA ≤4.95° showed acceptable validity in identifying patients with and without muscle weakness in this preliminary analysis. Pending further studies, it cannot be recommended as an independent diagnostic tool for muscle weakness, although it may hold significant value as a screening method.

PA values of ≤4.95° were highly sensitive for detecting muscle weakness in candidates for kidney transplantation, and could serve as a screening method for muscle weakness in this population.

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Acute Rehabilitation of a Critically Ill Patient in the Intensive Care Unit

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BACKGROUND: In the last two decades, progress in intensive care medicine has led to a decrease in the mortality of critically ill patients in the Intensive Care Unit (ICU). Today, there is a lot of evidence that survivors of critical illness have long-term physical, neurological and cognitive problems. Research has shown that these complications are the result from the disease itself, medical treatment, endocrine imbalance and inflammation, as well as from prolonged bed rest. According to medical reports half of surviving patients after ARDS have returned to usual work and life activities one year after the disease while the other half of the patients could not get back to their usual activities due to extreme muscle weakness, breathing difficulties, joint contractures. Current literature emphasizes the importance of introducing acute rehabilitation in the ICU which contributes to faster discharge from intensive care, faster discharge from the hospital, increased quality of life and financial savings of treatment.

AIM: The aim of our work is to present the concept of acute rehabilitation of a critically ill patient based on the recommendations of the European Association of Intensive Medicine for the initiation of rehabilitation of a critically ill patient through a case report.

METHOD: Acute rehabilitation in the ICU of patient R.J., 73 years old, suffering from urosepsis, was analyzed. The patient was hospitalized in November 2021. Mechanical ventilation was initially set due to respiratory insufficiency and medical antiseptic therapy was started. After 5 days, hemodynamic stability of the patient was achieved and we started rehabilitation. The patient was intubated and sedated at that time. Initially, we performed passive exercises for joint range of motion and skeletal muscle stretching. After discontinuing sedation we managed to achieve non-verbal contact with the patient and started performing actively supported strengthening exercises for the skeletal muscles, breathing exercises, chest palpation techniques, sitting on the edge of the bed, in armchairs next to the bed and walking. After extubation, we intensively implemented aerosol therapy and exercises to strengthen the inspiratory musculature with resistance and exercises with weights for the upper extremities. The complication that occurred is critical illness neuropathy (flaccid paralysis of both feet and phrenic nerve) and we intensively did strength exercises and electrostimulation of muscles.

RESULTS: After 4 months, the patient was discharged from the ICU to the ward where we continued with rehabilitation.

DISCUSSION AND CONCLUSION: Acute rehabilitation procedures started early in the ICU help to improve physical performance and survival of critically ill patients.

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Early Mobilization in Patient in Intensive Care Units-Our Experiences in Montenegro

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BACKGROUND:Immobilization, which is considered to be a typical critical care management strategy, is associated with patients presenting with intensive care unit (ICU) delirium, impaired exercise capacity, poor functional outcomes, and poor quality of life (QOL) (1,2).
The early mobilization of critically ill patients, although not a new strategy, is an ICU intervention that is beginning to receive significant attention by ICU multidisciplinary team members as its positive impact on patients' outcomes is now being reported (3-5).

AIM:To describe early mobilization practices in Intensive care unit Clinical Center of Montenegro.

METHOD: A cross-sectional study conducted in Clinical Center of Montenegro, Intensive care Clinic from January 2023 to August 2023. Data collected included adult patient demographic and clinical data, and mobilization activities done in ICU.

RESULTS: The study included a total of 68 patients. Mean age of the patients was 63.5±17.7 years. 13 patients were on invasive mechanical ventilation via an endotracheal tube, 8 patients were on invasive mechanical ventilation via tracheotomy, 7 patients were on non-invasive ventilation and the other patients were on spontaneous ventilation. Primary reasons for admission to ICU included traumatic injury (n =33; 48%) and postoperative care (n = 35; 52%). Mobilization activities included turning the patient in bed (n = 53; 77%) marching on the spot (n = 9; 4.4%) and walking (n = 10; 4.9%). Out-of-bed mobilization was done in 10 (14.7%) patients. The most common barriers to early mobilization included patient unresponsiveness (n = 39; 57.3%) and hemodynamic instability (n = 42, 42.7%). The type of ventilation was found to have a significant positive relationship with out-of-bed patient mobilization (P = 0.001).

DISCUSSION AND CONCLUSION: A small proportion of patients attained their highest level of mobilization in ICU. The type of ventilation influenced on early mobilization in ICU. Early mobilization may be initiated safely in the ICU setting, improve the functional capacity, and number of ventilator-free days. Further large-scale and well-designed research studies are needed to provide more robust evidence to support the effectiveness and safety of the early mobilization of critically ill patients in the ICU setting.

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Comparison of Motion Tracking Technology and Standard Goniometry and the Possibility of Application in Clinical Practice

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BACKGROUND: Assessment of the range of motion is an essential task in daily clinical practice to adequately assess therapeutic effects.

AIM: Our study aimed to assess the possibility of using the KEMTAI software system to measure shoulder joint movement amplitude, comparing it to the traditional goniometer with arms.

METHOD: We studied 40 participants who, under the supervision of three experienced physiotherapists, measured shoulder joint flexion movement in three attempts. Measurements were taken using both a goniometer with arms and the KEMTAI system, which utilizes the examiner's mobile phone camera through specialized software.

RESULTS: Our findings revealed that the initial session yielded the lowest mean value (M1 = 154.68), while the third session produced the highest mean value (M2 = 156.53). Additionally, the use of the KEMTAI software resulted in significantly greater variability in mean values for the entire examined population compared to using a goniometer with arms.

DISCUSSION AND CONCLUSION: The results demonstrate the KEMTAI software/system's reliability when comparing the average of three measurements. Furthermore, our findings highlight the high reliability exhibited by three human experts when using a goniometer with arms for assessment. Despite differences between the measurement results from these methods, our study suggests the practical applicability of the KEMTAI software/system in real-world scenarios.

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Lean Body Mass Versus Body Weight for Resting Metabolic Rate and Exercise Capacity in Heart Failure

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BACKGROUND: Resting metabolic rate (RMR) is critical in calculating energy expenditure for physical activities and determining exercise intensity in cardiac rehabilitation. Traditionally accepted RMR, 3.5 mL of oxygen per kilogram per minute (3.5mlO2·kg−1·min−1), has faced controversy due to its unreliable assumption and ignoring the effect of lean body mass(LBM)(1,2,3). Several studies have been conducted to estimate RMR, but LBM based equation is poorly studied, especially in heart failure(1,2 3 4).

AIM: This cross-sectional study compares residual error among RMR and exercise capacities calculated by standard(3.5mlO2·kg−1·min−1), weight-based (Harris-Benedict; HB), and LBM-based (Cunningham) equation in heart failure. We also investigate the clinical role of peak VO2 per lean body mass (peak VO2/lbm) compared with peak VO2 per body weight(peak VO2/kg).

METHOD:130 heart failure patients who had visited Yongin Severance Hospital underwent cardiopulmonary exercise stress test(CPET) and bioimpedance analysis. After calculating RMR by three equations, exercise capacities were measured as multiples of each RMR in terms of measured metabolic equivalents(METs). The blant-Altman plot was performed to assess differences in RMR equations and METs. After adjusting for age and sex, peak VO2 values with a high respiratory exchange ratio(>1.10) were calibrated by LBM(peak VO2/lbm) and body weight(peak VO2/kg) to explore correlations with body composition, laboratory, and echocardiographic findings.

RESULTS: Mean positive differences were observed between (1) the standard and HB equation, as well as between (2) the standard and Cunningham equation[[149.22 kcal/d (83.64 – 214.81) vs. 175.32 kcal/d (139.59 – 211.05); 5.61% vs. 8.75% differences]. The standard deviation between the standard and Cunningham equation was more minor (403.56 vs. 740.79), and a lower ratio of outliers was observed(5.38% vs. 7.69%). Measured METs using both the HB and Cunningham equations showed a negative bias compared to the standard equation[-0.94(-1.15 – -0.72) vs. -0.62(-0.76 – -0.47); 9.08% vs. 8.54% difference]. Female patients revealed a higher positive bias between the HB and Cunningham equations than males. Both peak VO2/lbm and peak VO2/kg significantly correlated with ejection fraction, brain natriuretic peptide, hemoglobin, and phase angle. Compared to peak VO2/kg, peak VO2/lbm exhibited a significant correlation with sarcopenia index and albumin.

DISCUSSION AND CONCLUSION: Standard RMR equation could underestimate the relative exercise intensity in heart failure patients, and the Cunningham equation could be considered a more reliable tool than HB equation. Peak VO2/lbm might be a potential method for predicting clinical prognosis of sarcopenic heart failure patients. Further research is required to establish a causal relationship between Peak VO2/lbm and clinical outcome.

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Validating the Arabic Version of PROMIS Depression Short Form among Cancer Patients using Rasch Analysis

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BACKGROUND: A projected global increase in cancer cases raises concerns regarding the need for enhanced cancer patient care. Patients with cancer often encounter various medical procedures and treatments, heightening the risk of depression. Depression scales enable healthcare providers to track changes in psychological distress, assess intervention effectiveness, and deliver essential support throughout the cancer journey (1).

AIM: To evaluate the psychometric properties of the Arabic version of the short-form PROMIS Depression in cancer.

METHOD: This cross-sectional study involved a convenience sample of cancer patients from Saudi Arabia. They completed the PROMIS Depression short form 8a, with items rated on a 5-point Likert scale, ranging from 1 ('not at all') to 5 ('very much'). Raw scores were subsequently transformed into T-scores, where higher values indicated greater emotional distress. The data underwent Rasch analysis using WINSTEPS® version 5.6.1 to assess category functioning, item fit, reliability indices, and item difficulty, as well as to evaluate unidimensionality and local item dependency.

RESULTS: Two hundred twenty-four cancer patients participated in the study with an average age of 48 years (±17 years), with women comprising 56.7% (n=127) of the sample. The PROMIS Depression short form 8a did not meet the Rasch model criteria for the functioning of its rating scale, showing disordered thresholds for categories 2 and 3. However, all the items exhibited a satisfactory fit within the Rasch model. The person separation index was 1.33, indicating moderate differentiation (Cronbach's α=0.93 for internal consistency). In contrast, item separation and reliability were 2.64 and 0.87, respectively. A floor effect was observed in 33% of cases (73 participants), suggesting the scale's sensitivity in distinguishing at least two levels of depression. Participant abilities spanned a range of 6.67 logits (with a mean of -1.01), while item difficulty ranged 0.76 logits, indicating poor item targeting. The unidimensionality of PROMIS Depression short form 8a was verified, with 58% of the variance explained by the measure and an unexplained variance of 1.6 eigenvalues (8.6%) in the first contrast. Local item dependency was not observed.

DISCUSSION AND CONCLUSION: The study underscores the suitability of the PROMIS Depression short form 8a scale for assessing depression among Arabic-speaking cancer patients. While most items aligned well with the Rasch model, there were issues with category functioning and item difficulty. Despite the challenges in item targeting, the scale exhibited high internal consistency and sensitivity, allowing discrimination between different levels of depression. The participants' abilities span a wide range, indicating varying degrees of depression. However, the item difficulty range is relatively narrow, suggesting that items may not effectively target individuals across the entire spectrum of depression severity.

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Quality of Life and Rehabilitation Program in Sarcopenic Obesity Patients

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BACKGROUND: Sarcopenic obesity (SO), a condition defined by a reduction in lean body mass and muscle strength with increased fat mass, has a significant im¬pact on health-related quality of life in older people. Although interest in SO among medical profes¬sionals is growing, must be mentioned the lack of standardised diagnostic criteria and limited rehabilitation consensus.

AIM: In our prospective study, we assessed the efficacy of the rehabilitation program (TENS, electrostimulation and exercise program) over the quality of life and level of leptin (one of the adipokines and biomarkers of physical inactivity, stimulate an excessive release of cytokines, which activate muscle fiber remodeling resulting in extensive muscle breakdown and anthropometric disturbance) in SO patients.

METHOD: 26 patients, aged between 67 - 79 years, were clinical (body mass index – BMI, total body fat – TBF, skeletal muscle – SM, assessed via bioelectrical impedance analysis, BF511 - OMRON), lab (screening, leptin) and functional (Timed Up and Go tests - TUG, handgrip force - HG, SarQoL quality of life tool) evaluated. The complex rehabilitation program, including kinetic exercises (aerobic and resistance exercises), was performed 5 days / week, 2 weeks inpatient and 2 weeks outpatient. All subjects were valuated at baseline (T1) and at 4 (T2) and 12 (T3) weeks.

RESULTS: Leptin level is correlated with anthropometric measures and performance tests (TUG, HG). The parameters had a trend of improvement, especially in T3 moment ($p < 0.05$) – BMI, HG, TUG. Correlations between baseline and follow-up SarQoL were weak, due to the reduced time. In multivariate analysis SarQol has correlated with performance measures (HG and TUG). After 12 weeks, improved functional status was maintained.

DISCUSSION AND CONCLUSION: Our results reflected two aspects: a combination of obesity and sarcope¬nia means more disability and major impact for well-being and quality of life in elderly people; rehabilitation measures require attention and must be integrated in the known triad for in¬creasing muscle strength and mass, and reducing adiposity: good nutrition, physical activity and pharmacologic options.

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Rasch Validation of the Arabic Version of Patient-Reported Outcome Measurement Information System (PROMIS) Cognitive Function-Abilities

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BACKGROUND: It is imperative for individuals to effectively carry out their instrumental activities of daily living to the best of their abilities. PROMIS Cognitive Function- Abilities item banks provide an opportunity for standardized measurement.1 Moreover, the cross-cultural validity of measures and the availability of reference values are prerequisites for standardized measurements prior to implementation in different languages and contexts.2, 3

AIM: The study aims to evaluate the psychometric properties of the Arabic version of PROMIS Cognitive Function -Abilities in general in healthy population

METHOD: Design: A cross-sectional (methodological study)
Population and Setting: A convenience sample of 351 healthy participants from Riyadh Saudi Arabia completed the cognitive Function -Abilities short form 8a . Items are rated on a Likert scale ranging from 1 (‘not at all’) to 5 (‘very much’). Raw scores were transformed into T-scores, with higher T-scores representing better cognitive function.
Statistical Analysis: The collected Data were analysed using Rasch analysis to determine item fit, reliability indices, item difficulty, local item dependency, and differential item functioning (DIF) using WINSTEPS® version 5.6.1.

RESULTS: The mean age of the participants 37 ±15.4 years, women constituted 85% (298) of the sample. The PROMIS Cognitive Function- Abilities met the Rasch criteria for the functioning of rating scale. All items demonstrated an acceptable fit to the Rasch model, except one item which demonstrated slightly overfitting values (infit MnSq 1.34). The person separation indices were 2.85 (Cronbach’s α=0.92). whereas Item separation and reliability were 1.99 and .80 respectively. Meanwhile participants abilities spanned 11.84 logits (mean 0.47) and item difficulty spanned 0.53 logits which makes the targeting of items to participants poor. The unidimensionality of PROMIS Cognitive Function- Abilities was confirmed and no local dependency was noted between the items.

DISCUSSION AND CONCLUSION: The study highlights the suitability of the PROMIS Cognitive Function-Abilities scale for evaluating cognitive function abilities among participants. While most items conform well to the Rasch model, some minor overfitting was identified in one item. The scale demonstrates strong internal consistency and sensitivity, enabling discrimination between various levels of cognitive abilities. Despite challenges in item targeting, the scale's unidimensionality provide confidence in its ability to reliably measure cognitive function abilities in diverse populations.

Overall, the findings indicate that the psychometric evaluation of cognitive Function -Abilities is an effective measure of perceived cognitive abilities. Furthermore, this study provides clinicians dealing with Arabic speaking with a validated measure of cognition. Further studies are necessary to improve the metric quality of the measures in different contexts and conditions.

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Implementation of Patient Experience Measures as an Outcome Indicator and an Important Quality Dimension in Physical and Rehabilitation Medicine

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BACKGROUND: Patient experience measures enable continuous monitoring and assessment of the quality of care in rehabilitation and are an important outcome indicator. Patient experience data can be used to compare the efficiency of hospitals, monitor the effectiveness of interventions, rank hospitals and improve the quality of care provided. (1)

AIM: The goal of this paper is to present the most commonly used measures of patient experience in physical medicine and rehabilitation, the process of their implementation in everyday clinical practice, and the challenges we face along the way.

METHOD: In this paper, the authors used several sources and methods to search literature databases for data on the development and implementation of questionnaires for measuring patient experience in physical and rehabilitation medicine.

RESULTS: The results show that the implementation of patient experience measures is important in improving the quality, efficiency and more objective evaluation of rehabilitation outcomes. Patient Reported Experience Measures (PREMs) are the most commonly used instruments for measuring patient experience in physical and rehabilitation medicine. Although there is no universally accepted questionnaire for use in physical and rehabilitation medicine, analyzed studies conclude that the PEPAP-Q (Patient experience in postacute outpatient physical therapy settings questionnaire) is the most suitable instrument for measuring the experience of patients receiving outpatient physical therapy.(2) The implementation of measures of patient experience in daily clinical practice requires a scientific approach that includes pre-implementation, implementation and post-implementation actions that should be carried out for a successful process.(3)

DISCUSSION AND CONCLUSION: Patient experience measures and their implementation are still insufficiently recognized as an important tool for improving quality and outcomes in physical and rehabilitation medicine. Numerous international initiatives and experiences of countries that have implemented measures of patient experience in daily practice show that the world needs to optimize healthcare through measures of patient experience.
The implementation of measures of patient experience in daily clinical practice in the field of physical and rehabilitation medicine is a complex and demanding process, but literature data indicate that these measures enable adequate monitoring of rehabilitation outcomes, comparison of outcomes between institutions and the creation of a health policy aimed at continuous improvement quality of care while minimizing costs.(2) In order to raise the awareness of all participants in the process of providing rehabilitation care about the importance of the implementation of these measures as well as the patient's participation in the process itself, it is necessary to define instruments for measuring the patient's

experiences by consensus at the international level, as well as to ensure adequate training and support during their implementation.

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English Translation and Cultural Adaptation of Cog-First: Validation of a French Tablet-Based Tool Into the English Clinical Setting

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BACKGROUND: Acquired brain injuries often lead to persistent cognitive deficits, which can be challenging to detect and impact patient outcomes. Early and specific screening are crucial for proper management. Cog-First, a tablet-based promising tool, is performed independently and briefly evaluates executive functions, memory, and attention in approximately 20 minutes.

AIM: This study aimed to translate and culturally adapt Cog-First into English, enabling its use for English-speaking patients.

METHOD: Our translation process followed International Society for Pharmacoeconomics and Outcome Research guidelines. Two professional translators independently translated Cog-First into English and combined into a consensus version. Two translators back-translated the consensus version into French, which was compared to the original version. The resulting English version was assessed by ten healthcare practitioners experienced in cognitive testing to ensure its suitability. Ten English-speaking brain injured patients tested the version for relevance and comprehensibility.

RESULTS: Practitioners highly rated the relevance and applicability of sub-tests. Strong agreement (90%) was observed for sub-test assessing memory, attention and inhibition. 90% of practitioners expressed a clear need for Cog-First and indicated they would "very likely" use it in cognitive screening. All patients completed the study, with 90% reporting high satisfaction with Cog-First. Instructions received a positive rating of 96.3% for relevance and comprehensibility.

DISCUSSION AND CONCLUSION: Our study supports the quality of the English version of Cog-First, and enables its integration into clinical and research practice. Cog-First is a promising tool for detecting and screening cognitive deficits in individuals with acquired brain injury. While further research is required to explore its performance comprehensively, Cog-First may have the potential to enhance patient treatment outcomes.

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Quality of Life in Patients With Abdominal Aortic Aneurysm Treated With Endovascular Procedures

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BACKGROUND: Aneurysm of the abdominal aorta (AAA) is a localized, permanent extension that widens its diameter by at least 50%. The decision on the method of treatment and the setting of indications for reconstruction depends on the size of aneurysm, the presence of associated diseases and the anatomical and morphological characteristics of AAA, and femoral arterial.

AIM: Aim of the study was to investigate the dynamic of health-related lifestyle a changes (HRQoL) over a period of 12 mounths after an endovascular (EVAR) or open surgycal approach to AAA surgery.

METHOD: On the Clinical for Vascular and Endovascular Surgery Clinical Centre of Serbia, from January 1, 2007 to January 1, 2015, 100 patients with open surgery and 99 patients with endovascular stent graft (EVAR) were operated. The HRQoL(SF-36) questionnaire was applied in patients before, after 1 month and 12 months after AAA intervention. In addition, the cause of death was recorded in both groups for 72 months. The size of all differences in HRQoL results in the observed period was calculated as the effect size (ES). The quality of life was also examined by the EQ-5D questionnaire at the same time intervals, before surgery, after 1 month and after 12 months in the both groups of subjects.

RESULTS: from this study point out that the group that AAA resolved with endovascular stent graft has undergone significant improvement in most SF-36 domains (especially in mental health domains), as well as in both composite results, a month after intervention, but this effect was not sustainable after 12 months. In contrast, a subset of AAA patients resolved to a conventional classical approach, showing a predominantly stable quality of life one month after intervention, with a significant tendency for major improvements in all SF-36 domains after 12 months.

DISCUSSION AND CONCLUSION: The obtained results suggest that the HRQoL assessment following various AAA surgical approaches can be considered as one of the most valuable indicator of the effectiveness of operative treatment in the first year, as well as for the evaluation of the long-term intervention-related outcomes.

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Intergrated Assesment Score (IAS) as a Predictor of Quality of Life (QoL) and Relative 2-Year Survival Rate of Hemodialysis Patients Included in an Exercise Program

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BACKGROUND: In the clinical assessment of hemodialysis (HD) patients, there was a need to develop an instrument that would include the physical and psychological components of the subjective assessment by the patient, as well as the objective assessment by the doctor, and serve as a predictor of quality of life and 2-year survival in patients undergoing HD treatment.

AIM: To determine correlation between the Integrated Assessment Score (IAS) and other instruments: the Kidney Disease Quality of Life Short Form (KDQOL-SF™ 1.3), Patient Health Questionnaire-9 (PHQ-9) and Charlson Comorbidity Index (CCI) and whether IAS can serve as a predictor of relative 2-year survival in patients on HD treatment.

METHOD: A randomized clinical, prospective longitudinal study was included 120 HD patients at the Clinic for Hemodialysis and the Clinic for Physical Medicine and Rehabilitation, Clinical Center of the University of Sarajevo, in a two-year follow-up period. The patients were randomized into two groups: the experimental group (n=60) were patients who had a 30-minute kinesiotherapy program with a physiotherapist during the first two hours of dialysis and the control group (n=60) were patients without intervention. Patients were followed for the next 24-months and study included five visits, at baseline, after 6th, 12th, 18th month and at the end of the study. All study visits included administration of following questionnaires: IAS, KDQOL-SF™ 1.3, PHQ-9 and CCI as well as measurement of limb circumference, manual muscle testing (MMT), administration of Barthel index and determination of albumin level in serum (g/L). P-value <0.05 was considered as significant

RESULTS: The adjusted Cox regression model (taking into account sex, duration of HD treatment as covariables) represented that HD patients in the first quartile for the IAS had a significantly higher risk of death [adjusted HR 1.52 (95% CI=1.19;2.13)] compared to HD patients in the other quartiles. There was a positive linear correlation between the IAS and the KDQOL-SF™ 1.3 questionnaire and negative linear correlation between the IAS and the PHQ-9 questionnaire in observed time points. The value of the first quartile of the IAS was a better predictor of death compared to the CCI [adjusted HR 1.18 (95% CI=1.09;1.23)]. HD patients with comorbidity level 3 (five or more comorbidities) had a statistically significantly shorter survival time in the observed 24-month follow-up period (p=0.015).

DISCUSSION AND CONCLUSION: Our results represented that the IAS instrument can be used as a reliable predictor of the relative 2-year survival in HD patients. Nephrologists and other doctors should proactively discuss and promote physical activity in order to modify the risk of chronic diseases. HD centers should certainly include physical assessment in the development of a clinical pathway for HD patients, develop and implement a kinesiotherapy program, both in dialysis centers and at the patient's home.

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Hospital- Versus Home-Based Cardiopulmonary Rehabilitation for Post-Acute COVID-19 Symptoms

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BACKGROUND: The need for cardiopulmonary rehabilitation for post-acute COVID-19 symptoms such as dyspnea and fatigue is known. However, rehabilitation units do not have the capacity to handle all post-acute COVID-19 patients and this would also be a huge economic burden.

AIM: The aim of this study was to compare the effect of a hospital and home-based cardiopulmonary rehabilitation (CPR) program on exercise endurance and quality of life in post-acute COVID-19 patients.

METHOD: This study was conducted with the retrospective records of 88 post-acute COVID-19 patients who received hospital (n=45) or home-based CPR (n=43). Both programmes included aerobic, breathing and flexibility exercises. Hospital-based CPR: three or four days per week for a total of 20 sessions. Home-based CPR: three or four days/a week over a period of six weeks. The results of six minutes walk test (6MWT) for exercise endurance as a main outcome measure, and Borg-dyspnea/fatigue, the visual analog scale (VAS) for pain and the Short Form-36 (SF-36) as secondary outcome measures before and after treatment were recorded. T-test, Mann Whitney-U and Wilcoxon-Signed Ranks-Test were used for statistical analysis.

RESULTS: The baseline characteristics of the outcome measures were similar between groups. Borg-dyspnea (p=0.004), fatigue (p=0.001), VAS-pain (p=0.034), SF-36: physical function (p=0.023), physical role (p=0.049), emotional role (p=0.038), bodily pain (p=0.021) energy (p=0.001) showed more improvement in hospital-based CPR than home-based CPR. However improvements in the 6MWT were similar (p=0.266).

DISCUSSION AND CONCLUSION: Both programs were found to have a positive effect on exercise endurance, pain, dyspnea and quality of life in post-acute COVID-19 patients who had persistent symptoms for more than four weeks. Short-term CPR in hospital improved pain, dyspnea, fatigue and quality of life more than the six-week home-based CPR; however, comparison of groups showed that both treatment programs had similar effects on exercise endurance. The current study found that CPR after acute COVID-19 is effective in improving dyspnea, pain, exercise capacity and quality of life, independent of whether it is carried out in hospital or in the home. The pandemic reinforced the global importance of CPR. However, given that both home- and hospital-based CPR had similar effects on exercise endurance, we believe that home-based CPR programs could be an alternative to hospital-based programs during the ongoing COVID-19 pandemic.

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Upper Airway Obstruction Caused by Secretion in a Patient With Tracheostomy Tube: A Case Report

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BACKGROUND: Tracheostomy tube is placed in spinal cord injury patient to maintain airway and to manage pulmonary complications. However tracheostomy tube itself causes many complications and inconvenience to patient, so early decannulation is recommended if possible. Indications for removal of the tube includes resolution of upper airway obstruction. Deballooning of the cuff is tried first, and then usually nasopharyngolaryngoscopy or bronchoscopy is checked. Then at least 24 hours of capping without breathing problem should be confirmed prior to decannulation.

AIM: This report presents the importance of upper airway evaluation before decannulation of tracheostomy tube and helpfulness of neck computed tomography.

METHOD: A 61-year-old man who had cervical spine injury on 4th cervical level had a cuffed, fenestrated tracheostomy tube for breathing and prevention of aspiration pneumonia. As we had a plan for decannulation, laryngoscopy was checked. There was no obstruction between oropharynx and vocal cord, and the patient's cord mobility was favorable for speaking and able to cough with reflex. After upper airway evaluation, trachea suction and cuff deballooning was done and we tried tracheostomy tube capping. Although the patient had no contraindication in his general condition and laryngoscopy evaluation, he was not able to breathe. As a reason of desaturation, we suspected the mechanical obstruction specifically between the tube and vocal cord where laryngoscopy could not reach. Neck computed tomography(CT) was taken to evaluate airway above tracheostomy, and CT found out the fluid collection of secretion stuck in the upper airway above the tube. To remove the fluid obstruction, we deballooned the tube cuff and waited until whole secretion fluid comes down through trachea. Suction was done continuously and fluid collection was removed.

RESULTS: After that, being capped again, the patient could not only ventilate without desaturation but also speak with vocal cord. The voice was maintained about 1 minute at first, and he gradually extended the capping time and the patient can now endure an hour a day of tube capping.

DISCUSSION AND CONCLUSION: In planning tracheostomy tube decannulation, nasopharyngolaryngoscopy is recommended but it has limited field of vision between the vocal cord and the tracheostomy tube. In this case we presents the importance of upper airway evaluation before tube capping and helpfulness of neck CT in specific situation.

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Evaluation of Vocational Rehabilitation in Slovenia

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BACKGROUND: Slovenia's return-to-work strategy for unemployed persons with disabilities is based on vocational rehabilitation services.

AIM: The purpose of the annual national evaluation is to systematically collect information on the VR professionals' teamwork, clients' outcomes, satisfaction, and quality of life to improve the implementation of VR services.

MATERIALS: Five questionnaires for evaluation, which include the development of VR teams, cooperation with employers, outcomes from VR, level of users' satisfaction and quality of life, are based on the Likert scales and open questions.

METHODS: All questionnaires for clients contain demographic questions. Descriptive statistics were calculated in MS Excel 2021. Completion was voluntary and anonymous; it took place from January to December 2023.

RESULTS: In 2022, VR professional teams in Slovenia consisted of 155 professional workers, of whom 113 were regularly employed. Analysis shows a multidisciplinary structure – the main profiles were medical doctors, occupational therapists, psychologists and social workers. All VR providers have an Equass Assurance certificate. Their development through education and professional work is constant, and they are trying to gain more knowledge of specific VR themes.
2.027 clients were included in VR services in 2022. Waiting lists vary from team to team, ranging from 1 month to 1 year. Outcomes: 140 clients employed in the open labour market, 26 in enterprises for persons with disabilities and 118 in employment centres. Others were still in the VR process, searching for jobs or assessed as not-employable (460). 312 persons temporarily concluded their VR.
The main issues in working with employers were too high expectations, not enough workplaces, lack of trained mentors, low wages and not enough possibilities for training.
The satisfaction evaluation, conducted annually from 2010 to 2022 at the level of VR service users, showed high satisfaction rates throughout the years.
Service users assessed that the VR process has positively impacted on their quality of life.

DISCUSSION AND CONCLUSIONS: The research showed professional development in teams, which met the quality requirements for all VR providers. Users of VR were very satisfied with VR, as evidenced by the positive impact of the VR process on their quality of life.

KEYWORDS: Vocational rehabilitation, users/clients, persons with disabilities, satisfaction, quality of life

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