

# JRM JOURNAL OF REHABILITATION MEDICINE

The International  
Non-profit Journal

VOL. 54.

JUNE 2022

## 7<sup>th</sup> Baltic and North Sea Conference on Physical and Rehabilitation Medicine Vascular Rehabilitation – the Journey from Causes to Results Tartu, Estonia, June 9–11, 2022

### ABSTRACT BOOK

**Immediate  
Open Access**

#### **Official journal of the**

- UEMS European Board and Section of  
Physical and Rehabilitation Medicine  
(EBPRM)
- European Academy of Rehabilitation  
Medicine (EARM)
- Baltic and North Sea Forum for Physical  
and Rehabilitation Medicine (BNFPRM)

#### **Published in association with the**

- European Society of Physical and  
Rehabilitation Medicine (ESPRM)
- Canadian Association of Physical Medicine  
and Rehabilitation (CAPM&R)
- Asia Oceania Society of Physical and  
Rehabilitation Medicine (AOSPRM)
- Baltic and North Sea Forum for Physical  
and Rehabilitation Medicine (BNFPRM)

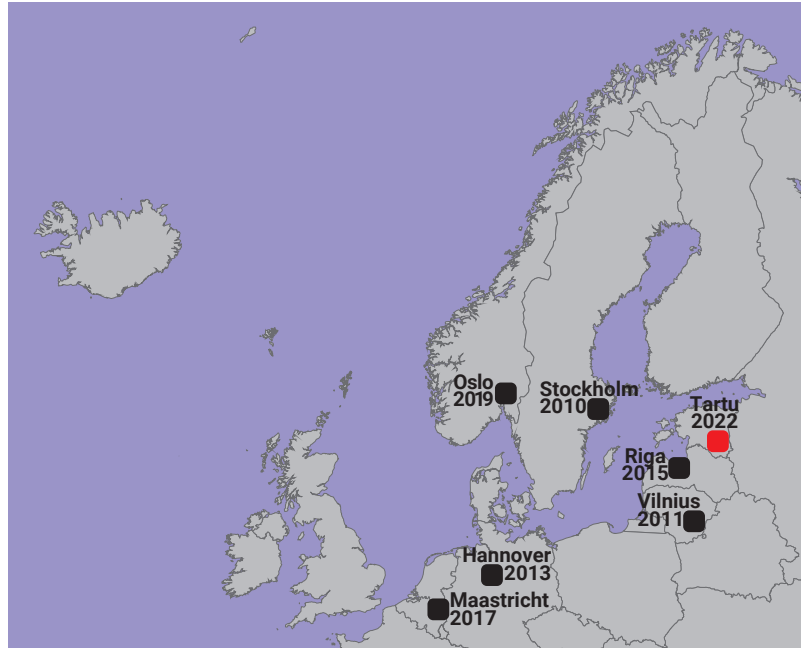


# 7<sup>th</sup> Baltic and North Sea Conference on Physical and Rehabilitation Medicine

## Vascular Rehabilitation – the Journey from Causes to Results

*Tartu, Estonia*  
*June 9–11, 2022*

### Abstract book



Baltic & North Sea Conferences on PRM



## 7<sup>th</sup> Baltic and North Sea Conference on Physical and Rehabilitation Medicine



# Programme

## Thursday, June 9th, 2022

### Estonian National Museum / HURDA HALL

- 
- 13.00-15.00 BNF Board Meeting
- 
- 15.00-16.00 Registration, exhibition and welcome coffee
- 
- 16.00-16.15 **Opening Ceremony**  
Welcome greetings from Alvydas Juosevičius, Kristian Borg, Aet Lukmann
- 
- 16.15-17.30 **OPENING SESSION – QUO VADIS PRM?**  
Moderator: Kristian Borg
- 
- 16.15-16.30 **The Baltic and North Sea Forum on PRM – ideas and achievements**  
Christoph Gutenbrunner, Germany (ONLINE)
- 
- 16.30-16.45 **Innovation and future in PRM**  
Kristian Borg, Sweden
- 
- 16.45-17.00 **Rehabilitation across the borders – aim and purpose**  
Alvydas Juosevičius, Lithuania
- 
- 17.00-17.30 **PANEL DISCUSSION**  
Christoph Gutenbrunner (ONLINE), Kristian Borg, Alvydas Juosevičius, Henk Stam, Mauro Zampolini
- 
- 17.30-18.30 **WELCOME LECTURES**
- 
- 17.30-18.00 **Management of vascular diseases in Tartu University**  
Ken Kalling, Estonia
- 
- 18.00-18.30 **Bygone times - insight of a vascular surgeon into Estonian picturesque past**  
Tiit Meren, Estonia

**18.30 WELCOME RECEPTION AT ESTONIAN NATIONAL MUSEUM**

## Friday, June 10th, 2022

### Estonian National Museum / HURDA HALL/MANNINEN AUDITORIUM

9.00-10.00 Registration, exhibition and welcome coffee

---

10.00-12.00 **PLENARY SESSION I**  
Moderators: Aet Lukmann and Henk Stam

---

10.00-11.00 **Olle Höök lecture: Cardiovascular complications of COVID-19**  
Rory O'Connor, United Kingdom

---

11.00-11.30 **Vascular dysfunction: a multifacet target**  
Jaak Kals, Estonia

---

11.30-12.00 **Recent findings in cardiovascular rehabilitation of obese patients**  
Henk Stam, The Netherlands

---

12.00-13.00 **LUNCH**

---

13.00-15.00 **PLENARY SESSION II**  
Moderators: Kristian Borg and Margus Viigimaa

---

13.00- 13.30 **Acute ischaemic stroke and carotid surgery – does rehabilitation matter?**  
Tiit Meren, Estonia

---

13.30-14.00 **When is anti-coagulation safe after acute cerebral ischemia/hemorrhage?**  
Tiit Illimar Mathiesen, Denmark

---

14.00-14.30 **Erectile dysfunction in cardiovascular disorders**  
Margus Viigimaa, Estonia

---

14.30-15.00 **Anticoagulation therapy in secondary prevention of ischemic stroke – Answered and unanswered questions**  
Janika Kõrv, Estonia

---

15.00-15.30 **E-POSTER SESSION IN HURDA HALL**  
Moderators: Kaja Elstein and Anda Nulle

---

15.30-16.00 **POSTER SESSION IN THE VENUE AND COFFEE BREAK**  
Moderators: Kaja Elstein and Anda Nulle

---

16.00-17.30 **PARALLEL SESSIONS****HURDA HALL****Cardiac Rehabilitation.  
Rehabilitation after Amputations.**Moderators: Annelii Jürgenson and  
Alvydas Juocevičius16.00-  
16.20 **Telemetric cardiac rehabilitation in  
patients after acute coronary syndrome**  
Mattias Tralla, Estonia16.20-  
16.40 **Clinical pathway for rehabilitation of  
individuals with lower limb amputation  
in Latvia**  
Dina Grinberga, Latvia16.40-  
17.00 **Lymphoedema-from symptoms to  
systematic management**  
Annika Albert-Aksjonov, Estonia17.00-  
17.15 **Effectiveness of a multidisciplinary  
approach in the rehabilitation of  
patients with cardiovascular diseases**  
Roksolana Nesterak, Ukraine (ONLINE)17.15-  
17.30 **Physiotherapy for women with first  
degree hypertension**  
Valentyna Liashenko, Ukraine (ONLINE)17.30-  
17.45 **The autonomy and participation of  
persons after unilateral lower limb  
amputation three months after  
inpatient rehabilitation: analysis of  
several cases**  
Nikita Horosevs, Latvia17.45-  
18.00 **Heart rate variability biofeedback in  
Long COVID (HEARTLOC) – original  
Research**  
Joanna Corrado, UK (ONLINE)**MANNINEN AUDITORIUM****Sequelae of Covid 19  
Varia**

Moderator: Eduard Tsvetkov

16.00-  
16.40 **Pulmonary rehabilitation  
after COVID 19**  
Jan Szczegieliak, Katarzyna  
Bogazc and Jacek Luniewski,  
Poland (ONLINE)16.40-  
17.00 **Voice and Swallowing  
Disorders after COVID-19**  
Lagle Lehes and Merje  
Viigand, Estonia17.00-  
17.20 **Evaluation of post-COVID  
exertional dyspnoea**  
Aleksandra Butchelovskaya,  
Estonia17.20-  
17.35 **Rehabilitation of patients  
with Guillan-Barre Syndrome  
due to Covid-19 at East-  
Tallinn Central Hospital**  
Anneli Teder-Braschinsky,  
Estonia17.35-  
17.50 **Gradually increased exhaling  
pressure with concomitant  
back and leg pain in  
suspect spinal stenosis –  
evidence for central venous  
sufficiency?**  
Pekka Rantanen, Finland**20.00 CONFERENCE DINNER IN THE BARGE HALL**

## Saturday, June 11th, 2022

### Estonian National Museum / HURDA HALL

9.00-9.30 Registration, exhibition and welcome coffee

9.30-12.30 **PLENARY SESSION III**  
Moderators: Tiina Rekand and Anda Nulle

9.30-10.00 **Cardiovascular problems after spinal cord injury and rehabilitation**  
Tiina Rekand, Norway

10.00-10.30 **Cardiometabolic diseases following the spinal cord injury**  
Marija Glicec, Switzerland (ONLINE)

10.30-11.00 **Psychiatric side of vascular diseases**  
Pavel Ptjushkin, Switzerland

11.00-11.30 **COFFEE BREAK**

11.30-12.00 **Cardiovascular complications of traumatic brain injury**  
Tiina Ader, Norway

12.00-12.30 **Physical activity and cardiovascular medicine – new insights**  
Maj-Lis Hellenius, Sweden (ONLINE)

12.30-13.30 **LUNCH**

13.30-15.00 **PLENARY SESSION IV**  
Moderators: Guna Berzina and Katrin Gross-Paju

13.30-13.50 **Stroke management in Estonia**  
Katrin Gross-Paju, Estonia

13.50-14.20 **Organization of stroke rehabilitation**  
Guna Berzina, Latvia

14.20-14.40 **Psychological perspective on the cardiocerebral syndrome: the aspects of emotion, cognition and personality**  
Aija Kala, Estonia

14.40-15.00 **Blurring boundaries of rehabilitation: Does the involvement of municipality's social workers secure holistic and person-centred post-stroke management?**  
Katrin Gross-Paju, Estonia

15.00-15.20 **COFFEE BREAK**

**PLENARY SESSION V****15.20-17.00 Rehabilitation across the borders – a systematic approach**

Moderators: Varje Riin Tuulik and Kristian Borg

**15.20-15.50 How to describe and compare rehabilitation in health system**

Christoph Gutenbrunner, Germany (ONLINE)

**15.50-16.20 The role of scientific evidence in developing rehabilitation programme at international level**

Antti Malmivaara, Finland

**16.20-16.40 How to describe and compare rehabilitation services**

Boya Nugraha, Germany (ONLINE)

**16.40-17.00 Quality management in rehabilitation**

Anda Nulle, Latvia

**17.00-17.20 Knowledge transfer and peer support in the Baltic region**

Volodymir Golyk, Ukraine (ONLINE)

**17.20-17.30 CLOSING CEREMONY**



ORAL PRESENTATIONS

OP 01

**THE BALTIC AND NORTH SEA FORUM ON PHYSICAL AND REHABILITATION MEDICINE – IDEAS AND ACHIEVEMENTS**

**Christoph Gutenbrunner**

*Hannover Medical School, Hannover, Germany*

Before 1990, health systems including rehabilitation services developed very differently in countries of Warsaw Pact and Western Europe leading to profound differences in rehabilitation care. Both the Western and the Soviet Union approach underwent rapid and fundamental developments towards a modern multi-professional and patient-centered rehabilitation model. These differences were obvious also in the Baltic and North Sea region formerly divided by the so-called Iron Curtain. However, historically this region shared a lot of common culture. In this situation, the idea of a regional Forum on Physical and Rehabilitation Medicine (PRM) in Northern Europe was born and the Baltic and North sea Forum on PRM (BNF-PRM) was founded in Riga in 2007, and its first Congress was held in Stockholm in 2010. The BNF-PRM committed on some fundamental principles being

- Human rights of people with disabilities and working with them as partners as a basic principles;
- Rehabilitation as comprehensive process to improve functioning;
- Science as a basic principle of creating knowledge;
- Democratic principles to make decisions;
- Open exchange of information;
- Cooperation with other professionals in spirit of team work;
- Awareness for different traditions and tolerance towards different opinions.

For the conferences that taken place in Stockholm, Riga, Hannover, Maastricht, Oslo and Tartu, some principles have been defined; one of them is to organize sessions entitled “Rehabilitation across borders”. In these sessions, principles of rehabilitation care provision such as “teamwork in rehabilitation”, “transition of PRM ‘from restorative treatment to comprehensive rehabilitation programs’ and ‘country cases’” were discussed by comparing the situation in different countries and to develop common principles for development. Besides the conferences, strong networks have been build up, including neighboring countries not directly connected to the Baltic or North Sea, and the awareness of the region in the PRM community was growing.

In a historical situation where Russia started an aggressive war and invaded Ukraine new challenges for the BNF-PRM occur. At Government level sanctions for Russia (including scientific collaboration) is a measure to react to the disruption of International Laws. Another important fact is that persons with disabilities and people with old age are significantly vulnerable and war “produces” an immense need for rehabilitation, both in civil populations and in fighters. This includes both physical injury and mental trauma. Together with the damage on health structures, this will cause an immense need to support the (re-) establishment of rehabilitation services. We also need to find answers for the problem of scientific communication at individual level in a country of which the government disrupts a number of human rights. As there will be no simple answers, a profound discussion within the BNF-PRM is required.

OP 02

**FUTURE AND INNOVATION IN PRM**

**Kristian Borg**

*Division of Rehabilitation Medicine, department of Clinical Sciences, Karolinska Institutet Danderyd University Hospital, Stockholm, Sweden*

Physical and rehabilitation medicine (PRM) is a young medical speciality and the development of the speciality has varied in the different European countries. In the north of Europe 16 countries have borders to the Baltic Sea and/or to the North Sea. Between those countries there is a cultural diversity and the rehabilitation

services differ strongly. As a mirror to the Mediterranean Society of PRM the Baltic and North Sea Forum on PRM was founded in 2009 and the first conference of BNF-PRM was held in Stockholm 2010. The main goals of the forum was; to communicate and to exchange knowledge, to look at concepts for PRM activities and debating best practice, to create networks for scientific projects, to support each other in education and training and to facilitate exchange of young clinicians and scientists, to influence politicians incorporation rehabilitation issues into national health strategies, to build up regional networks for rehabilitation of persons with rare diseases and to give opportunity for personal contact.

We are approaching the 7th BNF-PRM conference and we have achieved some of the goals. PRM of Northern Europe has a place in European PRM and we have a close personal contact between the different countries.

The seven conferences have been an excellent way of communication and exchanging knowledge and we now have a deeper understanding of the differences between PRM in the different countries much due to the item “Rehabilitation across borders” presented at the conferences.

However, at this point it is important to move on and take new steps and to challenge the goals that have been more difficult to reach i.e. to create networks for scientific projects, to support joint education and training and to facilitate exchange of young doctors and scientists between different countries within the BNF-PRM region.

OP 03

**REHABILITATION ACROSS THE BORDERS - AIM AND PURPOSE**

**Alvydas Juocevicius prof., PhD, (Habil.P.), MD**

*Health Science Faculty, Klaipeda University, Klaipeda, Lithuania*

There is need to analyze ( WHO plan) PRM services organization in countries, which started development of modern rehabilitation systems.

The aim of the study was to evaluate changes in PRM systems ( PRM training programs, resources, net of PRM institutions, scientific activities) in Eastern Europe.

For countries of this region the experience of Baltic states can be used, because last decades there was done real improvement in this field. Quality of care (accreditation of PRM programs), certification of PRM trainees and young specialists in PRM, certification of the PRM training centers by UEMS PRM Section and Board indicates such positive trend. At the BNCPRM in Tartu the results of cooperation between institutions of Eastern Europe countries and countries of Baltic region will be presented. It is important to reminder that initial support to start comprehensive rehabilitation in Estonia, Latvia, Lithuania was given by PRM departments of the Denmark, Sweden, Finland, Norway, USA, Switzerland and now is time to share experience with other countries.

In conclusion. We need to restore our previous cooperation and have plan of the professional, educational and scientific exchange between Baltic Nordic Sea countries using BNF PRM frame.

OP 04

**MANAGEMENT OF VASCULAR DISEASES AT THE UNIVERSITY OF TARTU**

**Ken Kalling**

*University of Tartu, Tartu, Estonia*

The history of vascular medicine in Tartu can be traced back to the beginning of the 19th century, when the university was reopened and the internal clinic established. One of the pioneers in the field was the later activist of Estonian national movement, Friedrich Robert Faehlmann, with his thesis „Observations on Concealed Inflammations“. This work, published in 1827 discussed heart conditions, and is considered to be the beginnings of Estonian cardiology. Stetoscope

arrived Tartu in 1820. It hastened the teaching of physical methods of diagnostics in vascular medicine. Yet, despite the emergence of a strong school of experimental science at the university, the therapeutic practice in its clinics remained under the influence of natural philosophy. It was only in 1860ies that the clinical practice became fully based on modern natural sciences.

In the final quarter of the 19th century patients with cardiovascular diagnoses constituted only 10 per cent of the total number of the hospitalized at the internal clinic. The number remained similar also in the first decades of the 20th century, when sphygmomanometer (systolic blood pressure mentioned for the first time in case histories in 1902, diastolic in 1912) and electrocardiograph (1914) were introduced into clinical practice. The year 1914 witnessed increase also in the x-ray diagnostics concerning heart conditions. The first arteriography (angiography) in Tartu was performed in 1936.

It were the post-war years when the treatment of cardiovascular diseases reached a new level. The ratio of patients with relevant diagnoses at the then First Internal Clinic rose from 24 per cent in 1950 to 44 per cent in 1975. In these years the management of cardiovascular diseases went through further specialization with different clinics involved in the process.

#### OP 06

### FACTORS INFLUENCING LENGTH OF STAY IN INPATIENT REHABILITATION PROGRAMMES

**Rory J O'Connor<sup>1</sup>, Robert O Isaac<sup>2</sup>, Joanna Corrado<sup>2</sup>**

<sup>1</sup>National Demonstration Centre in Rehabilitation and University of Leeds, Leeds, UK, <sup>2</sup>National Demonstration Centre in Rehabilitation, Leeds, UK

**Introduction:** Growing numbers of highly complex patients surviving life-changing injuries and illnesses is increasing demand for inpatient rehabilitation services. Rehabilitation capacity is often less than demand and extended length of stay (LOS) in rehabilitation can impact on acute and rehabilitation flow. We hypothesized that patients with delayed transfers to rehabilitation are likely to have longer overall length of stays.

**Methods:** Using commissioning data from the UK Rehabilitation Outcomes Collaborative (UKROC), we examined data for patients admitted between December 2013 and March 2020 to the complex rehabilitation unit in Leeds, which included an expansion in unit capacity from 22 to 30 beds in 2017. The data included diagnosis, acute and rehabilitation LOS and patients' outcomes measures on admission to rehabilitation and on discharge.

**Results:** Mean rehabilitation LOS in this group of 624 patients was 90.7 days, ranging from 94.3 days for patients with acquired brain injuries, such as stroke, to 75.4 days for patients with progressive conditions, such as multiple sclerosis. Increases in function and reduced care costs were shown year-on-year over the time period analysed, despite an increase in patients' complexity during this time. There was a positive correlation between longer acute LOS and rehabilitation LOS, specifically in the time between referral for rehabilitation and admission to the inpatient rehabilitation unit.

**Conclusions:** The long length of stay for this highly complex cohort of patients is unsurprising. The positive correlation between acute and rehabilitation LOS may be explained by delays in accessing specialist inpatient rehabilitation and the increasing complexity of patients being referred for rehabilitation. Further work is planned explore additional factors that affect LOS.

#### OP 07

### VASCULAR DYSFUNCTION: A MULTIFACET TARGET

**Jaak Kals<sup>1,2</sup>**

<sup>1</sup>Institute of Clinical Medicine, University of Tartu, Tartu, Estonia, <sup>2</sup>Tartu University Hospital, Tartu, Estonia

Vascular dysfunction contributes to development of cardiovascular disease (CVD). Arterial stiffness (AS) is considered to be one of

the earliest detectable measure of adverse functional changes in the vasculature, and is a widely used parameter for evaluation of vascular health. AS describes the rigidity of the arterial wall, i.e. the capability of an artery to expand and contract in response to pressure changes. AS is a key player in the pathogenesis of hypertension and atherosclerosis, and is an important determinant of target organ damage, as well as CVD risk factor. There is strong evidence that AS, measured as carotid-femoral pulse wave velocity (cf-PWV), independently predicts CVD and all-cause mortality.

To date, AS has primarily been assessed for research purposes. Although the independent prognostic value of cf-PWV is now overwhelming, it still remains to be proven whether its measurement truly facilitates clinical decision-making. Development of pharmacological agents that directly target AS would also help pave its way into clinical practice. Current therapeutic options that ameliorate AS include use of antihypertensives, statins, and antidiabetic agents along with non-pharmacological interventions such as weight loss, exercise, low salt diet, and smoking cessation.

It is well known that regular exercise is associated with a better profile of traditional CVD risk factors. A number of studies have also demonstrated the beneficial effect of exercise on AS. Aerobic exercise can modify classical CVD risk factors, thereby improving AS. Repeated exposure to hemodynamic stimuli during exercise can lead to anti-atherogenic adaptations in vascular function. Improvements in vascular function are mainly attributable to increased shear stress, which stimulates vasodilatation *via* release of nitric oxide, as well as *via* decrease in inflammation, oxidative stress and sympathetic activity. The current overview is a journey from the pathophysiology of arterial dysfunction to its role in prognosis and as a treatment target.

#### OP 08

### RECENT FINDINGS IN CARDIAC REHABILITATION OF OBESE PATIENTS

**H. J. Stam, I. den Uijl, N. ter Hoeve, M. Sunamura, E. Boersma, H. J. G. van den Berg**

Erasmus University Medical Centre, Rotterdam, The Netherlands

**Background:** Cardiac Rehabilitation is essential for secondary prevention.

Many cardiac patients suffer from overweight and obesity.

**Objective:** To evaluate the effectiveness of a new (Opticare XL CR) program designed for patients with obesity.

**Population:** Opticare XL n=102, Standard CR n=99.

Mean age 59 years. 66% CAD, 34% AF

**Opticare XL:** 12 weeks aerobic and resistance exercise, Information and lifestyle sessions, 9 months aftercare + boostersessions. Focus on long-term behavioral changes.

**Results:** Improved HRQoL, fatigue and participation in both groups. No added value of Opticare XL compared to standard CR with respect to physical fitness, body mass, physical activity/sedentary behavior.

#### OP 09

### ACUTE ISCHEMIC STROKE (AIS), TRANSIT ISCHEMIC ATTACK (TIA) AND IMMEDIATE OPEN CAROTID SURGERY – DOES REHABILITATION MATTER? VASCULAR SURGEONS VIEW

**Tiit Meren MD, PhD, FESVS**

Hospital of Reconstructive Surgery Ltd., Tallinn, Estonia

Stroke continues to be one of the leading causes of death. Stroke is responsible for major disability among survivors. In US, nearly half of AIS victims appear to have atherosclerotic plaque occurring in the bifurcation of common carotid artery. As international standard - Carotid endarterectomy (CEA) can be performed immediately in the acute phase of this symptomatic disease.

In Estonia, in everyday life, not all Stroke Units consider this immediate surgical approach reasonable. Still other neurologists, in and

out of Tallinn, send their patients to vascular surgeons of Hospital of Reconstructive Surgery (HRS) because this surgical team is 24/7 ready to perform surgical restoration of blood flow in carotid bifurcation to the ischemic hemisphere.

In 2016-2020 open CEA has been performed in HRS to 273 patients with TIA or AIS. Surgical reperfusion was achieved in 59% of patients during first hours to 1 week starting the acute incident with no hospital deaths. Because of different obstacles, only 10% of operated TIA or AIS patients were offered rehabilitation in a specialized centre. Rapid clinical decrease of neurological deficiency symptoms after surgery – this has not been proved, neither internationally nor by HRS - yet. Open CEA can safeguard the victim ischemically an uneventful future in the same hemispheric area.

If some neurologists could change their attitude and others, while referring their patients to surgery, could mark to which National Institutes of Health Stroke Scale (NIHSS) score their patient belongs - it could objectively quantify the impairment caused by stroke to the patient, enable vascular-surgeons to find subgroups of patients who benefit from surgery most, allow continue fighting with bureaucrats and get most of patients with neurological deficiencies to rehabilitation.

#### OP 11

### ERECTILE DYSFUNCTION IN CARDIOVASCULAR DISORDERS

*Margus Viigimaa*

*North Estonia Medical Centre, Tallinn University of Technology, Tallinn, Estonia*

Sexual health is an integral part of overall health, and active and healthy sex life is an essential aspect of good life quality. Cardiovascular disease and sexual health share common risk factors (arterial hypertension, diabetes mellitus, dyslipidemia, obesity, and smoking) and common mediating mechanisms (endothelial dysfunction, subclinical inflammation, and atherosclerosis). The introduction of phosphodiesterase type 5 inhibitors revolutionized the management of sexual dysfunction in men. This presentation will focus on erectile dysfunction and its association with arterial hypertension.

The update on the erectile dysfunction in cardiovascular disorders was created by the Working Group on Sexual Dysfunction and Arterial Hypertension of the European Society of Hypertension in 2020. This working group has been very active during the last years in promoting the familiarization of hypertension specialists and related physicians with erectile dysfunction, through numerous lectures in National and International meetings, a position paper, newsletters, incorporation of erectile dysfunction in ESH guidelines, and a book specifically addressing erectile dysfunction in hypertensive patients.

Erectile dysfunction precedes the development of coronary artery disease. The artery size hypothesis has been proposed as a potential explanation for this observation. This hypothesis seeks to explain the different manifestations of the same vascular condition, based on the size of the vessels. Clinical presentations of the atherosclerotic and/or endothelium disease in the penile arteries might precede the corresponding manifestations from larger arteries.

Treated hypertensive patients are more likely to have sexual dysfunction compared to untreated ones, suggesting a detrimental role of antihypertensive treatment on erectile function. The occurrence of erectile dysfunction seems to be related to undesirable effects of antihypertensive drugs on the penile tissue. Available information points toward divergent effects of antihypertensive drugs on erectile function, with diuretics and beta-blockers possessing the worst profile and angiotensin receptor blockers and nebivolol the best profile.

#### OP 12

### ANTICOAGULATION THERAPY IN SECONDARY PREVENTION OF ISCHEMIC STROKE – ANSWERED AND UNANSWERED QUESTIONS

*Janika Kõrv*

*Department of Neurology and Neurosurgery, University of Tartu, Tartu, Estonia*

Ischemic stroke is common with high risk of recurrence. Oral anti-coagulants (OAC) effectively reduce the risk for ischemic stroke in patients with atrial fibrillation (AF). There are guidelines on how to introduce OAC in clinical practice for secondary prevention after a cardioembolic stroke. Generally, non-vitamin K antagonist OACs are preferred over vitamin K antagonists because they have a lower risk of major hemorrhage and death. However, recent studies have shown that approximately a third of patients on anticoagulation will suffer from a recurrent ischemic stroke. There are several causes for failure of treatment effect, including poor treatment adherence and competing non-cardioembolic stroke etiology or cardioembolic mechanisms other than AF. The identification of the causes requires individualized approach. Also, there are uncertainties regarding treatment in specific patient subgroups of those of older age, with cognitive impairment, renal failure or small vessel disease because of lack of randomized controlled studies. Activated factor XI inhibition has been proposed as a new promising treatment option for patient with stroke of cardioembolic and non-cardioembolic etiology.

#### OP 13

### CARDIOVASCULAR PROBLEMS AFTER SPINAL CORD INJURY AND REHABILITATION

*Tiina Rekand, MD, professor*

*Department of Neurology, Haukeland University Hospital Bergen, Bergen, Norway*

Cardiovascular symptoms are common after spinal cord injury. These problems are caused by imbalance in the autonomous nervous system. The sympathetic part of the nervous system has lost necessary supraspinal control, in addition have changes below the spinal cord injury (SCI) occurred. The persons with SCI have low blood pressure and bradycardia both in the acute as well as in the chronic phase. Orthostatic hypotension and autonomic dysreflexia should have been monitored and managed as known cardiovascular complications. The cause of autonomic dysreflexia should be treated or managed immediately to avoid further life-threatening development. The persons with SCI are at risk to develop early cardiovascular disease because of numerous known risks. High lipids, insulin resistance, obesity and physical inactivity are all present after the SCI. The treatment should be directed to protect and prevent additional cardiovascular problems. The persons with SCI have increased coagulation three months after SCI and prophylactic treatment has to be started as soon as possible.

#### OP 16

### CARDIOVASCULAR COMPLICATIONS OF TRAUMATIC BRAIN

*Tiina Ader*

*Haukeland University Hospital, Bergen, Norway*

Traumatic brain injury (TBI) has been described to be man's most complex disease, in man's most complex organ. Since TBI is not a single event, but a life-long disorder with differential needs over time, it is recognized as one of the most challenging areas in modern rehabilitation medicine.

Cardiovascular complications after severe head injury are common (45 to 65%). The tight linkage between brain and heart is becoming increasingly recognized as the underlying mutual mechanisms are better identified, having a potential impact for clinical treatment. There is growing evidence that cardiovascular manifestations like arrhythmias, arterial hypertension, and conditions of myocardial stunning are the consequence of an autonomic imbalance within the autonomic nervous system, with the sympathetic activation outweighing the parasympathetic one.

Traumatic damage in specific cortical areas, which usually slow down the activity of the sympathetic branch, may produce a wide pattern of cardiac manifestations ultimately interfering with the prognosis of



patients. This presentation will focus on the consequences of increased sympathetic tone, mostly Paroxysmal Sympathetic Hyperactivity, and treatment of this, after moderate and severe TBI.

#### OP 17

### PHYSICAL ACTIVITY AND CARDIOVASCULAR MEDICINE – NEW INSIGHTS

*Mai-Lis Hellenius*

*Karolinska Institutet, Stockholm, Sweden*

The knowledge about the role of physical activity in cardiovascular prevention and rehabilitation has increased considerably during the last decades. We know from prospective studies as well as clinical trials that physical activity plays an important role in prevention. At the same time many new prospective studies also demonstrate a close association between sedentary behaviour and increased cardiovascular risk irrespective of total physical activity levels. The understanding of the many underlying mechanisms is consistently increasing.

Physical activity patterns and risk factor patterns in societies are constantly changing. New studies with more objective measurements (accelerometers) demonstrate that children, adults and the elderly now spend 9 to 10 hours per day sitting. Meta-analysis of prospective studies demonstrate dose-response associations between sedentary behaviours and increased risk of cardiometabolic diseases, as well as dementia and depression.

Several new randomised controlled trials about the effects of increased physical activity in individuals at increased cardiovascular risk have been published. Physical activity on prescription is one effective method being used for decades in the Scandinavian countries.

A systematic review and meta-analysis of exercise-based cardiac rehabilitation for coronary heart disease from the Cochrane institute, reveal that exercise-based cardiac rehabilitation reduce cardiovascular mortality, decrease the number of hospital admissions and improve quality of life. A total of 63 studies with 14,486 participants with a median follow up or 12 months were included in the meta-analyses. Physical activity is still underused and in the future we need to emphasise the implementation of knowledge into healthcare more. The implementation-process also need to be studied.

#### OP 20

### BLURRING BOUNDARIES OF REHABILITATION: DOES THE INVOLVEMENT OF MUNICIPALITY'S SOCIAL WORKERS SECURE HOLISTIC AND PERSON-CENTRED POST-STROKE MANAGEMENT?

*Kadi Lubi<sup>1</sup>, Maarja-Liis Elland<sup>1</sup>, Helin Pevkur<sup>2</sup>, Hedvig Soone<sup>2</sup>, Peeter Ross<sup>1</sup>, Katrin Gross-Paju<sup>3</sup>*

*<sup>1</sup>Department of Health Technologies, Tallinn University of Technology, Estonia, <sup>2</sup>Neurology Clinic, West Tallinn Central Hospital, Tallinn, Estonia, <sup>3</sup>Neurology Clinic, West Tallinn Central Hospital, Estonia and Department of Health Technologies, Tallinn University of Technology, Tallinn, Estonia*

Aging population poses challenges to healthcare systems globally. Albeit stroke is one of the leading causes of death worldwide, the mortality from stroke is declining and the demand for supportive care increases. One of the tools used in post-stroke management to identify people's personal needs and wishes is TaCAS (Taking Charge After Stroke). In 2020, the pilot project improving post-stroke patient journey was launched in Estonia. As part of the project, West Tallinn Central Hospital tested the involvement of local municipality social workers (stroke coordinators in this context) in securing holistic and person-centred approach through their participation in medical stroke teams during acute care and evaluation of participants wishes by using TaCAS tool.

The objective of this study was to examine the perceptions of different specialists regarding selected approach. Methodologically, a

qualitative approach of semi-structured in-depth interviews was used. In total, eleven interviews with healthcare and both hospital's and municipalities' social care professionals were conducted. For data analysis, thematic textual analysis based on the interview schedule was used. In addition to the categories of interview schedule (i.e., regular role of municipalities' social workers in terms of illnesses, project-related general, council- and TaCAS-related perceptions), the analysis revealed structural healthcare and social care systems' issues which may hinder holistic and person-centred post-stroke support. In general, the approach where municipality's social worker is involved already at the acute phase of post-stroke management was considered useful and valuable by different specialists. The main challenges identified were the lack of different resources (e.g., specific knowledge, human resource, time) and incompatibility between different electronic systems. To conclude, there is need to analyze and manage structural issues in parallel with specific involvement of stroke coordinators as in general, all parties of specialist evaluated the impact of piloted approach valuable for people and their families.

#### OP 21

### HOW TO DESCRIBE AND COMPARE REHABILITATION IN HEALTH SYSTEMS

*Christoph Gutenbrunner*

*Hannover Medical School, Hannover, Germany*

There is a strong consensus that rehabilitation is an essential part of Universal Health Coverage. However, the implementation of rehabilitation services and its integration in health systems vary from country to country, both qualitatively and quantitatively. With the aim of strengthening rehabilitation in health systems at country level, WHO developed a guide for action (WHO 2019). It is based on a four-step approach: (1) assess the situation; (2) develop a strategic plan; (3) establish monitoring, evaluation, and review process; (4) implement a strategic plan. This guide for action provides checklists for all these four phases, namely: the (1) Systematic Assessment of Rehabilitation Situation (STARS) tool, the (2) Guidance for Rehabilitation Strategic Planning (GRASP), the (3) Framework for Rehabilitation Monitoring and Evaluation (FRAME) and the (4) Action on Rehabilitation (ACTOR). On invitation of ministries of health, WHO provides technical assistance to perform rehabilitation situation analysis and implementation projects at a national level.

Even before the publication of these tools rehabilitation situation assessments were performed, e.g. in Ukraine and Albania (Gutenbrunner et al. 2018; Nugraha et al. 2020). These projects showed a number of similarities in the results, e.g.

- Lack of sound data on the rehabilitation needs and services;
- Lack of understanding of functioning and disability;
- Lack of a systematic planning to implement rehabilitation in acute, post-acute and long term care;
- Lack of (some rehabilitation professions such as physical and rehabilitation medicine, occupational therapy, prosthetics and orthotics and others.

Moreover, it is obvious that implementation is highly dependent on strong commitment and leadership of experts and stakeholders in the country itself. In Ukraine, a number of relevant changes occurred since the first analysis (Golyk et al. 2021), e.g.

- New disability and rehabilitation act;
- Steps toward ICF in health reporting and rehabilitation planning;
- Inclusion of Physical and Rehabilitation Medicine and Occupational Therapy in the list of health professions;
- Raising awareness at the political level towards implementation of rehabilitation services;

Another important factor is scientific evidence about the living situation of people with disabilities within the country and as benchmark with other countries. Such evidence has been obtained for people with Spinal Cord Injury within the International Spinal Cord Injury Community Survey (InSCI).

Of course, WHO-led analysis is the gold standard, but if the government does not initiate such a project, it makes sense to conduct a (less comprehensive) analysis based on scientific evidence conducted by academic institutions (Nugraha et al 2020).

References

World Health Organization (2019): Rehabilitation in Health Systems – A Guide for Action. WHO, Geneva 2019

Gutenbrunner C, Tederko P, Grabljevec K, Nugraha B: Responding to the World Health Organization Global Disability Action Plan in Ukraine: Developing a National Disability, Health and Rehabilitation Plan. *J Rehabil Med* 2018; 50: 338-341

Golyk V, Syvak O, Grabljevec K, Tederko P, Gutenbrunner C, Nugraha B: Five years after development of the national disability, health and rehabilitation plan for Ukraine: Achievements and challenges: *J Rehabil Med*. 2021; DOI: 10.2340/16501977-2792

Nugraha B, Tani K, Gutenbrunner C: Rehabilitation Service Assessment and Workforce Capacity Building in Albania – A Civil Society Approach. *Int J Environ Res Public Health* 2020; 17: PMID: 33036266

OP 22

**THE ROLE OF SCIENTIFIC EVIDENCE IN DEVELOPING REHABILITATION PROGRAMME AT INTERNATIONAL LEVEL**

**Antti Malmivaara, Professor, MD, PhD**

*National Institute for Health; University of Helsinki, Helsinki, Finland*

Studying effectiveness requires baseline comparability of groups receiving different treatments. Comparability is achieved either by randomizing patients or by observing similar patients treated by similar units. In most cases, a randomized controlled trial (RCT) is the best method for assessing the effectiveness of a single intervention; the suggested term here is ‘experimental effectiveness’.

When the aim is to assess the effectiveness solely of the biological component (drug molecule, surgery or electromagnetic/mechanical energy) of an intervention, a double blinded randomized controlled trial is the only feasible study design. When the question is the effectiveness of the biological component of an intervention in the clinical situation the only study option is an open RCT, where patients and treating personnel know which treatment each patient receives. When the intervention includes several components, as in rehabilitation, open RCTs and benchmarking controlled trials (BCTs) are both feasible. The BCT is a new method which covers all observational effectiveness studies (1). The term benchmarking relates to the core element of this study design: there must always be a benchmarking situation at baseline. The suggested term here is ‘real-world effectiveness’.

The BCT is usually the best method for assessing effectiveness of treatment chains and characteristics of health care systems (2). However, reasons related to ethics, study question and feasibility may render BCTs feasible and sometimes even the only option for assessing effectiveness of a single intervention.

The value of health and social services and rehabilitation is produced by professionals interacting with patients and customers (3). The task of decision-makers at organizational, district and national levels is to enable professionals to create value in patient/client work. The impact of domestic or international system level rehabilitation interventions, investments and programmes on effectiveness, safety and cost-effectiveness for patients can be best evaluated with benchmarking controlled trials (4)

References

1. Malmivaara A. Benchmarking Controlled Trial—a novel concept covering all observational effectiveness studies. *Ann Med* 2015;47:332-40.
2. Malmivaara A. Clinical Impact Research - how to choose experimental or observational intervention study? *Ann Med* 2016;:1-4.
3. Malmivaara A. Vision and strategy for healthcare: Competence is a necessity. *Journal of rehabilitation medicine* 2020;52:jrm00061.
4. Malmivaara A. System impact research - increasing public health and health care system performance. *Ann Med* 2016;:1-5.

OP 23

**HOW TO DESCRIBE AND COMPARE REHABILITATION SERVICES**

**Boya Nugraha, PhD**

*Hannover Medical School, Hannover, Germany*

Rehabilitation is one of health strategies that should be implemented in health system. It is not only because of it is stated in Universal Health Coverage (UHC), but also its importance and relevance. Rehabilitation needs have been reported to increase worldwide since last decades due to the increase of aging population, chronic health conditions, and injury. Furthermore, the COVID-19 pandemic has triggered the increase rehabilitation needs faster. Because this patient group shows the decrease of functioning from acute until long-term. Due to these issues, rehabilitation should be provided by quality rehabilitation services. The unavailability of standard tool to describe rehabilitation service have initiated the working group of International Classification of Service Organization in Rehabilitation (ICSO-R) of International Society of Physical and Rehabilitation Medicine (ISPRM) to propose ICSO-R. ICSO-R 2.0, the most recent version, is a checklist which consists of two dimensions: Provider and Service Delivery. Dimension Provider consists of 9 categories; dimension service delivery consists of 14 categories. Each dimension categories and subcategories consists of definition, inclusion, and exclusion. ICSO-R can be used to describe existing rehabilitation services, compare and analyse. Some examples from Community-based rehabilitation and also hospital contexts will be presented and discussed.

OP 24

**QUALITY MANAGEMENT IN REHABILITATION**

**Anda Nulle**

*National Rehabilitation center Vaivari, Jūrmala, Latvia*

Rehabilitation is an integral part of health care, necessary to achieve and maintain the best outcomes for other health interventions, such as surgery, trauma care, and non-communicable diseases, and to improve the quality of life of people with disabilities. Rehabilitation services are very diverse, according to the latest publication on the European Framework for Rehabilitation Services. The quality of rehabilitation services is essential in all types of services to achieve the goal of rehabilitation – to improve the quality of patients’ life.

Quality management includes structure, processes, and specific quality indicators for analysis. Self-assessment and External expertise are essential for quality management. UEMS PRM Section Clinical Affairs Committee PRM Programs accreditation process is an effective instrument for developing rehabilitation services and improving patient quality of care. It includes validation of the scientific background and structure of the Programme of Care, collection of epidemiological data, rehabilitation goals expressed in ICF categories, inclusion/exclusion criteria of patients, documentation of rehabilitation processes, staffing, duties in a multidisciplinary team, future development strategy. The rehabilitation application should describe the program structure, goals, and content. The accreditation process will review the organizational aspects, including the program’s human resources and technical equipment. The accreditation process is an excellent way to get advice and expertise from Europe PRM bodies during reviewing and accreditation processes. In 2004, the UEMS PRM Section set up a European scheme for Accreditation of PRM Care Programmes. During a pilot phase, 13 programs were accredited by a European jury. Later the accreditation procedure was upgraded, and there are 17 PRM programs accredited using the new system. UMS PRM Section Clinical Affairs Committee program accreditation system is recommended to improve rehabilitation programs.

## PARALLEL SESSION I

## PS1 01

**TELEMETRIC CARDIAC REHABILITATION IN PATIENTS AFTER ACUTE CORONARY SYNDROME***Mattias Tralla**Mist OÜ, Harjuma, Estonia*

The Rehabilitation Department of the University of Tartu Hospital is conducting a 12 month pilot (2022.03 - 2023-03) of designing and monitoring a care path for remote cardiac rehabilitation (CR) to improve care coordination, patient engagement and outcomes.

Cardiovascular (CV) diseases are the main cause of death in Estonia. There are 80,000 new cases, 8,000 deaths (50% of all deaths) every year, but only 10% of CV patients receive CR (in Dutch for example it's over 30%).

The pilot aims to reduce administrative burden and improve patient experience and outcomes by:

- Empowering patients through self-service materials/videos, questionnaires, independent training monitoring and automatic reminders, supporting the lifestyle change and staying on track with the recovery plan
  - Reducing the burden of administrative and repetitive tasks for health care professionals via automatic data gathering, rule based notifications and interactive dashboards
  - Increasing reach, efficiency and quality of service for hospitals by introducing coordinator role with data driven engagement rules to intervene when necessary
  - Improving the reach, transparency and outcome for both patients and payers via process/data driven and remotely managed carepath
- Merging the new processes of remote carepath with existing roles and workflows introduce specific change management challenges for process designers, health care professionals and hospitals management which, if not managed properly, increase the cost and duration of the design phase and entire project significantly.

As the data keeps coming in both from patients and healthcare professionals, our team keeps improving the design of the care path providing more self-care touchpoints and reducing the repetitive and non-value adding activities from the carepath to find the right set of processes, metrics and automation/human interaction balance suited for our patients, hospitals and payers.

## PS1 03

**LYMPHEDEMA FROM SYMPTOMS TO SYSTEMIC MANAGEMENT***Annika Albert-Aksjonov**Sports Medicine and Rehabilitation Clinic of Tartu University Hospital, Tartu, Estonia*

Lymphedema is a long-term (chronic) condition that causes swelling in the body's tissues. It most commonly affects the arms or legs, but can also occur in the chest wall, abdomen, neck and genitals. Lymphedema is caused by a problem with the lymphatic system draining excess fluid from tissues.

There are two main types of lymphedema:

- primary lymphedema – caused by faulty genes that affect the development of the lymphatic system; it can develop at any age, but usually starts during infancy, adolescence, or early adulthood
- secondary lymphedema – caused by damage in the lymphatic system; it can be the result of a cancer treatment, an infection, injury, inflammation of the limb, venous problems or a lack of limb movement

It's important that lymphedema is identified and treated as soon as possible and as complex as necessary. Advanced and untreated lymphedema can affect the patient's physical, functional, mental and financial condition. Overall the quality of life is impaired.

Complex Decongestive Therapy (CDT) is the gold standard for treating lymphedema and consists of a decongestion phase, followed by a maintenance phase.

A system of complex lymphedema management has been developed in Estonia since 2014.

During this period, more attention has been paid for the early detection of lymphedema, specialists for CDT have been trained, and state-funded treatment options have been developed.

## PS1 04

**EFFECTIVENESS OF A MULTIDISCIPLINARY APPROACH IN THE REHABILITATION OF PATIENTS WITH CARDIOVASCULAR DISEASES***Roksolana Nesterak, Ryslana Hryhoryshyn, Oleg Partsey, Ulyana Veretyk, Volodymura Sovtus**Ivano-Frankivsk National Medical University, Ivano-Frankivskis, Ukraine*

Cardiovascular disease is the most common cause of death worldwide. Rehabilitation of patients should take place as part of a multidisciplinary team.

*The aim of the study is:* to analyze the effectiveness of rehabilitation of cardiac patients being the part of a multidisciplinary team according to the author's method "Program of clinical-psychological rehabilitation cardiac patients by optimization of the internal picture of health".

*Materials and methods:* there were examined 450 patients with coronary heart disease. Classes were performed with the involvement of a cardiologist, clinical psychologist, nutritionist, and the doctor of physical and rehabilitation medicine led the team. Lessons included an introductory conversation, 5 interactive classes, individual psychological counseling, post-diagnostic stage. Classes are designed taking into account the components of the internal picture of health. The internal picture of health was assessed according to 5 components: emotional, sensitive, cognitive, value-motivational, behavioral. Diagnostic methods were: HADS; PHQ-9; SF-36; SAQ; Borg scale; 6-minute test walk.

*Results obtained:* Application of the developed rehabilitation program as part of a multidisciplinary team contributed to the increased tolerance to physical activity, improved subjective sensations of load tolerance, there was a decrease in anxiety, but there were more pronounced changes in the group using a multidisciplinary approach ( $p < 0.05$ ). Analyzing the quality of life indices, improvement was noted according to Physical Limitation Scale, Angina Stability, Angina Frequency. In all groups there were high values according to the scale of satisfaction with treatment.

*Conclusions:* Comprehensive rehabilitation of cardiac patients should be based on multimodal biopsychosocial, multidisciplinary and patient-oriented approaches. Effectiveness depends on optimal medical treatment, physical recovery, psychological support, training of patients correct risk factors and adapt to new living conditions.

## PS1 05

**PHYSIOTHERAPY FOR WOMEN WITH FIRST DEGREE HYPERTENSION***Valentyna Liashenko<sup>1</sup>, Tetiana Turytska<sup>2</sup>**<sup>1</sup>Scientific-consultative diagnostic medical center «Headache», Dnipro, Ukraine, <sup>2</sup>Oles Honchar Dnipro National University, Dnipro, Ukraine*

*Introduction.* Today, hypertension is a disease of civilization and is an important medical and social problem. Currently, in the prevention and treatment of hypertension, the priority is the drug methods of correction of high blood pressure. Nevertheless, a comprehensive approach to correcting the functional state of patients with hypertension gives not only qualitative but also long-term effect. This is especially true for women of both reproductive and menopausal ages.

*Research methods.* The experiment involved 24 women with hypertension of the first degree. According to the age and stage of the



disease, the main group (MG) and the comparison group (CG) of 12 people each were formed by random sampling. The average age of the subjects was  $50.27 \pm 0.79$  years in MG,  $51.23 \pm 0.69$  years in CG. A group of medical and biological methods was used: 6-minute walk test, tonometry, registration of electrocardiogram, electroencephalogram and heart rate variability.

**Main results and conclusions.** Examination of patients in the main group and the comparison group was performed twice - before and after the rehabilitation course. The main group was engaged in physical therapy according to the program developed by us, the comparison group - according to the standard scheme of therapeutic gymnastics. The women underwent appropriate physical rehabilitation programs for 1 hour three times a week for four months. The novelty of the program developed by us, in contrast to the previous ones, was the content - in our program there are static and strength exercises in the amount of 25% and dynamic exercises in the amount of 75%; in previous programs, only dynamic physical exercises were most often used (almost 100%).

The difference was also in walking of moderate intensity with a heart rate of up to 40% of the maximum heart rate and the use of psychotherapy and autogenic training; in previous programs, walking was of medium intensity and autogenic training was not used.

**Conclusions.** Our physical therapy program has caused adaptive changes, which are likely to increase tolerance to exercise, lower blood pressure, normalize sympathetic balance, reduce neuronal excitability, which led to an increase in energy reserve, which can be realized during adaptive responses.

**Key words:** physical therapy, hypertension, middle-aged women.

#### PS1 06

### THE AUTONOMY AND PARTICIPATION OF PERSONS AFTER UNILATERAL LOWER LIMB AMPUTATION THREE MONTHS AFTER INPATIENT REHABILITATION: ANALYSIS OF SEVERAL CASES

**Nikita Horosevs<sup>1</sup>, Daina Smite<sup>2</sup>**

<sup>1</sup>National Rehabilitation Centre "Vaivari", Jurmala, Latvia, <sup>2</sup>Riga Stradins University, Department of Rehabilitation, Riga, Latvia

**Introduction:** The autonomy and participation aspect in Latvian patients after unilateral lower limb amputation, who finished the prosthesis rehabilitation, has not been researched yet. Aim of this study was to explore autonomy and participation in unilateral lower limb amputation patients 3 months after discharge from inpatient prosthetic rehabilitation and to explore potential influencing factors.

**Methods:** Exploratory embedded multiple case study including 4 (2 males, 2 females) patients with unilateral lower limb amputation (3 transfemoral, 1 transtibial amputation) with mean age 66,75 was used. Data collection and compilation within each case was made, data analysis within each case, between case analysis and pattern search (as well as searching for modifiable factors), then conceptual model and hypothesis were made based on existing scientific evidence, theoretic knowledge, and findings of the present study.

**Results:** In current research the various aspects of the phenomenon "participation and autonomy of the lower limb amputation patient three month after inpatient rehabilitation" have been analysed. The hypothesis of patients' participation and autonomy after lower limb amputation have been made that was based on the pattern analysis and by modifying influenceable risk factors of participation and autonomy restriction.

**Conclusions:** The most affected autonomy and participation restrictions was associated with activity outside the house and family role, or

social life and relationship, although they weren't rated as important, contrary to work, recreational activities and activities in or around the house. Physical and social environmental barriers, emotional disorders, high risk of complications and reduced aerobic capacity were named as a main participation and autonomy restrictive factors in people with lower limb amputation.

**Key words:** lower limb amputation, autonomy, participation, prosthesis

#### PS1 07

### HEART RATE VARIABILITY BIOFEEDBACK IN LONG COVID (HEARTLOC) - ORIGINAL RESEARCH

**Joanna Corrado<sup>1</sup>, Stephen Halpin<sup>1</sup>, Rory O'Connor<sup>2</sup>, Alex Casson<sup>3</sup>**

<sup>1</sup>Academic Department of Rehabilitation Medicine, Leeds Institute of Rheumatic and Musculoskeletal Medicine University of Leeds, UK and COVID rehabilitation service, Leeds Community Healthcare Trust, Leeds UK and National Demonstration Centre of Rehabilitation Medicine, Leeds Teaching Hospitals NHS Trust, UK, <sup>2</sup>Academic Department of Rehabilitation Medicine, Leeds Institute of Rheumatic and Musculoskeletal Medicine University of Leeds, UK and National Demonstration Centre of Rehabilitation Medicine, Leeds Teaching Hospitals NHS Trust, UK, <sup>3</sup>Academic Department of Rehabilitation Medicine, Leeds Institute of Rheumatic and Musculoskeletal Medicine University of Leeds, UK and School of Electrical and Electronic Engineering, University of Manchester, UK

**Introduction:** Long COVID (LC) refers to symptoms persisting 12 weeks after SARS-COV-2 infection. It affects over 50 million people worldwide, causing varied symptoms including fatigue, breathlessness and palpitations. Many of these symptoms can be linked to autonomic nervous system dysregulation (dysautonomia). This proof-of-concept study tests feasibility, and estimates efficacy, of a heart rate variability biofeedback (HRV-B) intervention using a standardised diaphragmatic breathing technique in LC patients.

**Methods and Analysis:** 30 adult LC patients with symptoms of palpitations or dizziness and abnormal NASA Lean Test (NLT) will be recruited from a UK COVID-19 rehabilitation service. They undertake an active 4-week HRV-B intervention using a chest strap linked to a HRV phone application while undertaking the breathing technique for 10-min twice daily. Quantitative data including HRV are gathered during the study period using Fitbit, the modified COVID-19 Yorkshire Rehabilitation Scale (C19-YRSm), Composite Autonomic Symptom Score (COMPASS 31), World Health Organisation Disability Assessment Schedule (WHODAS 2.0) and EQ-5D-5L health related quality of life measure. Quantitative data will be analysed using standard statistical tests.

**Results:** This study is ongoing; we have preliminary data for 3 completed participants. They demonstrated mean improvement of 3.7 points (from 16.7 pre-intervention to 13 post-intervention) on C19-YRS symptom severity scale, 1.3 (from 5.3 to 4.0) on C19-YRS functional scale, and 0.6 (from 4.7 to 5.3) on C19-YRS overall health score. Average autonomic score improved by 9.6 (from 47.0 to 37.4). Mean WHODAS score improvement was 4.3 (from 28.5 to 24.2). There was improvement in HRV score and reduction in resting heart rate. Further data will be presented at conference.

**Conclusion:** These preliminary data demonstrate that HRV-B can improve LC symptoms, autonomic symptoms, reduce disability and improve HRV.

**Ethics and Dissemination:** Sponsor - University of Leeds. Ethical approval - Health Research Authority (HRA) Leicester South Research Ethics Committee (21/EM/0271).

## PARALLEL SESSION II

PS2 01

**POST-COVID-19 PHYSIOTHERAPY MODELS BY  
J. SZCZEGIELNIAK****Jan Szczegielniak<sup>1,2</sup>, Katarzyna Bogacz<sup>1,2</sup>, Jacek Łuniewski<sup>1</sup>**<sup>1</sup>Opole University of Technology, Faculty of Physical Education and Physiotherapy, Opole, Poland, <sup>2</sup>Specialist Hospital of the Ministry of the Interior and Administration in Glucholazy, Glucholazy, Poland

This presentation is an attempt to show necessity of physical rehabilitation for individuals after COVID-19 disease and underline a purpose of complex therapeutic program. ERS and ATS recommendations clearly indicate the necessity of rehabilitation for everyone hospitalized due to COVID -19 and possibility to participate in complex though individualized physical rehabilitation program when hospitalization reaches it's purpose. These recommendations include necessity to conduct Respiratory Function Tests, Effort (Exercise) Tolerance Test and Psychological Evaluation.

Rehabilitation program goal is to remove or reduce to maximum the effects of the disease and help to regain full physical and mental fitness. The necessity of dedicated rehabilitation programs was ignited by still growing number of victims with prolonged presence of persistent symptoms. The project of complex rehabilitation program for patients suffering post-Covid-19 complications was created in Ministry of Internal Affairs Specialized Hospital in Glucholazy, Poland.

The program suits individual needs and capabilities of the patient including accompanying symptoms occurrence and intensification. Program objectives include evaluation of the effects of the applied rehabilitation model identification of additional symptoms and rehabilitation needs. The program is based on: strict qualification to proper model (level) of the program, complexity of the physical therapy program depending of all diagnosed symptoms, evaluation of the results on the end of rehabilitation.

Qualification for physiotherapy includes: evaluation of exercise tolerance, based on results of 6MWT (6 minutes walk test), evaluation of related to 6MWT dyspnoea and tiredness, evaluation of oxygen blood saturation, evaluation of physical fitness, evaluation of ratio TLC in bodyplethysmography, evaluation of patient's mental condition. Physiotherapy models include physical efficiency training on a cycle ergometer or treadmill and, breathing exercises (relaxation exercises, extended expiration exercises, diaphragm exercises, exercises increasing lower rib cage respiratory movement), general fitness exercises, walking training, resistance training and circuit training, techniques for removing secretions from the bronchial tree (drainage positions, effective cough, active bronchial vibration, chest percussion), inhalations relaxation and individual treatments include to the needs and condition of the patient for example respiratory biofeedback, relaxation in virtual reality conditions, interactive exercises - cognitive and motor tasks, cognitive function therapy supporting the process of short and long time memory, logical thinking, understanding and improving communication skills, high intensity electromagnetic field, stimulates the diaphragm, intercostal nerves and respiratory muscles, bio-electro-magnetic energy regulation for microcirculation improvement, vibrotherapy which normalize muscle tension, improves static and dynamic balance, improves motor coordination, stimulates proprioception.

PS2 02

**VOICE AND SWALLOWING DISORDERS AFTER  
COVID-19****Lagle Lehes, Merje Viigand**

Tartu University Hospital, Tartu, Estonia

**Objective:** Voice and swallowing disorders are common in patients after COVID-19. Early research indicates that 44.8% of COVID-19 patients post-ICU show some degree of oropharyngeal dysphagia (OD), and up to 25% of patients exhibit voice complaints.

**Methods:** We conducted a retrospective qualitative cohort study to describe the underlying mechanisms and severity of the post-COVID OD and voice disorders.

Seven patients referred to SLPs in inpatient rehabilitation clinic were included (two female and five male, aged 50-77 years). All of them had been intubated and three of them had also been tracheostomed. All subjects were evaluated by multidisciplinary team. Daily individualized swallowing and/or voice therapy sessions were delivered. Patients underwent pre- and post-therapy videolaryngostroboscopy and/or fiberoptic evaluation of swallowing. In addition, acoustic voice analysis using PRAAT-program, maximum phonation time and perceptual voice evaluation were conducted.

**Results:** Three patients experienced OD, one patient had dysphonia and three patients suffered from both. Causes of dysphagia were mainly neurological (e.g. CIP), in one case mechanical (intubation granulomas) and combination of neurological and mechanical cause was also evident. Severity of dysphagia ranged from severe to mild pre-therapy. Post-therapy, one patient had mild dysphagia, five patients completely recovered. Dysphonia was caused by mechanical (intubation granulomas) or neurological factors (vocal fold paresis), and in one case combination of both (contact ulcer and vocal fold paresis). Two patients were aphonic, one had severe and one had mild dysphonia. Post-therapy, one patient initially with mild dysphonia recovered, three patients were discharged with severe dysphonia.

**Conclusion:** COVID-19 patients who are treated in ICU experience voice and swallowing problems with different etiologies. Clinical manifestations of longer intubation were not always more severe. It requires multidisciplinary team to identify the underlying mechanisms of OD and voice disorders. Intensive voice and swallowing therapy showed positive dynamics in laryngeal functions.

PS2 03

**EVALUATION OF EXERCISE INTOLERANCE  
AND EXERCISE PRESCRIPTION AFTER  
COVID-19****Eduard Tsvetkov, Karl-Erik Laid, Aleksandra  
Butšelovskaja**

Medicum, Tartu, Estonia

**Introduction:** The COVID-19 pandemic has had a significant impact on the quality of life and well-being of the population. One of the primary issues people have experienced is shortness of breath, exercise intolerance and fatigue syndrome.

**Method:** A retrospective analysis of approximately 1,500 Post-Covid visits was conducted with the main inclusion criteria being exertional dyspnoea and fatigue following the infection. Of those, 268 (132 men, 136 women, age: 61.1±10.9 years) were chosen for the statistical analysis. These patients had undergone initial evaluation with cardiopulmonary exercise testing (CPET), followed by the intervention programme consisting of 40 training sessions and a follow-up CPET. The analysis also focused on differences between the following subgroups: gender (male vs female), age (under 60 vs over) and pulmonary function (restrictive vs normal).

**Results:** The follow-up CPET showed improvement in peak oxygen uptake (VO<sub>2</sub>peak: +1.8 ml.min<sup>-1</sup>.kg<sup>-1</sup>; p<0.001), ventilatory efficiency (VE/VCO<sub>2</sub>; -1.1; p=0.043), heart rate reserve (HRR: +4.8; p=0.001), peak power achieved (+15.1W; p<0.001), and forced vital capacity (FVC: +0.16L; p=0.005) within all cases. Among predetermined subgroups, the most notable changes occurred in cases with restrictive pulmonary function, where improvements were seen in FVC (+0.42L; p=0.001), forced expiratory volume in first second (FEV<sub>1</sub>: +0.26L; p=0.012), VE/VCO<sub>2</sub> (-0.9; p=0.044) and VO<sub>2</sub>peak (+1.6 ml.min<sup>-1</sup>.kg<sup>-1</sup>; p=0.038).

**Conclusion:** Post-COVID exercise programme seems to be an efficient method to improve exercise capacity and ventilatory function. CPET evaluation provides a detailed insight into patients' cardiopulmonary function and allows a good overview of true exercise limiters.



PS2 04

### REHABILITATION OF PATIENTS WITH GUILLIANI-BARRE SYNDROME DUE TO COVID-19 AT EAST-TALLINN CENTRAL HOSPITAL

Anneli Teder-Braschinsky<sup>1</sup>, Piret Arula<sup>2</sup>

<sup>1</sup>Inpatient Rehabilitation Centre, Clinic of Medical Rehabilitation, East Tallinn Central Hospital, Tallinn, Estonia, <sup>2</sup>Centre of Neurology, Clinic of Internal Medicine, East Tallinn Central Hospital, Tallinn, Estonia

SARS-CoV-2) began in April 2020 and resulted in the implementation of emergency measures and a reorganization of Hospital work. The neurological manifestations are beginning to take on unquestionable importance, mainly in the critical patient, also the rehabilitation of the patients due to deterioration of moving ability. Guillain-Barré syndrome (GBS) is an inflammatory polyneuropathy associated with numerous viral infections and the rehabilitation outcomes are not so clear. Guillain-Barré syndrome following COVID-19 characterised by rapidly progressive limb weakness, often with sensory and cranial nerve deficits, and can result in significant morbidity and mortality. This autoimmune condition is still less described.

We analyzed the data of 4 patients (3 men and 1 woman) during the period 25.04-25.06.2021, who were treated at the Inpatient Rehabilitation Centre of East-Tallinn Central Hospital. The mean length of hospital stay before have been admitted to rehabilitation program was 23 days. One patient had also acute respiratory distress syndrome. Mean age of the patients was 51 years. All the patients left home were able to walk independently with the help on 2 canes through the distance at least of 25m.

**Keywords:** Guillain-Barre syndrome; SARS-CoV-2 virus; coronavirus, COVID-19; neurological diseases.

PS2 05

### GRADUALLY INCREASED EXHALING PRESSURE WITH CONCOMITANT BACK AND LEG PAIN IN SUSPECT SPINAL STENOSIS – EVIDENCE FOR CENTRAL VENOUS INSUFFICIENCY?

Pekka Rantanen, MD., PhD., eMBA<sup>1</sup>, Ruut Karjalainen, MD<sup>2</sup> Ari Palomäki, MD, PhD<sup>3</sup>

<sup>1</sup>Department of Physiatry and Rehabilitation, Kanta-Häme Central Hospital, Hämeenlinna, Adjunct Professor of Physiatry, Faculty of Medicine, University of Helsinki, Helsinki, Finland, <sup>2</sup>Kanta-Häme Central Hospital, Hämeenlinna, Finland, <sup>3</sup>Faculty of Medicine and Health Technology, Tampere University, and Clinical Director, Emergency Department and Division of Medicine, Kanta-Häme Central Hospital, Hämeenlinna, Finland

**Introduction:** Mouth and thoracic cavity pressures are in connection during exhalation as has been shown while playing wind instruments. If exhaling pressure increases, the body cavity pressure probably finally exceeds central venous pressure (8-12 mmHg). If the spinal venous flow is already somehow distorted, the increased pressure may further impair the flow, just as in lumbar spinal stenosis: the symptoms - claudication and lower limb weakness - are thought to result from venous congestion of the spinal nerve roots.

**Subjects and methods:** The study group comprised 13 (eight female) volunteer low back pain patients with referred pain into lower legs (mean age 73.5 years). Most of them had difficulties in walking longer distances due to lower limb symptoms although they had normal joint function and arterial circulation.

In the breathing experiment, the participant exhaled through a pipe (diameter 2cm). The inhalation was free. The other end of the pipe was gradually embedded in the water until 20 cm depth was reached (corresponding 14.7 mmHg exhaling pressure). Lower back and leg pain were assessed within one-minute intervals with numeric rating pain scale (NRS). The area under NRS-curve (AUC) was calculated for every participant.

**Results:** Breathing test did not provoke any discomfort in six patients. Instead, both back pain and leg pain increased in seven patients tested ( $p < 0.01$ ), correlating with each other ( $r = 0.66$ ). The walking symptoms were reproduced exactly in one patient. All the provoked symptoms relieved rapidly.

**Discussion:** This is the first pilot report of methodology showing a connection between gradually increased exhaling pressure and lower back or leg pain. The gradually increased body cavity pressure probably distorts venous flow, which supports the hypothesis that the symptoms of lumbar spinal stenosis are a result from venous congestion and ischaemia of the spinal nerves. Further studies are planned to confirm our observation.

## POSTER PRESENTATIONS

**2. Cardiovascular complications**

PP 01

**FUNCTIONAL FOOD IN COMPLEX REHABILITATION OF CORONARY HEARTS DISEASE PATIENTS: GENDER DIFFERENCES***Alexander Plakida, Olga Yuschkovska**Odessa National Medical University, Odessa, Ukraine*

Cardiovascular diseases are the most prevalent and occupy first place in the structure of morbidity and mortality in developed countries. One of the promising directions of current research is the use of functional foods in complex rehabilitation. We observed 60 patients with cardiac heart disease at the stage of sanatorium rehabilitation. Twenty-eight patients (46.7%) were men and 32 (53.3%) – women. Mean age of patients - (52.2±2.4). A control group (30 persons) received the standard range of spa treatments which include: diet therapy, climato-therapy, gymnastics, magnetotherapy. The main group of patients (30 people), in addition to the standard complex, received functional food including L-carnitine, taurine, inositol, choline, coenzyme Q10. Investigations before and after the courses include anamnesis, dynamic clinical observation of objective and subjective condition, laboratory diagnostics (general clinical research, lipidogram, coagulogram, liver function tests, transaminase), instrumental methods of investigation (measurement of blood pressure, electrocardiogram in 12 standard leads, Holter ECG daily monitoring, assessment of the quality of life (questionnaire WHOQOL-100). The spa treatment with the inclusion of functional foods in patients with cardiovascular disease has a pronounced positive effect on clinical manifestations in reducing of the main symptoms of the disease, reducing ectopic myocardial activity, improving coronary blood flow, and myocardial perfusion unidirectional regardless of gender. At the same time, when assessing the quality of life in men, probable increases were registered in all four areas: physical ( $p<0.01$ ), psychological ( $p<0.01$ ), independence ( $p<0.05$ ), and social life ( $p<0.05$ ). In women, in contrast to men, significant changes were registered in two of the four areas - physical and psychological; changes in independence and social were not statistically significant.

**3. Diabetes mellitus**

PP 02

**RISK OF METABOLICALLY UNHEALTHY OBESITY IN CHILDREN ASSOCIATED WITH LACTASE AND MCM6 GENES***Aleksandr Abaturov, Anna Nikulina**Dnipro State Medical University, Dnipro, Ukraine*

**Background.** Lactase deficiency associated with single nucleotide variants (SNVs) of the lactase (LCT) and minichromosome maintenance complex component 6 (MCM6) genes is the trigger that initiates meta-inflammation.

**Aim:** to study the role of SNV LCT, MCM6 to the development of in metabolically unhealthy obesity (MUO) in children.

**Materials and methods.** 42 obese children aged 6-18 years old were examined using whole genome sequencing (CeGat). The main group ( $n=27$ ) was represented by children with MUO. The control group ( $n=15$ ) consisted of children with metabolically healthy obesity (MHO). To verify the results of the study, the analysis of nominal data was used, the strength of the relationship between the risk factor and the formation of MUO was assessed by calculating the Cramer criterion (V), Pearson's contingency coefficient (C), the normalized value of Pearson's coefficient (C').

**Results.** Among obese children revealed 20 SNV LCT and 11 SNV MCM6. Odds ratio (OR) at MUO to detect SNV LCT A/G rs3213891 – 1.75 95% CI 0.17-18.4; G/A rs3213890 -2.5 95% CI 0.65-10.06; C/T

rs3754689 – 3.4 95% CI 1-13.6; SNV MCM6 G/A rs1057031 – 2.6 95% DI 0.65-10. The estimate of the strength of association between SNV LCT and MUO in A/G rs3213891 genotype is weak ( $V=0.073$ ;  $C=0.072$ ;  $C'=0.102$ ); with genotypes G/A rs3213890 ( $V=0.284$ ;  $C=0.273$ ;  $C'=0.386$ ); C/T rs3754689 ( $V=0.278$ ;  $C=0.268$ ;  $C'=0.379$ ); SNV MCM6 G/A rs1057031 ( $V=0.143$ ;  $C=0.142$ ;  $C'=0.201$ ) is moderate ( $p<0.05$ ).

**Conclusions.** The greatest contribution to the development of MUO is the following three genotypes A/G rs3213891; G/A rs3213890; C/T rs3754689 and SNV MCM6 G/A rs1057031.

**Funding.** The work is a fragment of the research work of the Dnipro State Medical University "Prediction of the development of childhood diseases associated with civilization" (No 0120U101324), funded by the Ministry of Health of Ukraine from the state budget.

**Keywords:** obesity, children, lactase gene, Minichromosome maintenance complex component 6 gene

**4. Lower extremity peripheral artery disease and amputations**

PP 03

**FOUR MONTH STUDY OF INPATIENT REHABILITATION FOLLOWING DYSVASCULAR LOWER EXTREMITY AMPUTATION***Helena Gapeyeva, Eve Sooba, Kelly Kirt, Heidi Alasepp, Meeli Mumma**Clinic of Medical Rehabilitation, East Tallinn Central Hospital, Tallinn, Estonia*

**Objective:** Cases of dysvascular lower extremity amputation (LEA) have a tendency to increase. Main objective was to describe rehabilitation periods, treatment duration and kinds of four month inpatient treatment for a cohort of patients with dysvascular LEA.

**Design:** A retrospective cohort study.

**Setting:** Clinic of Medical Rehabilitation in East Tallinn Central Hospital

**Patients:** Twenty-eight patient data (14.3% women, age mean and SD, 70.3±10.0 years), who received inpatient treatment after dysvascular LEA, were included in the analysis.

**Methods and Main Outcome Measures**

Patients following dysvascular LEA underwent early post-operative rehabilitation or rehabilitation including prosthetic training after multidisciplinary team estimation at treatment initiation and before discharge. Rehabilitation stage, its duration and specific intervention modes were tracked. Descriptive statistics was performed to analyse received data.

**Results and Discussion:** During the four month study period, a total of forty-eight patients underwent treatment following dysvascular LEA, twenty eight (58.3%) of them received inpatient treatment, three (6.3%) outpatient treatment and 17 (35.4%) prosthetics related consultations.

Eleven inpatient department patients with dysvascular LEA (39,3%) participated in post-operative early stage rehabilitation, other patients participated in rehabilitation with prosthetic training. Most of patients had unilateral transfemoral amputation (75%) and unilateral transtibial amputation (21.4%), one patient had combination of transfemoral and transtibial amputation (3.6%). Mean period of postoperative early stage rehabilitation initiation after surgery was 17.5±15.6 days, and duration of treatment 10.6±6.1 days. Physiotherapy, occupational therapy, prosthetist's and psychologist's as well as social worker consultations were provided. In a previous study there were no or low correlations noted between performance-based and self-report changes in functional mobility from initial exam to discharge with rehabilitation intensity measures (Christiansen et al, 2015).

**Conclusions:** Most of the patients of the inpatient department were men after dysvascular transfemoral amputation, who underwent a prosthetic training phase of rehabilitation, including multidisciplinary

rehabilitation team treatment opportunities to decrease functional limitations.

#### PP 04

### ONE-YEAR ANALYSIS OF DEMOGRAPHICS, CLINICAL CHARACTERISTICS, AND FUNCTIONAL MOBILITY LEVEL OF LOWER LIMB AMPUTEES WHO RECEIVED PROSTHESES IN LATVIA

**Dina Grīnberga<sup>1</sup>, Dace Stīrāne<sup>2</sup>, Katie Marie Leatherwood<sup>3</sup>, Ēriks Švēde<sup>2</sup>, Anda Nulle<sup>4</sup>**

<sup>1</sup>Vaivari Orthotics and prosthetics centre, National rehabilitation centre "Vaivari", Vaivari, Latvia, <sup>2</sup>National Rehabilitation Centre "Vaivari", Riga Stradins University, Department of Rehabilitation, Vaivari, Latvia, <sup>3</sup>Director of Designed to Live, Greater Europe Mission, USA, <sup>4</sup>National Rehabilitation Centre "Vaivari", Vaivari, Latvia

**Introduction:** Global and national data should be collected and analyzed to assess the need and service for assistive devices, including lower limb prostheses. The aim of the study is to analyze data of amputee patients who receive prostheses and to provide descriptive statistics on a national level.

**Design:** Quantitative retrospective study.

**Objective:** Analyze demographics, clinical characteristics, and functional mobility level of lower limb amputees who received prostheses by the national assistive device system in Latvia during 2019.

**Methods:** Data (age, cause of amputation, mobility level, etc.) from 366 subjects were analyzed using descriptive statistics, nonparametric tests, and regression analysis.

**Results:** From 366 cases (mean age 59.8 years, SD 15 years), 81.4 % were male. Amputation cause: cardiovascular – 182 (50.84%), trauma – 140 (39.11%), oncology – 15 (4.19%), congenital – 9 (2.51%), other – 12 (3.35%). 71 cases of cardiovascular (19.83%) were related to diabetes. Identified groups: preparatory prosthesis – 132 cases (36.16%, mean age - 64.84 years (12.95 SD)); permanent prosthesis – 232 cases (63.84%, mean age 57 (15.13 SD)). Functional mobility level: preparatory prosthetic candidates: K1–47 (39.83%), K2–47 (39.83%), K3–22 (18.64%), K4–2 (1.69%); permanent prosthetic candidates: K1–81 (35.68%), K2–119 (52.42%), K3–27 (11.89%), K4–0.

**Conclusion:** Preliminary results indicate that an adequate amount of data has been collected to enhance the understanding of the prospective amputee population in Latvia. It was determined that gender, the number of comorbidities, and age are factors found to affect functional mobility level for prosthetic patients. There is a significant time from amputation until the patient is eligible to receive a preparatory prosthesis (7.6 months, SD 6.64 months). Further research is necessary to identify factors that affect the time until eligibility and to determine descriptors of the amputee population in Latvia.

**Keywords:** Lower limb amputation, prosthesis, functional mobility level.

## 6. Stroke

#### PP 05

### REHABILITATION OF PATIENTS WITH SWALLOWING DISORDERS AFTER ISCHEMIC STROKE

**A. Volosovets<sup>1</sup>, I. Zozulya<sup>1</sup>, B. Parkhomenko<sup>1</sup>, O. Volosovets<sup>2</sup>**

<sup>1</sup>Shupyk National University of Healthcare of Ukraine, Kyiv, Ukraine, <sup>2</sup>Bohomolets National Medical University, Kyiv, Ukraine

**Introduction.** Dysphagia is expected to occur in more than 50% of patients in post-stroke rehabilitation, with approximately 11.6% requiring tube feeding (Ickenstein G.W. et al., 2005). The mortality

rate of patients with post-stroke dysphagia varies from 20% to 24% for those with stable tube feeding (Martino R. et al., 2005).

**The aim of the study.** Optimization of guidelines for the management of patients with neurogenic oropharyngeal dysphagia after ischemic stroke and adequate rehabilitation to restore swallowing function and oral nutrition of patients.

**Materials and methods.** We have performed clinical, neurological and magnetic resonance imaging examination of 120 patients (77 men and 73 women) aged from 32 to 84 years (mean age - 66.3±12.5 years) with neurogenic oropharyngeal dysphagia after ischemic stroke. Assessment of level of swallow dysfunction was made with Scale of Assessment of Swallowing Function (SASF, Volosovets et al., 2009) with involvement of 7 elements of swallowing act. To adequately correct swallowing dysfunction in patients with post-stroke neurogenic dysphagia, we have developed a system of measures, which included: in the case of aphagia - parenteral nutrition through the introduction of infusion solutions; usage of nasogastric tube feeding 2 days after the establishment of total aphagia in the patient (every day - an attempt to self-oral nutrition). After partial restoration of oral nutrition, a modification of the diet of different food consistency according to the classification of L.L. Mann et al. (1996). 2-3 days after removal of the probe, the patient is offered an extended set of rehabilitation exercises for random training and stimulation of the muscles responsible for the oral and pharyngeal stages of the act of swallowing (the patient performs the exercises daily for 15-20 days). The effectiveness of the modified method of correction of neurogenic dysphagia after stroke was evaluated by the results of treatment of 70 patients (group 1), who, along with differentiated therapy of stroke, underwent measures of specific and nonspecific correction of dysphagic disorders. The control group consisted of 50 patients with post-stroke neurogenic dysphagia who received only drug treatment in combination with parenteral and / or tube feeding. Clinical groups were similar in demographics and severity of neurological and swallowing deficits.

**Results.** Assessment of swallowing function on our scale showed that in patients of group 1 on the background of differentiated therapy in combination with complex correction of dysphagic disorders, significant recovery of swallowing function to the level of minor disorders occurred on the 7th day (26.4±3.2 points  $p<0.05$ ). The volume of swallowing functions was restored even more on the 14th day (30.5±2.6 points), and on the 21st day the oropharyngeal dysfunction was 32.3±2.3 points, which practically was the restoration of the physiological act of swallowing. In patients of the 2nd group, who did not undergo additional correction of dysphagic disorders, significant recovery of swallowing movements to the rate of minor disorders was observed in the period up to the 14th day (27.2±2.7 points;  $p<0.05$ ), but and on the 21st day, the swallowing function in patients on average remained at the level of minor impairment (29.5±2.3 points). Among patients of the 1st group complete regression of dysphagic manifestations on the 21st day of treatment occurred in 60.0% of cases, among patients of the 2nd group - in 46.2% of cases ( $p<0.05$ ). **Conclusions.** Usage of specific correction of swallowing disorders (tube feeding, dysphagic diet) and nonspecific correction using rehabilitation exercise sets statistically significantly accelerates the rate and timing of recovery in 60.0% of cases against 46.2% with the background of standard therapy.

**Key words:** ischemic stroke, post-stroke dysphagia, rehabilitation

#### PP 06

### REHABILITATION OF STROKE PATIENTS IN SATAKUNTA DISTRICT - ONE YEAR FOLLOW UP

**Aet Ristmägi<sup>1</sup>, Vilma Tikka<sup>2</sup>, Vuokko Lampinen-Laine<sup>1</sup>, Hannu Heikkilä<sup>1</sup>**

<sup>1</sup>Satasairaala Hospital, Pori, Finland, <sup>2</sup>Uppsala Universitet, Uppsala, Sweden

**Background:** Stroke survivors are estimated to benefit of multidisciplinary rehabilitation within the first year after onset of symptoms. The aim of this study was to assess how the stroke rehabilitation process is carried out in practice.



**Methods:** Retrospective study based on the patient registry data. All patients diagnosed with stroke or TIA (I60-I64, G45) in 9/2018-8/2019 in Satakunta Central Hospital were included the study.

**Results:** Functional abilities (according to FIM, mRS) improved the most and most outpatient therapy was recommended in the multidisciplinary rehabilitation unit in Satakunta Central Hospital (14% of patients) compared to other rehabilitation/treatment units. Overall, 32% of stroke patients were suggested to continue outpatient therapy and had set a rehabilitation goal. Within the first year, 22% of patients received outpatient therapy. After acute care, 32% of stroke patients continued rehabilitation in multidisciplinary rehabilitation units in Satakunta Central hospital and primary care Rehabilitation Ward. Sixty-nine % of patients were functionally independent at discharge from rehabilitation units. Within the first year, 16 % of TIA patients had new TIA, 5% had new stroke and 19% were diagnosed with another significant disease.

**Conclusions:** Stroke patients in Satakunta received less community-based rehabilitation than suggested by Finnish Brain Association. We found inequality in receiving rehabilitation and availability of therapy resources. There are no systematically used common measures to assess the benefit of rehabilitation. Consistent care practices and common quality measures are needed to develop clinical pathways and outpatient rehabilitation services. We believe that a quality registry of rehabilitation would enable development of a cost-effective clinical pathway.

PP 07

### DEVELOPMENT OF STROKE REHABILITATION IN TARTU UNIVERSITY HOSPITAL DURING THE LAST 10 YEARS

**Carolyn Maran, Aet Lukmann, Jana Intšite, Margit Rikka**

*Department of Inpatient rehabilitation, Clinic of Rehabilitation and Sports medicine, Tartu University Hospital, Tartu, Estonia*

**Objective:** Stroke patient requires a lot of effort and multidisciplinary approach. Stroke patients form a substantial amount of overall number of rehabilitation patients. In 2020 27,5% of patients after acute stroke were referred to inpatient rehabilitation department.

The purpose of this research was to evaluate the development of rehabilitation medicine during the last 10 years (2010 versus 2020). **Methods:** We analyzed the aspects of referral of stroke patients from active treatment department (usually neurological department) to rehabilitation department; duration of rehabilitation of stroke patients; patients' gender and age; frequency and intensity of different rehabilitation therapies (physiotherapy, occupational therapy, speech and language therapy and psychotherapy); secondary prevention and patient transition after discharge from department of rehabilitation. The study involves 328 retrospective medical cases (142 cases in 2010, 186 cases in 2020)

**Results:** Post-stroke rehabilitation starts earlier, lasts longer and the accessibility of different therapies is better than 10 years ago. Referral to rehabilitation department is quicker (on the 29th day in 2010 versus 12th day in 2020). The duration of rehabilitation was 16 days in 2010 and 19 days in 2020. The amount of different function-specific therapies per person has changed during the years (1,3 hours per day per patient in 2010 versus 2,8 hours per day per patient in 2020). Secondary prevention has become an essential and inevitable part of post-stroke rehabilitation. The use of anticoagulant and statin therapy has significantly improved and is used in accordance with modern guidelines.

**Conclusion:** Stroke causes remarkable economical burden to society but we can alleviate it with the implementation of evidence-based treatment strategies including well directed rehabilitation, that is available in Tartu University Hospital.

## 9. Other topics

PP 08

### 2-MONTH HEART RATE TARGETED AEROBIC EXERCISE TRAINING EFFECT ON CARDIORESPIRATORY FITNESS PARAMETERS IN SUBJECTS WITH METABOLIC SYNDROME

**Jurate Zupkauskienė<sup>1</sup>, Ieva Lauceviciene<sup>2</sup>**

*<sup>1</sup>Clinic of Cardiac and Vascular Diseases, Faculty of Medicine, Vilnius University, Vilnius, Lithuania, <sup>2</sup>Department of Rehabilitation, Physical and Sports Medicine, Faculty of Medicine, Vilnius University, Vilnius, Lithuania*

**Introduction:** An impaired cardiorespiratory fitness (CRF) is associated with metabolic syndrome (MetS) development and disease burden. Regular exercise training, especially aerobic exercise, has been demonstrated to be beneficial in improving CRF and promoting health in MetS subjects.

**Objective:** The aim of the study was to evaluate the effect of the 2-month heart rate targeted supervised aerobic exercise training program on CRF parameters in MetS subjects.

**Methods:** The study included 140 MetS subjects (53.2±6.8 years, 55% female), who were randomly assigned to the intervention (n=84) or the control group (n=56). All participants received recommendations on physical activity but only the intervention group exercised on a cycle ergometer for 30-40 min/day, 5 days/week for 2 months. The CRF was assessed at baseline and after 2 months by performing a cardiopulmonary exercise test and evaluating maximal oxygen uptake (VO<sub>2</sub>max), resting heart rate (RHR) and anaerobic threshold (AT) using the "V-slope" method.

**Results:** After 2 months, VO<sub>2</sub>max increased by 2.22±2.76 ml/kg/min in the intervention group (p<0.001) and by 0.94±2.39 ml/kg/min in the control group (p=0.005), with a significant difference between the groups (p=0.005). In the intervention group AT increased by 9.05±13.27% (p<0.001), whereas in the control group it decreased by 3.64±11.15% (p=0.018), with the change difference between the groups being statistically significant (p<0.001). RHR decreased only in the intervention group by 2.78±8.28 b/min (p=0.003). According to the ROC analysis, the OR for the intervention group to increase VO<sub>2</sub>max by ≥0.3 ml/min/kg (optimal threshold value) after 2 months was 1.91 [1.3–2.78] (p=0.001) as compared to the control group.

**Conclusion:** After 2-month heart rate targeted aerobic exercise training program, middle-aged MetS subjects significantly improved their CRF by increasing VO<sub>2</sub>max, AT and reducing RHR. MetS subjects, who independently followed the physical activity recommendations for 2 months, improved only VO<sub>2</sub>max.

PP 09

### FIRST INSIGHTS INTO POST-COVID PATIENTS' NEUROREHABILITATION: TWO CLINICAL CASES

**Rūta Vosyliūtė<sup>1,2</sup>, Svetlana Lenickienė<sup>1,2</sup>, Ieva Michailovienė<sup>1,2</sup>, Ieva Besakirskienė<sup>2</sup>, Veronika Bartosevičienė<sup>2</sup>, Jūratė Guogienė<sup>1,2</sup>**

*<sup>1</sup>Vilnius University, Faculty of Medicine, Institute of Health Sciences, Department of Rehabilitation, Physical and Sports Medicine, Vilnius, Lithuania, <sup>2</sup>Vilnius University Hospital Santaros Klinikos (VUHHSK), Centre of Rehabilitation, Physical and Sports Medicine (CRPSM), Vilnius, Lithuania*

**Introduction:** The COVID-19 pandemic has brought many challenges in medical field and rehabilitation is not an exception. Post-COVID

neurological complications may determine mild to severe sequelae in patients functioning both physical and cognitive. In the VUHSK CRPSM from January 2021 to June 2021 thirty post-COVID patients underwent comprehensive multidisciplinary rehabilitation programmes. Ten of them presented severe neurological complications, e.g., encephalopathy, various patterns of neuropathies, including critical illness polyneuropathy (CIP). We report two clinical cases reflecting rehabilitation challenges of post-COVID patients with severe neurological complications.

**Case reports:** A 33-year-old female was admitted to VUHSK Department of Neurology due to severe all limbs weakness, numbness and neuropathic pain. 4 months prior to admission the patient was diagnosed with COVID-19 infection and mild symptoms of polyneuropathy appeared. After electroneuromyography post-COVID sensory axonal polyneuropathy was diagnosed. The patient was transferred to inpatient rehabilitation department due to severe functional impairment (Barthel index score 25), tetraparesis and neuropathic pain. Another patient, a 46-year-old male, diagnosed with COVID-19 infection, viral pneumonia, was admitted to VUHSK, where mechanical ventilation was performed for 38 days. Despite early mobilization and 54 physiotherapy sessions, he was transferred to inpatient rehabilitation department due to CIP, severe tetraparesis, contractures and neuropathic pain. On admission severe functional impairment (Barthel index score 15), fourth stage sacral pressure ulcer, anxiety symptoms and significant orthostatic reactions, that impeded patient's mobilization, were observed. Individual comprehensive multidisciplinary rehabilitation programmes were developed for both patients.

**Conclusions:** Nowadays we face new challenges in neurorehabilitation due to various neurological complications, induced by COVID-19 infection, requiring multidisciplinary measures. The lack of studies makes it difficult to predict long-term outcomes for post-COVID patients with neurological complications, but it is already clear that a holistic approach can lead to better rehabilitation results.

#### PP 10

### IN-PATIENT PULMONARY REHABILITATION AND EVALUATION OF POST COVID CONDITION USING "POST COVID-19 CRF": CASE SERIES

**Goda Auguste Pucetaite, MD<sup>1</sup>, Jurate Guogiene, MD<sup>1</sup>, Alydas Juocevicius, MD, PhD<sup>2</sup>, Barbara Semetiene<sup>3</sup>, Daiva Sakalauskiene<sup>3</sup>**

<sup>1</sup>Department of Rehabilitation, Physical and Sports Medicine, Institute of Health Sciences, Faculty of Medicine, Vilnius University, Vilnius, Lithuania, <sup>2</sup>Faculty of Health Sciences Klaipėda University, Klaipėda, Lithuania, <sup>3</sup>Rehabilitation, Physical and Sports Medicine Center, Vilnius University Hospital Santaros Klinikos, Vilnius, Lithuania

This case series reports on inpatient pulmonary rehabilitation and the medium- and long-term sequelae of COVID-19. It is a pilot case series report using "Global COVID-19 Clinical Platform Case Report Form (CRF) for Post COVID condition (Post COVID-19 CRF)", developed by WHO Medical charts of five patients were evaluated to reflect on their inpatient rehabilitation outcomes in the post-acute phase of severe or critical form of COVID-19. The functional outcome measures involved the six minute walking test (6MWT), Borg rating of perceived exertion (RPE) and diaphragmatic excursion administered at the beginning and end of the rehabilitation program. The clinical outcome measures included pulse oximetry measurements at the beginning and end of a 6MWT. All patients commenced a conservative rehabilitation program involving physical therapy (pulmonary profile), occupational and recreational therapy, medical massage therapy, mental health and social counseling. Additional individualized treatments provided were: treatment for pain, provision of assistive devices and various physical therapy modalities.

The first Post COVID-19 CRF was administered face-to-face during inpatient rehabilitation, second - after two (persistent symptoms) or five months (full recovery). All patients achieved improved functionality after the rehabilitation program. Pulse oximetry results and its change after physical exertion were not conclusive. Majority of the patients reported reduced ability to self-care (in comparison to the status before COVID-19) and continuation of some symptoms after inpatient rehabilitation discharge or being admitted to the hospital repeatedly. The results from this case series report indicate the importance of individualized rehabilitation programmes and demonstrate a variety of symptoms and functional decline caused by COVID-19 disease. More extensive research is needed to objectively evaluate the outcomes of an inpatient pulmonary rehabilitation program for COVID-19 patients. Prolonged duration of symptoms and reduced functionality after hospital discharge indicate the need to consider post COVID condition as a future indication for long-term rehabilitation.

#### PP 11

### REX ROBOT ASSISTED REHABILITATION TO ENHANCE BALANCE AND MOBILITY FOR PEOPLE WITH MULTIPLE SCLEROSIS, RAPPER IV CLINICAL TRIAL

**Mohamed Sakel, FRCP (UK)<sup>1</sup>, Karen Saunders<sup>2</sup>**

<sup>1</sup>Post Grad Diploma Rehab Medicine (Nottingham), Director/ Consultant Physician Neurorehabilitation, East Kent University NHS Hospital, Kent, UK, <sup>2</sup>Neuro-Physiotherapist, NIHR Research Fellow, University of Kent, Kent, UK

Exoskeleton devices have the potential to enable people with mobility impairments to exercise safely.

This study aims to explore benefits of using a Rex robot to assist in a neuro-rehabilitation program focused on improving balance with supervision from a specialist clinician.

**Ethics:** REC reference: 18/SC/0337 Protocol number: 1 IRAS project ID: 240267

South Central - Oxford C Research Ethics Committee, UK

**Study design:** Prospective, open label, single arm, non-randomized feasibility study of Rex robot assisted training to improve balance for people with MS.

*N* = 20, aged 18 to 80 years, with EDSS 4 to 6.5.

Mixed methodology – quantitative and qualitative interview.

**Primary Endpoint**

- Completion of a transfer into the device, sit to stand in device and 1 robotic rehabilitation session

- Serious Adverse Event/s

**Secondary Endpoints**

- Completion of robotic balance rehabilitation program over 5 weeks

**Screening Loss Analysis**

- Timed up and Go
- Berg Balance Scale
- Modified Ashworth Scale
- EQ-5D Health State Questionnaire
- Goal Attainment Scale
- ABC confidence scale
- Modified Falls Efficacy Scale
- MS Impact Scale

**Results:** Berg Balance: Pre ( 30.6±16.1), Post (36.8±15.3), *p*-value 0.01

EQ-5d: Pre (0.14±0.29), Post (0.32±0.31), *p*-value 0.01

There was a significant increase in the Berg balance, ABC, EQ-5d and EQVAS at the post-intervention timepoint. There was a mean increase of 6 units in the Berg balance score, 17 units in the ABC score and 0.2 units for the EQ-5d health index.

**Conclusion:** Rex Robot assisted exercise of core abdominal muscle increased balance in people with MS.

## PP 12

### EFFECT OF PELVIC FLOOR MUSCLE STRENGTHENING EXERCISES ON URINARY INCONTINENCE IN WOMEN AFTER UTERUS REMOVAL SURGERY

*Deividas Jankunas, Saule Sipaviciene, Simona Stakauskiene, Egle Milinaviciene, Antuaneta Matiukaite*

AB "Egles" sanatorium, Birštonas, Lithuania

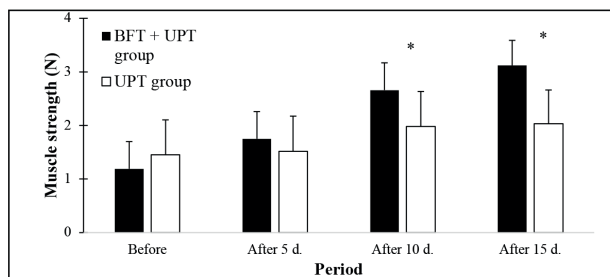
**Introduction:** Hysterectomy is the most common gynecological procedure in the United States, performed more than 600 000 women each year and may have a variety of residual phenomena, such as abdominal wall tension, bladder muscle overactivity or urinary incontinence (Ramdhan, Loukas & Tubbs, 2017). Urinary incontinence prevention include healthy weight maintaining, bladder irritants avoiding, abandonment of harmful habits, number of children controlling and pelvic floor exercise practicing (Hu & Pierre, 2019). On the other hand, applying pelvic floor muscle training different skill mixes is possible and there is still lack of information how pelvic floor muscle training can be combined with other intervention (Hagen, et al., 2020), and a large proportion of authors provide different results.

**Research aim:** The purpose was to evaluate the effect of pelvic floor muscle strengthening exercises on urinary incontinence in women after uterus removal surgery.

**Research methods:** Participants in experimental group received biofeedback training and usual physical therapy (BFT+UPT). Participants in control group received usual physical therapy (UPT). All subjects were evaluated for pain using VAS scale, PFM strength using pelvic floor muscle trainer „STOIS“, quality of life associated with urinary incontinence using I-QOL questionnaire, and common quality of life using SF-36 questionnaire, before and after intervention. After 5 and 10 days, pain intensity and PFM strength were evaluated additionally.

**Results:** Women who received BFT+UPT showed higher increase in PFM strength, and in quality of life associated with urinary incontinence results, compared with UPT group ( $p > 0,05$ ). There were no significant differences in pain and common quality of life between groups.

*Changes in pelvic floor muscle strength using STOIS pelvic floor muscle trainer*



Note\* -  $p < 0,05$  statistically significant change comparing in groups.

*Changes in quality of life associated with urinary incontinence, according to the I-QOL questionnaire*

		Avoidance and limiting behavior	Psychosocial impact	Social embarrassment
BFT + UPT	Before	25,38±3,95	29,00±4,22	15,46±2,76
	After	30,07±3,07*	31,38±3,62	18,08±2,36
UPT	Before	24,83±4,49	28,33±4,31	15,41±3,20
	After	26,75±3,84	31,17±3,86	17,75±3,19

Note\* -  $p < 0,05$  statistically significant change comparing in groups.

**Conclusion:** Physical therapy combined with biofeedback is more effective than usual therapy, in increasing pelvic floor muscle strength, and quality of life related to urinary incontinence, avoidance and limiting behavior.

**Sources:**

- Hagen, S., Elders, A., Stratton, S., Sergenson, N., Bugge, C., Dean, S., Hay-Smith, J., Kilonzo, M., Dimitrova, M., Abdel-Fattah, M., Agur, W., Booth, J., Glazener, C., Guerrero, K., McDonald, A., Norrie, J., Williams, L. R., & McClurg, D. (2020). Effectiveness of pelvic floor muscle training with and without electromyographic biofeedback for urinary incontinence in women: multicentre randomised controlled trial. *BMJ (Clinical research ed.)*, 371, m3719. <https://doi.org/10.1136/bmj.m3719>
- Hu, J. S., & Pierre, E. F. (2019). Urinary Incontinence in Women: Evaluation and Management. *American family physician*, 100(6), 339-348. Internet access: <https://www.aafp.org/afp/2019/0915/afp20190915p339.pdf>
- Ramdhan, R. C., Loukas, M., & Tubbs, R. S. (2017). Anatomical complications of hysterectomy: A review. *Clinical Anatomy*, 30(7), 946-952. doi: 10.1002/ca.22962

## PP 13

### THE EFFECTS OF CRYOTHERAPY ON PAIN, QUALITY OF LIFE AND SHOULDER JOINT FUNCTION IN RHEUMATOID ARTHRITIS

*Daumantas Bitinas, Simona Stakauskiene, Egle Milinaviciene, Antuaneta Matiukaite*

AB "Egles" sanatorium, Birštonas, Lithuania

**Introduction:** Joint diseases are becoming more common according to the Institute of Hygiene in Lithuania. Therefore, every year people are becoming more afflicted by rheumatoid arthritis. One of the methods that can help lessen the pain of damaged joints, increase functional activity and improve quality of life is cryotherapy.

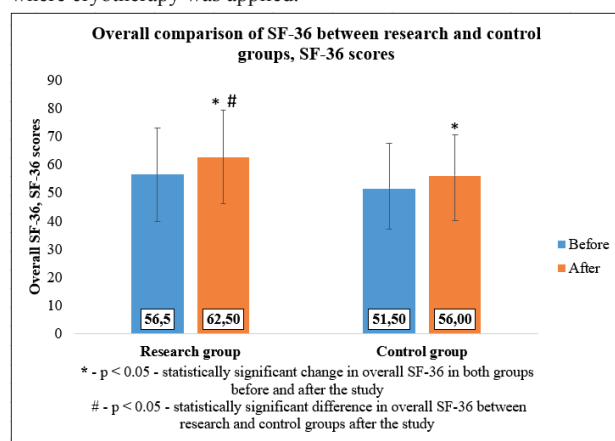
**Research aim:** To determine the effects of cryotherapy on pain, quality of life, and shoulder joint function in individuals with rheumatoid arthritis.

**Research methods:** 20 subjects with rheumatoid arthritis were included in this study. Two groups were formed: the control group ( $n=10$ ), where only physiotherapy was applied, and the research group ( $n=10$ ), where both physiotherapy and cryotherapy were applied.



At the start and at the end of the study both groups were evaluated using health related quality of life questionnaire (SF-36), VAS scale, shoulder range of motion, muscle strength, and pain threshold using the algometer.

**Results:** Pain scale (VAS) in both groups at the start had similar score (around 5-6 points). There was a statistical reduction of pain in both groups ( $p < 0,05$ ) at the end of the study. Comparing the shoulder joints of both hands at the beginning and at the end of the study there were statistically significant improvement in the range of motion (flexion, extension and abduction), pain threshold and quality of life in both groups ( $p < 0,05$ ). Although, comparing the results between groups, statistically significant improvement was found regarding the quality of life in the research group, where cryotherapy was applied ( $p < 0,05$ ). **Conclusion:** In both groups before and after physical therapy and cryotherapy, the results showed a reduction in pain (VAS), an increase in pain threshold, an improvement in shoulder flexion, extension and abduction, an increase in hand muscle strength and quality of life. However, quality of life was statistically more significant in the group where cryotherapy was applied.



#### PP 14

### FUNCTIONAL INDEPENDENCE LEVEL IN SPINAL CORD INJURY PATIENTS AND ITS ASSOCIATION WITH PRESSURE ULCER RISK

**Natālija Ļebedeva<sup>1,2</sup>, Dace Stirāne<sup>1,2</sup>, Anda Nulle<sup>1</sup>**

<sup>1</sup>National Rehabilitation Centre "Vaivari", Jurmala, Latvia, <sup>2</sup>Riga Stradins University, Riga, Latvia

**Introduction of the topic:** One of the most common complications in the first year after spinal cord injury (SCI) is pressure ulcers, which significantly limit patients' rehabilitation and resocialization process. The aim of the study was to determine changes in the functional independence level in SCI patients and their relationship with the pressure ulcer risk.

**Methods:** A retrospective analysis with data collected from medical records of 92 SCI patients admitted in 2018-2020 from National Rehabilitation Centre "Vaivari" for the first two specialized inpatient rehabilitation after injury. Assessment scales: Spinal Cord Independence Measure (SCIM) starting and finishing rehabilitation, Braden scale only in the beginning of rehabilitation.

**Results:** The extent of SCI for study participants according to the ASIA scale was: A in 20.6%, B-D in 79.3%. There were 43.5% cervical, 41.3% thoracic, and 27.1% lumbar lesion levels.

Scores in all SCIM sections increased during the primary rehabilitation, no significant differences were observed during the second rehabilitation.

A significantly higher risk of pressure ulcers was observed in patients with a lower level of functional independence in all three

SCIM sections with a moderate or high correlation, with high statistical reliability:  $\rho=0.81$  ( $p=1.11 \times 10^{-22}$ ),  $\rho=0.72$  ( $p=1.05 \times 10^{-15}$ ),  $\rho=0.81$  ( $p=1.44 \times 10^{-22}$ ) in the primary rehabilitation, and similarly during the second rehabilitation  $\rho=0.62$  ( $P=5.34 \times 10^{-11}$ ),  $\rho=0.81$  ( $P=1.67 \times 10^{-22}$ ),  $\rho=0.82$  ( $p=7.38 \times 10^{-24}$ ).

Although participants without pressure ulcer had higher SCIM scores, the relationship between SCIM scale scores in all three sections and the presence of actual pressure ulcer was found to be weak.

**Conclusions:** The functional independence level in SCI patients during the second rehabilitation was significantly higher than during the primary. The lower level of functional independence was associated with a higher risk of pressure ulcers for SCI patients. There was no statistically significant increase in the incidence of pressure ulcers in SCI patients with a lower level of functional independence.

#### PP 15

### INDIVIDUALISM OF THE REHABILITATION DEPARTMENT EMPLOYEES AND COLLECTIVE VACCINATION REGARDING COVID-19

**Jonas Tilvikas<sup>1</sup>, Nijole Sostakiene<sup>2</sup>**

<sup>1</sup>Klaipėda University, Faculty of Health Sciences, Department of Holistic Medicine and Rehabilitation, Klaipėda, Lithuania, <sup>2</sup>Head of the Department of physical Medicine and Rehabilitation, Lithuania

In the fight against the COVID-19 pandemic, the aim is to develop the immunity of the population ('herd') through collective vaccination programmes. However, there is an individual's freedom, individual responsibility, the right of a person to think freely, to decide your own fate, to behave according to one's own criteria, to know one's needs, to act at one's own discretion, not to be constrained by other individuals. How is individualism compatible to vaccination programmes close to the principles of collectivism? It has been observed, however, that individualistic aspirations are closely connected to the group to which one assigns oneself. Social structural problems are important in the fight against a pandemic.

**Aim -** to highlight the individualism of the employees of one rehabilitation department and to reveal the interfaces with the results of collective vaccination.

**Methodology.** The ethnographic field study was started on May 10, 2021 in one hospital and is currently ongoing. Methods used – observation through participation and semi-structured interviews. The study population consists of rehabilitation staff, support personnel, middle personnel, physicians and administration. The results of the field study are compared to the results of vaccination of employees. The research is conducted in accordance with ethical principles and data protection requirements.

**Results.** During the study, the individualism among the employees of the rehabilitation department emerged as a pursuit of personal gain, responsibility, and freedom of choice. Among workers who express their individualism differently, the number of vaccinated and non-vaccinated individuals is similar. Employees, whose individualism is based on personal gain, got vaccinated even if they disapprove of vaccination altogether, for fear of losing job or job position. Vaccination has increased dissatisfaction or even has led to refraining from revaccination for employees, seeking personal responsibility and freedom. The choice to get vaccinated or not to get vaccinated as an individual decision is determined by the gender, social and economic status, education, ethnicity of the employees.

**Conclusions.** Individualism is not in itself a factor that promotes or inhibits vaccination, however the different aspirations of the employees related to individualism, change the attitudes of the employees towards vaccination and the results of compulsory vaccination. The results of the study confirm the opinion, that individualism is conditional and is closely related to the group to which the employee assigns one self.

**Keywords:** individualism, collective vaccination, rehabilitation department employees, COVID-19.

## PP 16

**ORGANIZATION OF POST-ACUTE INPATIENT REHABILITATION IN UKRAINE****Kostiantyn Babov<sup>1</sup>, Iryna Babova<sup>2</sup>**<sup>1</sup>State Institution “Ukrainian Research Institute of Medical Rehabilitation and Resort Therapy of the Ministry of Health of Ukraine”, Ukraine, <sup>2</sup>State Institution “South Ukrainian National Pedagogical University named after K.D. Ushynsky”, Odesa, Ukraine

The rehabilitation system in Ukraine is currently in a state of reform along with the entire health care system. Patients can receive rehabilitation care at the expense of the Social Insurance Fund (for working persons who are insured in the Fund), the National Health Service of Ukraine (NHSU) due to Medical Guarantee Packages, other funds and for own account.

The Social Insurance Fund of Ukraine has been financing early health-resort (sanatorium) rehabilitation for working persons who are insured in the Fund after certain acute conditions for over 40 years, initiating such a practice by cardiorehabilitation service after acute myocardial infarction. The Fund provides rehabilitation services immediately after an acute stage of the disease in specialized rehabilitation departments of health-resorts in: cardiopulmonary, musculoskeletal and neurorehabilitation, after surgical interventions on the organs of vision, digestion, urogenital system, in violation of pregnancy and medico-psychological rehabilitation. In 2021, the Fund provided early rehabilitation to working patients with cardiopulmonary and neurological complications of COVID-19.

From 2020, the NHSU finances inpatient and outpatient rehabilitation care: medical rehabilitation of adults and children over 3 years with musculoskeletal and nervous system disorders and for children under 3 years. Unfortunately, the cardiopulmonary rehabilitation by NHSU is not yet provided.

Rehabilitation care in Ukraine is traditionally provided in the specialized early rehabilitation departments of health-resorts. Health-resorts are located in resort territories well spread in all regions of Ukraine, have sufficient personnel, medical and rehabilitation equipment, natural healing resources (climate, mineral waters of different types, peloids, etc) which guarantee implementation of patient rehabilitation strategies. Ukrainian Research Institute of Medical Rehabilitation and Resort Therapy for many years created a scientific and methodological basis for such departments. In particular, the “Standard (recommended) rehabilitation program for patients after COVID-19 at health-resort stage” was worked out, which improves the quality of rehabilitation care in health-resorts.

## PP 17

**DEVELOPMENT OF THE MODIFIED COVID-19 YORKSHIRE REHABILITATION SCALE (C19-YRSM) PATIENT-REPORTED OUTCOME MEASURE FOR POST-COVID SYNDROME OR LONG COVID****Manoj Sivan<sup>1,3</sup>, Nick Preston<sup>1</sup>, Amy Parkin<sup>2,3</sup>, Sophie Makower<sup>3</sup>, Jeremy Gee<sup>4</sup>, Denise Ross<sup>2</sup>, Rachel Tarrant<sup>3</sup>, Jennifer Davison<sup>3</sup>, Stephen Halpin<sup>1,3</sup>, Rory J O'Connor<sup>1,2</sup>, Mike Horton<sup>1</sup>**<sup>1</sup>Academic Department of Rehabilitation Medicine, University of Leeds, <sup>2</sup>National Demonstration Centre of Rehabilitation Medicine, Leeds Teaching Hospitals NHS Trust, <sup>3</sup>Covid Rehabilitation Service, Leeds Community Healthcare NHS Trust, <sup>4</sup>Covid Rehabilitation Service, Airedale NHS Foundation Trust, UK

**Background:** The C19-YRS was literature’s first condition-specific, validated scale for patient assessment and monitoring in Post-COVID syndrome (PCS) or Long COVID. The 22-item scale contains four subscales (scores): symptom severity (0-100), functional disability (0-50), additional symptoms (0-60), and overall health (0-10).

**Objectives:** This study aimed to modify the C19-YRS based on

psychometric properties of the scale, emerging information on additional PCS symptoms not covered in the original scale, and feedback from a working group of patients, healthcare professionals, and researchers.

**Methods:** Data collected from 370 PCS patients were assessed using a Rasch Measurement Theory framework, where all individual scale items of the symptom severity and functional disability subscales were assessed for model fit, local dependency, response category functioning, and differential item functioning by age group, sex, and hospitalisation status. The subscales were also assessed for targeting, reliability, and unidimensionality. The working group undertook iterative changes to the scale based on psychometric results and clinical evidence of emerging and relevant symptoms not covered in the original scale.

**Results:** Symptom severity and functional disability subscales showed good targeting and reliability. The original 0-10 item response category structure did not operate as intended. Post-hoc rescoring suggested a 4-point response category structure would be more appropriate for both subscales. Symptoms (including the new symptoms suggested by the working group) that would suit having a dichotomous response were placed in the other symptoms subscale. The overall health single-item subscale remained unchanged.

**Conclusion:** A 17-item modified version of the C19-YRS was developed based on a combination of psychometric evidence, clinical relevance of the content, and feedback from the working group. The C19-YRSM subscales (scores) are symptom severity (0-30), functional disability (0-15), other symptoms (0-25), and overall health (0-10). C19-YRSM is being further validated in a large-scale, multi-centre, National Institute for Health Research (NIHR) study on PCS.

## PP 18

**REHABILITATION FOR THE DISTAL HUMERUS FRACTURES****Dmitriy Nosivets, Oleksii Vinnyk***Oles Honchar Dnipro National University, Department Of General Medicine With A Course Of Physical Therapy, Dnipro, Ukraine*

The aim of the study - to improve the results of treatment of patients with distal humerus fractures.

Authors analyzed the results of operative and conservative treatment 194 patients aged 19-89 years (mean age 50,2±1,3 years) with the distal humerus fractures. Male was – 75 (38,7%), female – 119 (61,3%). According to AO/ASIF classification the fracture was type A – 15 (7,7%); type B – 40 (20,7%); type C – 139 (71,6%). According to method of treatment all patients was divided on 2 groups (1 - operative and 2 - conservative treatment) and each group on 2 subgroups (basic and control). The 1 group (operative treatment) was 140 (72,2%) patients, 99 (70,7%) – basic subgroup and 41 (29,3%) control. The 2 group (conservative treatment) was 54 (27,8%) patients, 29 (53,7%) – basic subgroup and 25 (46,3%) control. The basic methods of treatment in 1 group was: osteosynthesis by pins in 10 (7,1%) patients, external fixation device - 10 (7,1%), osteosynthesis by screw - 17 (12,2%), combine osteosynthesis - 49 (35,0%) and osteosynthesis by plates - 54 (38,6%). The methods of treatment in 2 group was: cast immobilization in 43 (79,6%) patients and skeletal traction - 11 (20,4%).

Method of combined osteosynthesis for the distal humerus metaepiphysis fractures is offered. Indications to the methods of treatment depending on the type of fracture are defined and dependence of the development of complications of treatment on duration of elbow joint immobilization is proved. Periods and approaches of restoration treatment are developed, the dependence of results of restoration treatment on the type of fractures and method of treatment is set.

The average follow-up was 39,0±0,8 months (from 7 months to 6 years) after trauma. The average score according to the Mayo clinic scale was 81,7±1,2 points (from 45 to 100). Analyzing the results of treatment 194 patients with the distal humerus metaepiphysis fractures showed that application of the differentiated approaches of treatment positive results are got for 91,4% of patients, in comparison with 71,2% of the control subgroup ( $p < 0,001$ ), and the number of complications.



**Keywords:** distal humerus bone, elbow joint, fracture, conservative and operative methods of treatment, rehabilitation.

## PP 19

### THE EFFECT OF MINERAL RICH FOOT BATH ON THE OVERUSE SYNDROM OF LOWER EXTREMITIES

**Varje-Riin Tuulik<sup>1,2</sup>, Tatjana Rõõmussaar<sup>3</sup>, Monika Kumm<sup>1,4</sup>, Viiu Tuulik<sup>1</sup>, Taavi Päll<sup>5</sup>**

<sup>1</sup>The Centre of Excellence in Health Promotion and Rehabilitation, Haapsalu, Estonia, <sup>2</sup>West Tallinn Central Hospital, Tallinn, Estonia, <sup>3</sup>Järveotsa Perearstikeskus, Tallinn, Estonia, <sup>4</sup>Pärnu College, University of Tartu, Pärnu, Estonia, <sup>5</sup>Department of Microbiology, Institute of Biomedicine and Translational Medicine, University <sup>12</sup> of Tartu, Tartu, Estonia

**Introduction.** Prolonged standing is likely to contribute to musculoskeletal and vascular symptoms. Work related lower extremity overuse with prolonged standing needs more attention and also an effective rehabilitation intervention. The aim of the study is to measure the efficiency of mineral rich leg baths as rehabilitation intervention for the lower extremity overuse by prolonged standing.

**Methods.** Study group were 50 persons 18–65 years old who work 4 hour and more in standing position.

**Inclusion criteria** BMI less than 35 and mild or moderate problem with leg tiredness, pain or uncomfortable. Subjective pain score in scale 2–7 from 10 in Nordic musculoskeletal pain questionnaire. The rehabilitation intervention was 5 days leg bath with 38–40 °C warm water for 15–20 min.

**I group** – used as additive 100 mg dry sea mud and 100 mg Mg salt. There were 25 persons in this group (7 male, mean age 45.7, mean BMI 25.9)

**II group** – used as additive only Mg salt (100 g). There were 25 persons in the second group (1 male, mean age 40.0 years, mean BMI 24.5) Before and 2–3 days after the last procedure a nurse measured 1) skin temperature on the first toe and 2) circumference of the leg 4 cm proximally from the ankle (measurement point C4) and 8 cm proximally (measurement point C8).

**Results.**

- There was no difference between two study groups in the temperature measured on the top of first toe. In pooled study group temperature increased by 0.095 °C [95%CI, 0.055 to 0.14], posterior probability that effect is bigger than zero is 1 (statistically important).

- Ankle circumference in study group with younger (less than 40 years) diminished -2,8 mm [95%CI, -8 mm to +2.7 mm], posterior probability that the effect size is smaller than zero 0.87 (statistically not important).

- The lower back, neck and knees were the most reported painful areas measured by the Nordic musculoskeletal pain questionnaire. Mean pain score diminished in both groups in all body areas – for example in lower back average effect size was more than 2 points in 10 point scale, posterior probability that effect size is bigger than zero is 1 (statistically important).

**Conclusions.** Both foot baths were effective in case of lower extremity overuse with prolonged standing.

## PP 20

### COMPREHENSIVE REHABILITATION PROGRAM FOR MIDDLE AGE WOMEN WITH FUNCTIONAL ARTHRALGIA OF THE KNEE JOINT

**Tetiana Turytska, Oleksii Vinnyk, Dmitriy Nosivets**  
Oles Honchar Dnipro National University, Dnipro, Ukraine

**Introduction.** Knee joints (KJ) are often exposed to severe overload, which is associated with constant stress during their functional purpose and is initially manifested by arthralgia. Musculoskeletal pain

associated with degenerative-dystrophic changes is most common in women, whose frequency increases with age. The initial assessment of the functional status of the KJ should emphasize the exclusion of urgent reasons when considering the need for assistance. Therefore, there is a need for a comprehensive approach to correct the functional state of patients with arthralgia of the KJ using non-drug methods of rehabilitation, namely physical therapy.

**Research methods:** physical research methods used to assess the functional state of the KJ.

**Main results and conclusions.** During the period of sparing-motor regime, the task was to reduce muscle imbalance, improve trophic processes in the tissues of the KJ, correction of the patient's psycho-emotional state. To achieve the goal were used: morning gymnastics (15-20 minutes) daily, independent classes; kinesitherapy aimed at improving mobility in the spine and KJ (30 min) 5 g / week 2 g / day; therapeutic massage (self-massage) of both lower extremities and the reflex zone of the lumbar region (20 min), 10 procedures; amplipulse on the lumbar spine (10 min), 5-7 procedures; magnetic therapy on the site of KJ (15 min), 10 procedures; reflexology 2 g / week from 5 to 20 procedures, including general and local points. During the period of sparing-training mode, the development of KJ mobility was added. The task of kinetotherapy was aimed at achieving painless passive and active movements in the KJ and lumbar spine. Mechanotherapy, PIR and intra-articular oxygen therapy (2 g / week, 5 procedures, 40-60 ml) were added to the morning gymnastics and therapeutic massage. During the period of training motor mode focused on stabilizing the KJ, increasing the amount of active movements. Added: intra-articular autoplasm therapy (1 g / week, 5 procedures, 3-4 ml), biopuncture with complex biological drugs (2 g / week, 10 procedures) and kinesiotope 1 time in 10-14 days, 3 times.

**Conclusions:** The use of complex physical therapy improves the functionality of patients by reducing muscle imbalance and the intensity of pain. The effectiveness of the complexity of rehabilitation measures, which differ in the direction of exercises aimed at improving the specific needs of the patient, was proved.

**Key words:** knee joint, physical therapy, rehabilitation, middle-aged women.

## PP 21

### IN-PATIENT POST-COVID REHABILITATION IN CHRONIC FATIGUE AND COGNITIVE DISORDERS

**Liudmila Babliuk, Svitlana Fediaieva<sup>2</sup>, Iryna Babova<sup>3</sup>, Vita Miesoiedova<sup>1</sup>, Sergii Tamazlykar<sup>4</sup>**

<sup>1</sup>Ivano-Frankivsk National Medical University, Ivano-Frankivsk, Ukraine, <sup>2</sup>Danylo Halytsky Lviv National Medical University, Lviv, Ukraine, <sup>3</sup>South Ukrainian National Pedagogical University named after K.D.Ushynsky, Odesa, Ukraine, <sup>4</sup>Central City Clinical Hospital of Ivano-Frankivsk City Council, Ivano-Frankivsk, Ukraine

SARS-CoV-2 infection is suspected to affect almost 80% of the world's population and the majority will need a rehabilitation care. The purpose of the study was to estimate effectiveness of rehabilitation program in patients after Coronavirus disease with cognitive disorders and manifestations of chronic fatigue syndrome.

The study design included 60 patients after SARS-Cov-2 infection of age 43,9±1,08 years (26 women and 34 men) who underwent rehabilitation in Department of Physical Rehabilitation of Central City Clinical Hospital (Ivano-Frankivsk) with chronic fatigue and cognitive disorders syndromes. All patients were divided into two groups due to severity of the disease in acute period at the hospital stage: group I - 28 patients with a general condition of moderate severity and 32 patients - group II, with severe course of the disease and oxygen demand. The duration of rehabilitation program was 14 days, observation periods: on 1st, 7th and 14th day. Online Stroop Test, Beck Depression Inventory, Spielberger-Khanin test, The Faces Pain Scale-Revised, Epworth Sleepiness Scale, Pittsburgh Sleep Quality Questionnaire were used. Rehabilitation program consists of: physical exercises, massage of the neck area, electrosleep and low-frequency magnetic therapy during 1st week; on the 2nd week

amplipulse in the projections of the cervical sympathetic ganglia, paravertebral and interscapular area and darsonval of the scalp region of the head were added.

Patients of I group complained about anosmia, cephalgia, cognitive impairment, increased anxiety and fatigue, of II group – dysgeusia, dyssomnia, and depression. Rehabilitation eliminated cognitive dysfunction, depression, cephalgia, drowsiness and dyssomnia on the 7th day in patients of I group, and in patients of II group on the 14th day. Thus, 9,4% patients of II group after of rehabilitation had manifestations of minor recurrent headache and drowsiness.

Patients after Coronavirus disease, who needed oxygen therapy at the hospital stage, need long-term rehabilitation program.

#### PP 22

### HOUSE DUST MITE SENSITIVITY IN ATOPIC CHILDREN WITH TOL-LIKE RECEPTOR 2 POLYMORPHISM

*Volosovets Olexander, Mozyrska Olena*

*O.O. Bogomolets National Medical University, Kyiv, Ukraine*

**Introduction:** Atopic dermatitis is a chronic recurrent inflammatory skin disease that affects 5-20% of children. Airborne allergens derived from house dust mites can cause atopic dermatitis. TLR2 play an important role in the recognition of house dust mite allergens. The aim of this study was to investigate the prevalence of sensitization to house dust mites in children with atopic dermatitis and the role of TLR2 rs4696480 polymorphism in the development of sensitivity to house dust mites.

**Materials and methods:** The study included 100 patients with atopic dermatitis. Genotyping of the polymorphism TLR2 rs4696480 was performed in the patient group using real-time PCR. Measurements of sIgE to dust mites were performed by Western blotting according to the manufacturer's protocol (Simesta-Medivis, Ukraine-Germany).

**Results:** Sensitization to house dust mites was found in 48% of children. Children with elevated levels of specific IgE to dust mites had a significantly higher SCORAD index than patients without sensitization ( $p < 0.001$ ). In the group of children sensitized to house dust mites, there were significantly higher levels of total IgE ( $p < 0.001$ ) and a longer course of the disease ( $p < 0.05$ ). There was no statistically significant difference in the distribution of genotypes depending on the presence of sensitization to dust mites (OR=1.250 (0.481-3.245)) for AA and AT, OR=2.125 (0.715-6.315 (0.715-6.315)) for AA and TT).

**Conclusion:** This study showed that the susceptibility to dust mites among children with atopic dermatitis is 48%. The presence of susceptibility to house dust mites affects the severity of the disease. There is a need for further study of the factors predisposing to the development of epicutaneous sensitization in children with atopic dermatitis.

#### PP 23

### TREATMENT AND REHABILITATION OF PATIENTS WITH PRIMARY PERIODONTITIS ASSOCIATED WITH CHRONIC PERSISTENT HERPES VIRUS INFECTION

*Tetiana Volosovets, Anton Volosovets*

*Shupyk National University of Healthcare of Ukraine, Kyiv, Ukraine*

**Introduction.** Periodontal diseases associated with persistent viral and bacterial infection are difficult to treat and lead to a significant reduction in the functionality of the dental system as a whole. They are characterized by a long period of recovery and subsequent rehabilitation.

**Materials and methods.** Examination of 290 adult patients with primary periodontitis revealed persistence of herpes virus infection in 153 (52.79%) individuals with a predominance of its associated forms in 135 (88.23%) individuals. The highest number of recurrences of GVI in the oral cavity was observed in patients aged 18-24 years.

Patients were divided into 2 groups. The first group included 87 patients who at the time of examination had no visible signs of herpesvirus infection in the oral cavity, the second group (66 people) included patients with existing herpesvirus lesions in the oral cavity. For the treatment and rehabilitation of patients of group 1 we have proposed a combined scheme with the inclusion of immunomodulators of plant origin with antiviral effect. For the treatment of patients in group 2 standard therapy with antiviral drugs was used (valacyclovir orally and cycloferon 5% liniment for applications to the elements of the lesion).

**Results.** After the treatment, the dynamics of index and biochemical parameters in patients of groups 1 and 2 significantly improved, although the results obtained after treatment in the groups differed significantly due to the predominant indicators of group 1. Patients were given recommendations for oral care, individual selection of care products. After 6 months, the picture of stable remission was observed in 97.65% of patients of the first and 85% of the second group. After 1 year, the tendency to stable remission was observed in 93.6% of patients in group 1 and 73.1% of patients of group 2.

**Conclusions.** The effectiveness of treatment according to our proposed scheme is 12.65% higher than the effectiveness of treatment according to the generally accepted scheme. The efficiency of rehabilitation with the usage of the proposed drug exceeds the efficiency of rehabilitation of patients treated and rehabilitated according to conventional schemes by 20.5%.

#### PP 24

### WAYS OF MEDICAL AND PSYCHOLOGICAL REHABILITATION OF CHILDREN, WHO HAVE SUFFERED AS A RESULT OF RUSSIAN MILITARY AGGRESSION AGAINST UKRAINE

*Oleksandr Volosovets<sup>1</sup>, Sergiy Kryvopustov<sup>1</sup>, Sergiy Guryev<sup>2</sup>, Anton Volosovets<sup>3</sup>, Olena Mozyrska<sup>1</sup>, Olga Dzuba<sup>1</sup>, Marya Kryvopustova<sup>1</sup>, Natalia Slusar<sup>1</sup>, Lylia Korkh<sup>1</sup>, Iryna Dzuba<sup>1</sup>, Svetlana Iordanova*

*<sup>1</sup>Bogomolets National Medical University, Kyiv, Ukraine, <sup>2</sup>«Ukrainian reaches and practical centre of emergency medical aid and disaster medicine Ministry of Public Health of Ukraine», Ukraine, <sup>3</sup>Shupyk National University of Healthcare of Ukraine, Kyiv, Ukraine*

**Introduction.** Russia's military aggression against Ukraine is lasting for three months now. Children and women are suffering the most from this war and its aftermath, because they have become targets of violence. According to preliminary analysis, more than 24,000 civilians have been killed so far, including 200 Ukrainian children and more than 300 children who have been injured and disabled. More than 1.7 million children and their parents have been forced to leave Ukraine and are now became refugees in EU countries. The consequences of war have a profound effect on their health and well-being, and for some it will last for a lifetime.

The hostilities directly led to chronic stress and the destruction of the children's habitual world, where they felt safe. This was due to the tragic events witnessed by these children: violence of the occupiers (massacre of civilians in Bucha, barbaric destruction of the population of Mariupol, Kharkiv, Volnovakha, Irpen, Borodyanka, Trostyanets, etc.), loss of home, relatives and friends, forced change of residence and schools, information wars.

As a result, such children have suffered from severe trauma, accompanied by fear, anxiety, loss of security, which is subsequently realized in post-traumatic stress disorder and leads to the development of mental and behavioral disorders.

According to the results of our retrospective medical and statistical research, children from Donetsk and Luhansk regions of Ukraine, where hostilities took place during the last 8 years, have demonstrated an increase of mental and behavioral disorders and growth of number of children with disabilities due to this pathology.

Such children's mental disorders have led to the increasing of incidence of epilepsy, infectious diseases, respiratory diseases, bronchial asthma, pneumonia, cardiovascular disease and oncology in war-torn regions in comparison with the national average level.

Conclusion. These children need constant medical and psycho-pedagogical support and rehabilitation. That's why we created individual comprehensive program "Cocoon of safety for the child", which includes teamwork of parents (caregivers), pediatricians and family physicians, child psychiatrists and psychologists.

PP 25

### NEURODEGENERATIVE REHABILITATION PROGRAM IN RIGA EAST UNIVERSITY HOSPITAL, LATVIA

*Anete Petersone, Liga Savicka, Guna Berzina, Illa Mihejeva*

*Riga East University Hospital, Riga Stradins University, Riga, Latvia*

Neurodegenerative diseases (NDD) are a common cause of functioning impairment and decrease in quality of life in adults, causing burden to society.

Riga East University Hospital Neurodegenerative rehabilitation program is evidence based rehabilitation program, based on The European Board of Physical and Rehabilitation Medicine (UEMS PRM) standards. It provides structural basis to define rehabilitation services provided, according to International Classification of Functioning, Disability and Health (ICF), as well as a framework for research.

NDD rehabilitation program provides low or moderate intensity rehabilitation integrated in all stages of medical treatment as mono or multi-professional team work. Screening is performed with aim to assess functioning and select patients for further rehabilitation services. Main outcomes are optimized functioning across all ICF components; decreased costs for treatment; reduced economic burden and improved quality of life.

The program is implemented at a multi-profile inpatient facility that provides 24-hour medical observation and emergency care. Inpatient and outpatient rehabilitation services are provided by Rehabilitation clinic.

Rehabilitation to an extent can be divided into 3 phases. In early phase patient education and succession of rehabilitation is crucial. Middle phase includes education, rehabilitation interventions for maintenance and facilitation of functioning depending on contextual factors. Late phase focuses on education and complication prophylaxis.

Specialists involved are Physical and rehabilitation medicine physician, physiotherapist, occupational therapist, speech therapist, nutritionist, social worker and clinical psychologist.

Program includes patients with the following diagnoses (according to International Statistical Classification of Diseases and Related Health Problems 10th Revision): G20, G35, G10, G11, G12, G13, G21, G22 and G30. In total 63 patients have been admitted into program from 2018 until 2021: 2018 – two patients, 2019 – 26 patients, 2020 – 15 patients, 2021 – 20 patients. Of these, 55 patients are active – receiving follow-up rehabilitation services. In 2021 eight patients were excluded from the program due to exitus letalis.

PP 26

### EXPERIENCE OF TEACHING REHABILITATION OF CHILDREN WITH PERINATAL PATHOLOGY OF THE CENTRAL NERVOUS SYSTEM AT THE MEDICAL UNIVERSITY

*Oleksandr Volosovets, Sergiy Krivopustov, Iryna Loginova, Tetiana Shevtsova*

*Bogomolets National Medical University, Kyiv, Ukraine*

*Introduction:* Lesions of the central nervous system occupy a leading place in the structure of childhood disability, majority of cases occurs

due to adverse factors in the perinatal period. According to statistics from the National Health Service of Ukraine, the frequency of this pathology in 2021 was 42.4 cases per 1000 live births. These statistics indicate the need to consider rehabilitation of newborns in training programs for future doctors.

*Materials and method:* Inclusion in students' curriculum early rehabilitation of children with perinatal pathology as an innovative strategy to improve the lives and health of children.

*Results:* The issues of etiology and pathogenesis of lesions of the central nervous system are studied by students in the fifth year of study during the topic "Newborn asphyxia and birth trauma". Students are given the opportunity to practice skills of intensive care for newborns with asphyxia, using mannequins. Students get acquainted with the technique of therapeutic hypothermia, which is the effective method of preventing the cerebral palsy. In the sixth year of study, the main attention is paid to differential diagnosis of perinatal lesions of nervous system, methods of neuromonitoring (neurosonograms, computed tomograms, electroencephalograms). Students study the protocols for the treatment of perinatal lesions of nervous system, the basic principles of rehabilitation, namely: the beginning of rehabilitation from the neonatal period, individual approach to the child, complexity and continuity of correction methods. Students get acquainted with the follow-up room in hospital and study the peculiarities of work in medical and social rehabilitation centers for children.

*Conclusions:* Improving the teaching of rehabilitation of children with perinatal lesions of the central nervous system within the study of the discipline "Pediatrics" will improve the prognosis of life, health and social adaptation of patients, early career guidance of future doctors.

PP 27

### OPTIMIZATION OF THE EARLY POSTOPERATIVE PERIOD IN PATIENTS AFTER REMOVAL OF TUMORS WITH INTRACEREBRAL LOCALIZATION

*Olha Kramareva, Anton Volosovets*

*Shupyk National University of Healthcare of Ukraine, Kyiv, Ukraine*

*Introduction.* In many institutions, it is the standard of care to admit patients to the neurosurgical intensive care unit (NICU) after any type of craniotomy. Michael A. Gropper MD, PhD, in Miller's Anesthesia, 2020

*The aim of the study.* Optimization of guidelines for early postoperative period in patients after removal of tumors with intracerebral localization.

*Materials and methods.* We have examined of 63 patients (33 men and 30 women) aged 32 to 54 years in early postoperative period with intracerebral tumors. We have developed the concept of early extubation, enhanced oral rehydration and patient follow-up in neurosurgery departments. The effectiveness of the modified method was evaluated by the results of treatment of 30 patients (group 1). The control group consisted of 33 patients who had delayed extubation, received mostly parenteral rehydration in the postoperative period and were observed in NICU.

*Results.* Patients of group 1 have demonstrated a significant reduction in infections complications and hospitalization time. Among patients of the 1st group infections complications (nosocomial pneumonia, meningitis) were 3.3% versus 6.75% in the second group. The length of hospital stay in the first group averaged 6 days versus 10 in the second group.

*Conclusions.* Usage of the concept of early extubation, enhanced oral rehydration and patient follow-up in neurosurgery departments may reduce the number of postoperative infections complications and the length of hospital stay.

*Key words:* intracerebral tumors, early extubation, oral rehydration.



## PP 28

### FEASIBILITY AND APPLICABILITY OF ICSO-R 2.0 FOR ANALYSIS OF REHABILITATION AND CATERING SERVICE PROVISION IN PATIENTS WITH DYSPHAGIA AND MALNUTRITION

*Līga Savicka, Dr. med. Guna Berzina*

*Riga East University Hospital, Latvia; Riga Stradins university, Riga, Latvia*

There are benefits to analyzing health care organization, because it promotes overall quality of services and ensures their further development. In Latvia current approaches are based on analysis of the main international and Latvian health policy documents and health care financing, analysis of Latvian healthcare system according to World Health Organization (WHO) Family of International Classifications (FIC), as well as other aspects.

The aim of this study was testing applicability and feasibility of International Classification of Service Organization in Rehabilitation (ICSO-R 2.0), to explore the meso level in service organization for neurologic patients with dysphagia and malnutrition, receiving medical rehabilitation in Latvia. A qualitative pilot study in the form of focus group interview was conducted in Riga, September 2021. Interview questions were based on ICSO-R 2.0 categories. Seven rehabilitation professionals (Physical and Rehabilitation Medicine (PRM) doctors, speech therapists and nurses) took part in the focus group. Participants were asked to describe medical rehabilitation, care and catering services provided to neurologic patients with dysphagia and malnutrition, according to ICSO-R 2.0 dimensions and categories. The interview was recorded, transcribed and relevant patterns were then identified and analyzed.

The narratives were mostly homogenous and supplemented one another. Rehabilitation team was identified to consist of PRM doctor, speech therapist, occupational therapist, physiotherapist, nutrition specialist, nurse, and nurse assistant and on occasion – radiologist and endoscopist. Focus group participants had difficulty speaking at length about aspects of 'Funding of provider' as well as 'Funding of service delivery'. Since dysphagia and malnutrition rehabilitation entails well-coordinated cooperation with catering provider, focus group participants touched upon some of the issues arising there, however, those aspects were not covered by ICSO-R 2.0, nor was it the goal of the classification. Overall, ICSO-R 2.0 was found to be feasible and applicable to analyze service provision regarding medical rehabilitation and care processes.

## PP 29

### COGNITIVE DECLINE ASSOCIATED WITH COVID-19 INFECTION IN PATIENTS HOSPITALIZED TO THE INPATIENT REHABILITATION DEPARTMENT

*Ronald Rütsep, Aet Lukmann*

*Department of inpatient rehabilitation, Clinic of Rehabilitation and Sports medicine, Tartu University Hospital, Tartu, Estonia*

*Introduction:* Studies show that patients experience cognitive decline after COVID-19 infection. Cognitive impairment is proportional to the severity of the disease and also occurs in COVID-19 patients not requiring hospitalization. The aim of this study was to perform a retrospective analysis in order to investigate post-COVID-19 cognitive impairment in rehabilitation patients.

*Methods:* The study group was comprised of patients with COVID-19 as the primary diagnosis, who were hospitalized to the department of rehabilitation during a 4-month period. There was no unambiguous assessment criteria for cognitive assessment during the study period, therefore a subjective description of cognitive function by a physician or psychologist was used based on medical records. Cognitive decline was assessed as mild when there were few problems with the patient's performance and cooperation, severe if there were significant memory, comprehension or cooperation problems and moderate if they did not

meet the criteria for mild or severe cognitive impairment. The "no assessment" criterion was used when the patient's cognition was not described in the medical records.

*Results:* The study group included 87 patients in total. Cognitive assessment was present in 65% of patients. Of these patients, 32% had cognitive impairment and 68% did not. The distribution of cognitive impairment severity was: 2% with mild, 7% with moderate, and 10% with severe impairment. All patients with cognitive impairment were over 74 years of age. Patient who required intensive care, 8% had cognitive impairment and 92% did not ( $p=0.03$ ).

*Conclusion:* All COVID-19 patients should receive primary cognitive assessment, as studies have shown evidence of cognitive deficits. Standardized objective cognitive assessment improves the quality of medical records and helps identify patients in need of further intervention. Following COVID-19, the course of neuropsychiatric complications is potentially prolonged, so dynamic assessment and monitoring of patients, both in outpatient and inpatient setting, is important.

## PP 30

### ACUTE REHABILITATION PROGRAMME FOR PATIENTS AFTER BREAST CANCER

*Agnese Kārklīņa, Līga Savicka, Illa Mihejeva, Guna Bērziņa, Aivars Vētra*

*Riga East University Hospital Riga Stradiņš University, Riga, Latvia*

*Background.* In Latvia the incidence and mortality from breast cancer ranks first among all malignancies in women. Breast cancer and its treatment cause physical and psycho-emotional disorders to the patient, which makes difficulties to perform self-care and daily life activities, to integrate into society, thus leading to a decrease in the quality of life.

Rehabilitation after an acute condition should be started as soon as possible; it plays an important role in providing the necessary ongoing care and thus reducing the consequences of disability. It is important not only to start rehabilitation in time, but also to ensure its continuity. The establishment of a rehabilitation programme would promote an equitable, standardized and evidence-based set of rehabilitation services, as well as improve health outcomes and the quality of health care services.

*Methods.* The program is based on a systematic literature review of functional limitations, assessment tools, interventions, and in the UEMS (The European Union of Medical Specialists) programme accreditation format.

*Results.* The developed programme includes multiprofessional, low or moderate intensity rehabilitation in the acute phase of hospitalization. The goal of the programme was to educate the patient.

For each of the involved rehabilitation specialists, the rehabilitation technologies to be used are listed according to the professional standard. A multi-professional rehabilitation team which participates in the programme - physiotherapists, occupational therapists, clinical psychologists, art therapist, social workers.

*Conclusions.* A rehabilitation programme has been developed for use in inpatients with breast cancer at the Riga East Clinical University Hospital. Before implementing a programme, it is necessary to check its usability. The outpatient rehabilitation (phase II) and the lymphedema rehabilitation programme follow from this program.

## PP 31

### POLYMORPHISM OF VITAMIN-D RECEPTOR (VDR) GENE AND VITAMIN-D-BINDING PROTEIN (VDBP) GENE IN CHILDREN WITH FOOD PROTEIN-INDUCED ENTEROCOLITIS SYNDROME

*O.G.Shadrin, M.H. Horianska*

*SI "O.M.Lukyanova Institute Of Pediatrics, Obstetrics And Gynecology NAMS of Ukraine", Kyiv, Ukraine*

The prevalence of allergic diseases today continues to grow, including allergic diseases of the gastrointestinal tract. The pathogenetic role of vitamin D in allergic diseases encourages the study of genetic component's role in this pathology.

**Materials and methods.** 18 children with food protein-induced enterocolitis syndrome (FPIES) were examined. The average age of the subjects was 8.5 months. FPIES was diagnosed according to the International Guidelines of the Adverse Reactions to Foods Committee of the American Academy of Allergy, Asthma and Immunology (2017). Analysis of the BsmI (rs1544410) polymorphism of the VDR gene and the rs7041 (c.1296T>G) polymorphism of the VDBP gene was performed by polymerase chain reaction (PCR) with the addition of oligonucleotide sequences, followed by PCR of the restriction fragment length polymorphism. 85.6% of examined children with FPIES had insufficient serum concentrations of 25-hydroxycalciferol.

**Results.** Analysis of the polymorphic locus BsmI A/G (rs 1544410) of the VDR gene showed that the G allele was more common (58.33%) in patients with FPIES compared to allele A (41.67% of patients), however the data had no statistical significance. The G/A genotype was significantly more common in children with FPIES (61.11%) than the A/A genotype (11.11%) ( $p<0.05$ ). 27.78% of the examined patients had the G/G genotype.

According to the analysis of the polymorphic locus rs7041 of the VDBP gene, it was noted that the T allele was found in 58.33% of examined children, compared with the G allele, which had 41.67% of patients. 22.22% of children with FPIES had the G/G genotype, and other children had T/T and G/T genotypes (38.89% each).

**Conclusions.** In children with FPIES the G/A genotype of the BsmI A/G polymorphic locus of the VDR gene predominated in frequency over the A/A genotype ( $p<0.05$ ). Determination of VDR gene polymorphism in these patients may be important in the correction of vitamin D deficiency.

#### PP 32

### DEVELOPMENT AND TESTING OF REHABILITATION GOAL SETTING TOOL (REGOS)

**Kathrin Förster, Christoph Gutenbrunner, Christoph Korallus, Christoph Egen, Andrea Bökel**

*Department of Rehabilitation Medicine of Hannover Medical School, Hannover, Germany*

**Background:** The use of digital technologies has increased in the medical field, those also enable patients to participate in their disease management. This includes participation in rehabilitation planning and decision making by being involved in the process. Since 2017, a special Rehabilitation Goal Setting Tool (ReGoS) has been developed and implemented.

**Methods/ Tool:** ReGoS is a self-report questionnaire, developed based on domains from the ICF-core-set rehabilitation, raising functional limitations. In addition to the items evaluation using a likert- scale, free text questions ask for the patients most relevant functioning problem and main rehabilitation goal. Before the medical consultation, the patient uses the tool on a tablet computer subsequently the profile is generated on the doctor's desk top computer. Patient and doctor define a rehabilitation goal in consensus with each other during the conversation. The achievement can be monitored by the REGOS data over time.

**Results:** In a pilot phase (2017-2019), ReGoS was used with 1.008 patients for the initial consultation. The average age of the respondents was 53.9 years (13–92 years) and 66% ( $n=665$ ) were female. The main diagnosis group were related to musculoskeletal disorders (62,1%), followed by mental and behavioural disorders with 14.3%.

**Conclusion:** ReGoS provides relevant information for rehabilitation goal setting, including participative treatment goal setting and the patients detailed functional capacity profile. Using the data changes in the functional profile can be monitored and therapy can be adjusted accordingly. It can also help to derive rehabilitation needs for other target groups in the future in order to improve quality of care.

#### PP 33

### MEDICAL REHABILITATION SUCCESS AMONG EMPLOYEES WITH MUSCULOSKELETAL DISORDERS ACCORDING TO SOCIODEMOGRAPHIC FACTORS IN GERMANY

**Maria Weyermann**

*Niederrhein University of Applied Sciences, Krefeld, Germany*

**Objective:** This study aims to identify sociodemographic determinants that influence success of medical rehabilitation in Germany.

**Methods:** Analysis based on Scientific Use Files of administrative pension records from the German Federal Pension Insurance (20% random samples of all cases of medical rehabilitation). We included 89.219 employed persons aged 18 to 60 years undergoing medical rehabilitation due to musculoskeletal disorders between 2010 and 2012. Follow-up data to determine rehabilitation success were available until 2019.

Risk of early retirement during seven years after rehabilitation (ER) was estimated using cox proportional hazard models, risk of low work ability at discharge (LWA) and failed return to work in the year after rehabilitation (FRW) was estimated using logistic regression models. Age, sex, citizenship, school and vocational education as well as annual income before rehabilitation were considered as potential risk factors.

**Results:** At the end of rehabilitation physicians assessed low work ability for 6.185 out of 83.708 employees (7.4%). Percentage of insufficient return to work one year after rehabilitation was 22.4% (19.783 out of 88.487) and 5951 patients (6.7%) received a disability pension during 7-year follow-up.

Non-German citizenship, older age, low educational level and low annual income before rehabilitation were risk factors for each outcome of work ability. For example, adjusted risk among persons with low annual income (1st quartile vs. 4th quartile, OR / HR [95%-CI]) was 2.3 [2.2;2.5] for FRW, 6.3 [5.7; 7.1] for LWA, and 2.7 [2.5; 3.0] for ER. Adjusted risk among persons without German citizenship (vs. employes with German citizenship), OR / HR [95%-CI] was 1.2 [1.1;1.3] for FRW, 1.3 [1.1; 1.4] for LWA, and 1.1 [1.0; 1.3] for ER. **Conclusions:** Our results deliver further evidence that success of medical rehabilitation is lower among socially disadvantaged employees in Germany.

#### PP 34

### RESULTS OF THE “COVID-REHAB UKRAINE PROJECT”: INFORMATION SUPPORT FOR REHABILITATION PERSONS AFTER COVID-19

**Dolynna Olena**

*National Pirogov Memorial Medical University, Vinnytsya; Vinnytsia Regional Hospital, Vinnytsia, Ukraine*

**Introduction:** The COVID-19 pandemic has led to an increase in the number of people in need of rehabilitation due to various complications. The availability of rehabilitation assistance, multidisciplinary rehabilitation teams and individual rehabilitation specialists is declining with the distance from district centers. The situation has become even more complicated in the face of armed aggression. In this situation, remote resources to support rehabilitation become especially relevant.

**Methods:** Rehabilitation experts from the European Union, the USA, the Ukraine, a video creation specialist and a site development programmer were involved in the implementation of the project tasks.

**Results:** A website and YouTube channel of the project were created to provide informational support to people with coronavirus disease, convalescents, their family members and caregivers. Specialists from the European Union conducted webinars for rehabilitation specialists from Ukraine on topics related to the rehabilitation of complications of COVID-19. The lectures are posted on the project's website and YouTube channel in the “Articles” - “For Professionals” section.

Ukrainian rehabilitation experts have created printed materials and recorded video lectures for patients on the rehabilitation of people with coronavirus and convalescents. The lectures are posted on the

YouTube channel COVID-REHAB and the project website in the section “Articles” - “For patients”.

**Conclusions:** The project created an information resource with text and video materials in various areas of rehabilitation: rehabilitation medicine, physical therapy, occupational therapy, speech and language therapy, and psychology. The created resource will increase access to information on post-COVID-19 rehabilitation, regardless of the location of the person and access to rehabilitation specialists.

#### PP 35

### INITIAL RESULTS OF THE FUNCTIONAL CAPACITY EVALUATING AMA<sup>®</sup>-TEST IN SOCIAL- MEDICAL EVALUATION IN REDUCED EARNING CAPACITY PENSION PROCEDURE IN GERMANY

**Judith Gartmann<sup>1</sup>, Norbert Geissler<sup>2</sup>, Elena Andreeva<sup>1</sup>**

<sup>1</sup>Clinic for Rehabilitation Medicine, Hannover Medical School, Hannover, Germany, <sup>2</sup>German Pension Insurance Braunschweig-Hannover, Hannover, Germany

**Background:** In Germany, Functional Capacity Evaluations (FCE) are accepted assessments to evaluate the performance capacity in applicants for disability pension in the framework of the early retirement procedure within the compulsory pension insurance.

To date there are no assessments focusing on the general employment market with light physical workload. Therefore, we developed AMA<sup>®</sup>-Test, a new simulation model for light physical workload aiming at low-risk assessment of functional capacity in claimants for disability pension. The test was calibrated during 2018/ 2019 on healthy volunteers (Gartmann et al. 2020).

**Objective:** The focus of this survey is the applicability of the AMA<sup>®</sup>-Test for social-medical evaluation in claimants for disability pension due to orthopedic diseases.

**Methods:** Survey results of about 60 applicants for reduced earning capacity pension at a regional department of German Pension Insurance (Braunschweig-Hannover) were analysed. After each completed AMA<sup>®</sup>-Test a consistency and pain behavior analysis was performed. To this end, the assessment employs proven consistency principles (Geissler et al. 2016, 2017).

**Results:** The initial results from orthopedic social-medical evaluation are presented. Besides, the majority of the participants being able to complete the AMA<sup>®</sup>-Test successfully, there were a number of dropouts with a good test consistency.

**Conclusion:** This study demonstrates the feasibility of the AMA<sup>®</sup>-Test for the orthopedic social-medical evaluation at regional department of the German Pension Insurance to prove the functional capacity for the general employment market with light physical workload. In the next step the results should be extended to supra-regional level.

#### PP 36

### THE BIOPSYCHOSOCIAL APPROACH OF THE WHOLE-BODY CRYOTHERAPY IN PHYSICAL AND REHABILITATION MEDICINE

**Kristine Petersone**

Member of the Board of the Latvian Cryotherapy association, Latvia

Sharing experience from more than 10 years of personal work in Latvia with whole body cryotherapy. Introducing to look into whole

body cryotherapy as one of the physical and rehabilitation medicines therapy.

The presentation will reveal the impact of whole-body cryotherapy on the body and how it has helped patients recover after postcovid symptoms and sports injuries. Krio centre in Riga is working with the Latvian Olympic team pro athletes and football players from the national football team and Riga football clubs. Studies of whole body cryotherapy are rapidly growing in sports medicine every year. Will also have a look at references from studies and cryotherapy development in the world (Europe and USA).

In future developing biopsychosocial approach in physical and rehabilitation medicine, it is worth looking at whole body cryotherapy as a complementary therapy to gain better results in a shorter time.

#### PP 37

### BENEFITS OF CARDIAC REHABILITATION AND ADDITIONAL STRENGTH AND BALANCE TRAINING IN THE ELDERLY AFTER ACUTE CORONARY SYNDROME

**Aurelija Beigienė, Daiva Petruševičienė, Raimondas**

**Kubilius, Jūratė Macijauskienė**

Lithuanian University of Health Sciences, Kaunas, Lithuania

**Background:** Specific exercises for strength and balance might be successfully integrated into the usual cardiac rehabilitation (CR) program, to expect better results of physical performance in older persons. The aim of this study was to assess the effectiveness of two different additional resistance and balance training programs during CR in patients aged ≥65 years after a percutaneous or surgical intervention due to acute coronary syndrome.

**Methods:** Single-centre randomized controlled trial. 63 participants were randomly assigned to groups: control (CG,  $n=19$ ), intervention-1 (IG-1,  $n=26$ ), intervention-2 (IG-2,  $n=18$ ). All patients participated in the usual inpatient CR program (mean duration of  $18.7 \pm 1.7$  days). In addition, IG participants received resistance and balance training (3 days/week): IG-1 – with traditional means of physical therapy, IG-2 – with mechanical devices. 6-minute walk test (6MWT, meters), veloergometry (workload, watts), short physical performance battery test (SPPB, score), and one-repetition maximum test (1RM, kilograms) for leg press were used to assess functional and physical capacity.

**Results:** The mean age was  $72.9 \pm 5.5$  years; 73% were men. As a result, 6MWT (IG-1 285 (233;316) vs. 388 (338;419.5), IG-2 348,5 (336.5;403) vs. 434.5 (392.5;475.2), CG 319 (224;406) vs. 420 (350;466)), workload (IG-1 64 (51;74.7) vs. 75 (59;84.5), IG-2 78.5 (58.2;93) vs. 93.5 (58.2;107.7), CG 85 (58;98) vs. 89 (57;125)), SPPB (IG-1 9 (7.7;10) vs. 10.5 (9.2;11.7), IG-2 10.5 (9.7;11.2) vs. 11.5 (10;12), CG 9 (8;10) vs. 11 (9;12)), 1RM (IG-1 31.5 (28;48) vs. 48 (41.2;56), IG-2 38 (31.7;46.2) vs. 55.5 (42.7;56), CG 45 (33;52) vs. 50 (45;65)), all variables improved significantly ( $p < 0.05$ ) in all groups with no significant difference between groups.

**Conclusions:** There were significant improvements in physical and functional capacity in elderly patients participating in all three CR programs. Additional benefit from the resistance and balance training with traditional physical therapy means and exercises with mechanical devices could not be confirmed.