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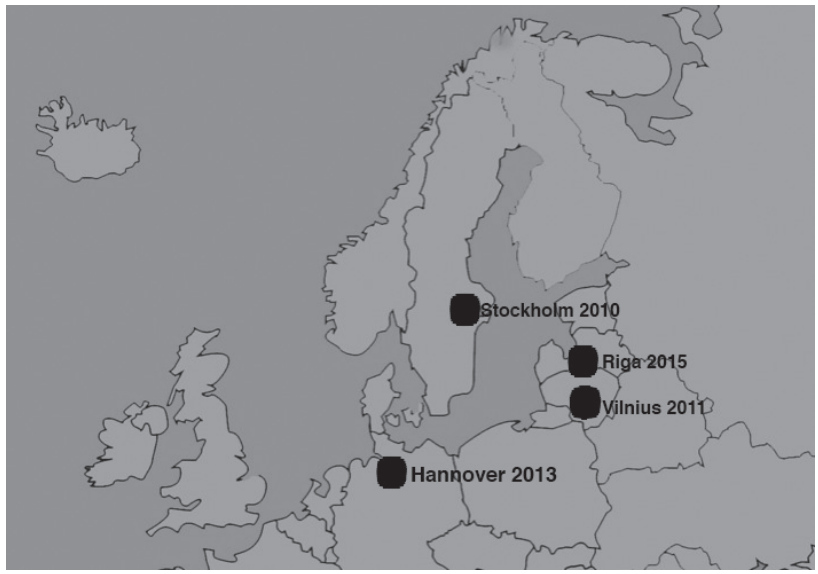
3rd Baltic and North Sea Conference on Physical and Rehabilitation Medicine

118th Congress of the German Society of Physical Medicine and Rehabilitation

Annual Congress of the Austrian Society of Physical Medicine and Rehabilitation

A joint conference/congress on Patient Management Strategies & Translational Research on PRM

Hannover, Germany
September 25–28, 2013



Baltic & North Sea Conferences on PRM

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3RD BALTIC AND NORTH SEA CONFERENCE ON PHYSICAL AND REHABILITATION MEDICINE

IL = Invited lecture
OP = Oral presentation free communication
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Pre-conference workshops on team co-operation
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Workshop B: How to avoid "monoprofessional thinking and interprofessional competition" in team work?

Workshop C: Who chould be the leader or moderator of rehabilitation teams in different settings?

Workshop D: How to be successful in team working in acute rehabilitation: Traumatic brain injury?

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IL03 Rehabilitation in Chronic musculoskeletal pain – lessons learned from basic research, *Marta Imamura*

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IL06 Psychological risk factors and mechanisms of pain, *Monika Hasenbring*

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IL13 Application of qualitative methods in rehabilitation: Goal-setting in Rehabilitation, *Diane Playford*

IL14 A qualitative research study on decision-making processes in disability assessment procedures, *Susanne Bartel, Heike Ohlbrecht, Dorothea Tegethoff, Ernst von Kardorff*

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OP03 Reliability of three-dimensional gait analysis in adults with spinal cord injury, *Pia Wedege, Grethe Maanum, Kathrin Steffen, Vegard Strøm, Arve Opheim*

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PP45 A comparison of effects of contrast-bath on circulation of non-affected lower limb in healthy and diabetic women, *Maryam Ebrahimian, Shohreh Taghizadeh, Zohreh Shafizadehgan, Fatemeh Fakhreahmad*

BODY STRUCTURES

PP46 Anatomical localization of motor entry point in thyroarytenoid muscle for laryngeal electromyography, *Soo Yeon Kim, Myung Eun Jung*

PP47 Lateral spread responses on facial motor nucleus suppression using intravenous diazepam in hemifacial spasm, *Soo In Choi*

INVITED LECTURES

TRACK 1: TRANSLATIONAL RESEARCH IN REHABILITATION MEDICINE ("FROM MICE TO MAN") (IL01–IL07, IL16–IL19)

IL01

OLLE HÖÖK LECTURE: HOW TO LINK BASIC RESEARCH WITH CLINICAL PRACTICE: PHYSICAL FUNCTION AND TRAINING IN REHABILITATION MEDICINE

Gunnar Grimby, MD, PhD
Section of Clinical Neuroscience and Rehabilitation, Department of Neuroscience and Physiology, University of Gothenburg, Sweden

Olle Höök, in honour of whom this lecture is given, was professor in Medical Rehabilitation in Göteborg 1966–1983, founder and Editor-in-Chief of Scandinavian Journal of Rehabilitation Medicine 1968–1998, my clinical mentor in rehabilitation, a colleague as professor and a very good friend. He saw the importance of having experimental and laboratory research closely connected to clinical work. There is unfortunately often a too long delay until results of basic research are implemented in clinical research and practice. Ways to enhance this would be: (1) arrangements for close connection between departments in basic medical sciences and clinical sciences, as to incorporate them into the same university institute, (2) clinical researchers have initially spent some time in basic research departments, (3) researchers in basic department have also an affiliation in clinical departments. Examples of these approaches are mentioned. In this presentation examples are given how knowledge in exercise and muscle physiology have been used in developing clinical treatment modalities especially in endurance and resistance training in rehabilitation. First are presented some basic definitions and concepts in exercise and muscle physiology and on muscle adaptation. Exercise testing and strength measurements and their use in designing training protocols are discussed as also central and peripheral limitations and risk factors in training. Examples are the physiological meaning of a maximal exercise test in persons with specific limitations in exercise performance and of interpretation of voluntary strength testing. The effects of endurance training are exemplified using evidence-based information from patients after myocardial infarction, stroke and generalized unspecific pain (fibromyalgia), and of resistance training after stroke and in patients with neuromuscular disease, especially in post polio. The integration of clinical limiting factors and basic physiological aspects for rehabilitation programs are discussed.

IL02

UPDATE IN NEUROPLASTICITY AND REHABILITATION – IMPACT OF THE GENOTYPE

Kristian Borg, MD, PhD
Karolinska Institutet, Stockholm, Sweden

Neuroplasticity refers to changes in nervous function and structure and is influenced by a number of factors, some with a molecular and genetic background. There is an increasing knowledge of the genetic influence on motor function. The assumption that all humans benefit from physical activity does not hold true. The difference in outcome of physical training is mostly due to genotype differences. Furthermore, concerning disorders in the peripheral nervous system one genotype may lead to different phenotypes and vice versa. Different genes are of importance for neurodegenerative disorders and selective genes are upregulated during brain ischemia. There is now evolving data that indicate that brain plasticity and repair, and thus recovery from stroke or traumatic brain injury, are influenced by genetic factors. Motor learning is influenced by the brain dopamine system and there are reports of delayed motor and cognitive function after stroke coupled to specific genes. It is thus of importance in rehabilitation to increase the neurobiological knowledge. Rehabilitation programs should be more individualized and tailored taking into account the patients genotype. Molecular and genetic factors will influence the result of rehabilitation programs regarding function, activity and participation. In the future, based on molecular genetics, new pharmacological and other interventions may be developed. Furthermore, the increased neurobiological developments may crystallize biomarkers to clarify the results of interventions and a more adequate prognosis may follow.

IL03

REHABILITATION IN CHRONIC MUSCULOSKELETAL PAIN – LESSONS LEARNED FROM BASIC RESEARCH

Marta Imamura, MD, PhD

Sao Paolo, Brazil

Abstract is missing.

IL04

TAKING BASIC MECHANISMS INTO PAIN REHABILITATION

Gunilla Brodda Jansen, MD, PhD
Karolinska Institutet, Stockholm. Div of Rehabilitation Medicine, Dept of Clinical Sciences, Danderyds Hospital, Stockholm, Sweden

The knowledge about basic mechanisms in nociception and pain is constantly increasing along with the number of scientific articles published and the concepts of pain amplification and sensitisation are studied in detail and well established in animal research as well as in human pain models. However, the implementation of basic scientific findings into clinical practice is somewhat more difficult. But growing evidence is pointing at the complex interaction between psychological, genetic as well as environmental factors, and how they can be addressed in a clinical setting. Musculoskeletal pain conditions such as fibromyalgia and low back pain have been studied in detail, but we still lack specific biological markers for the accurate diagnosis. Treatment strategies are aiming at a bio-psycho-social intervention but has they changed according to the new knowledge in the last decade? Is it possible to tailor treatment for patients by implementing preclinical pain research, and thereby individualising pain rehabilitation? Could this approach improve results in rehabilitation by increasing our patients' functions, activities, and participation?

IL05

GENETIC AND MOLECULAR ASPECTS OF WIDESPREAD PAIN

Eva Kosek, MD, PhD
Department of Clinical Neuroscience, Karolinska Institute, Stockholm, Sweden

Fibromyalgia is chronic pain syndrome characterized by generalized pain and increased pain sensitivity and has been linked to dysfunctional endogenous pain modulation. Functional genetic polymorphisms affecting the metabolism of serotonin and catecholamines have been linked to altered function of endogenous pain modulation in healthy subjects (1–3) as well as FM patients (4) and are overrepresented among chronic pain populations (5). Studies using functional magnetic resonance imaging (fMRI) to assess pain related

cerebral activation have shown a reduced ability of FM patients to activate a primary link in the descending pain regulatory system in response to pain provocation (6). Recently, we could show that pharmacological treatment with serotonin-noradrenalin re-uptake inhibitors (SNRIs) can have a normalizing effect on pain sensitivity and on cerebral response to pain stimuli in FM patients (7). The mechanisms of analgesic action of SNRIs is not fully understood and could, in addition to enhancing pain inhibitory mechanisms, also have central anti-inflammatory effects. Glia cell activation leading to central inflammation has been proposed as a potential factor leading to chronic widespread pain. Recently, we found indirect evidence of CNS inflammation in FM patients in the form of elevated interleukin 8 (IL-8) in the cerebrospinal fluid of FM patients (8). The implications of our findings in relation to other pain conditions as well as future treatment options will be discussed.

1) Lindstedt et al. PLoS One. 2011; 6: e18252.
2) Kosek E et al. Molecular Pain 2009; 5: 37.
3) Jensen et al. PloS ONE 2009; 4: e6016.
4) Martínez-Jauand et al. Eur J Pain 2013; 17: 16–27
5) Buskila D. Best Pract Res Clin Rheumatol 2007; 21: 535–547.
6) Jensen et al. Pain 2009;144: 95–100.
7) Petzke et al. Scan J Pain, 2013; 4: 65–74.
8) Kadetoff et al. J. Neuroimmunology, 2012; 242: 33–38.

IL06

PSYCHOLOGICAL RISK FACTORS AND MECHANISMS OF PAIN

Monika Hasenbring, Dr phil
Department of Medical Psychology and Sociology, Faculty of Medicine, Ruhr-University of Bochum, Germany

Firstly, the current presentation will focus on psychosocial risk factors that indicate an increased probability of developing chronic pain, disability accompanied with emotional distress, with main focus on patients with acute/subacute low back pain. Results are interpreted based on the Avoidance-Endurance Model of the development of chronic pain which conceptualizes short-term continuously or intermittently occurring benefits but long-term consequences. Second, the role of cognitive-affective and behavioural mechanisms will be elucidated focusing on experimental as well as clinical research. Among cognitive-affective mechanisms the link between pain, cognitive responses to pain and fear/anxiety or depression will be conceptualized based on recent models of emotion-regulation. This approach takes into account that in daily life there often occurs an individual conflict when pain tends to interrupt daily life activities, leading to high mental load which needs to be reduced, sometimes realized by maladaptive conscious or non-conscious processes. Among behavioural mechanisms, I'll focus on the role of physical activity and specific kinds of physical load caused by non-physiological body postures, behavioural endurance and increase in pain and, partly in disability. This approach is based on objective measures assessing dynamic and static aspects of physical activity in daily life. Third, fist results of individually tailored, risk-factor based cognitive-behavioural interventions from two randomized trails, conducted in patients with specific and non-specific back pain, will be reported. Results indicated, that individually tailored, risk factor based interventions additionally to the medical treatment, may lead to an effective prevention of pain and disability.

IL07

FROM BASIC MECHANISM TO FUNCTIONAL ASSESSMENT

Christoph Gutenbrunner, MD, PhD
Department of Rehabilitation Medicine; Hannover Medical School, Hannover, Germany

One of the major challenges in rehabilitation of patients with pain is the risk of the development of chronic generalised pain. It is known from numerous studies that besides pain duration, mental and psychosocial problems are risk factors for the development of chronic pain; these include among others depressive mood, catastrophising thoughts, social isolation and lack of control. As known from functional imaging studies in chronic pain, the cortical representation of pain is enlarged as compared to subjects without pain. Other studies show that in psychosocial stress, e.g. isolation, similar areas are activated. Additionally, it was shown that in chronic pain many mediators are involved, such as NGF, BDNF, anandamide and Interleukins. Some of them are correlated to mood disturbances such as depression and seem to be modified by psychosocial support. These findings suggest that changes in brain function as well as in pain mediators are part of the pathomechanism of chronic pain. Modern concepts of rehabilitation of patients with chronic pain, or at risk to become chronic pain, include strategies to avoid or reduce psychosocial risk factors (e.g. by cognitive behavioural treatments) as well as to re-increase general pain thresholds (e.g. by aerobic exercise). In order to apply the right intervention to the right time to the right patient information about the risk of development of chronic pain and/or the decrease of pain thresholds is needed. For the assessment of pain patients in rehabilitation this should include: (*i*) Pain intensity and pain duration. (*ii*) Pain thresholds (and autonomous dysregulation). (*iii*) Mood disturbances, in particular depression and anxiety. (*iv*) Behavioural risk factors and individual coping style. (*v*) Psychosocial and environmental risk factors. Recent studies support that the detection of pain mediators, such as NGF, BDF, anandamide, IL-6 and others may be useful in the diagnosis too. However, up to now no studies have been found about the clinical significance of such parameter in the diagnosis of chronic pain. At present, functional imaging is not feasible in routine diagnostics of chronic pain. Future research should also focus on biochemical markers for pain chronification and investigate their validity in the assessment of patients with chronic pain.

IL16

BONE AND LIGAMENT ADAPTATION AND CONSEQUENCES FOR CLINICAL REHABILITATION PROGRAMS

Michael Jagodzinski, PhD
Hannover, Germany

Abstract is missing.

IL17

ADAPTATION OF THE CARTILAGE AND CONSEQUENCES FOR CLINICAL REHABILITATION PROGRAMS

Sehim Kutlay, MD, PhD
Ankara University, Faculty of Medicine, Ankara, Turkey

Articular cartilage is an avascular and aneural connective tissue which is composed of two elements: cellular condrocytes and extracellular component. Its main functions are to provide a low friction environment for joint motion, and the distribution of loads. Chondrocytes and extracellular matrix are responsive to mechanical stimuli. During normal joint motion, chondrocytes are exposed to a complex mechanical environment that is characterized by time and spatially varying stresses and strains, hydrostatic pressure, interstitial fluid, streaming potentials and osmotic pressure changes. This micromechanical properties of chondrocytes in conjunction with biochemical factors (e.g., cytokines, growth factors), plays an important role in cartilage homeostasis and to maintain in normal joint function. The development, maintenance and destruction of cartilage are regulated by mechanical factors throughout life. Cartilage undergoes remarkable alterations in composition, organization and mechanical properties with aging and loading. When normal mechanics are altered and abnormal joint loading occurs, overloading induces morphological, molecular and mechanical changes in

cells and matrix which leads to softening, fibrillation, ulceration and loss of cartilage. From a mechano-biologic perspective, if we accept that a joint is a biomechanical organ, interaction of mechanical and biological factors can occur through many different pathways. This insight will enable us to understand the process of cartilage aging and relations between exercise and cartilage.

Hardingham T. Extracellular matrix and pathogenic mechanisms in osteoarthritis. Current Rheumatology Reports 2008; 10: 30–36.
Durham F. Biomechanical factors in osteoarthritis. Best Practice & Research Clinical Rheumatology 2011; 25: 815–823.
Bader DL, Salter DM, Chowdhury TT. Biomechanical influence of cartilage homeostasis in health and disease. Arthritis 2011, 16 pages.

IL18

MECHANISM OF SARCOPENIA AND CONSEQUENCES FOR CLINICAL REHABILITATION PROGRAMS

Michael Quittan, MD, PhD, Markus Praschak, Mag, Eva-Maria Strasser, Dr
Karl Landsteiner Institute of Remobilisation and Functional Health

Sarcopenia is defined as age-related loss of muscle strength and mass. Impaired function of skeletal muscles subsequently affects all aspects of functional health. Muscle loss may start as early as the 4th decade of life and progresses towards advanced age. More than 50% are regarded sarcopenic over the age of 80. The causes of sarcopenia are multidimensional. The loss of fast-twitch muscle fibres exceeds the loss of slow twitch muscle fibres and results in a clinically relevant loss of muscle power. On a sub-cellular level, age associated changes in the mitochondria lead to functional decline of the muscle. The reduction of motor units causes muscle fibre atrophy and loss of muscle strength. Low levels of anabolic hormones and the imbalance of pro- and anti-inflammatory cytokines are responsible for changes in body composition of older adults. Reduced levels of physical activity, Vitamin D and protein are highly associated with muscle loss. Biomarkers of sarcopenia include functional tests, strength measurements and evaluation of functional impairment. Body composition, particularly appendicular skeletal muscle mass can be assessed preferably by DEXA or ultrasound. Additionally, nutritional parameters should be evaluated. The only effective therapeutic option is regular and preogressive strength training, according to various guidelines supported by regulation of Vitamin D levels and adequate protein intake.

IL19

MEDIATORS RELATED TO MOOD AND CONSEQUENCES FOR TREATMENTS

Kai Kahl, PhD
Hannover, Germany

Abstract is missing.

SPECIAL ISSUE SESSION 1: INCLUSION OF THE PATIENTS IN DECISION MAKING IN REHABILITATION MEDICINE (IL08–IL11)

IL08

ADAPTED MODELS FOR DECISION MAKING IN REHABILITATION (FROM ACUTE TO LONG TERM)

Anthony Ward, BSc, MD, FRCPEd, FRCP
Haywood Hospital, Stoke on Trent, UK

Early rehabilitation in acute settings is an activity under the clinical responsibility of PRM specialist and the tasks are to deliver specialist rehabilitation programmes for all patients during an acute hospital admission and provide a triage for further rehabilitation. It should also separate those with and without complex needs, who require highly specialised programmes. There are many issues to address in early mobilisation, as well as dealing with medical complications. Good clinical demands that patients move from one setting with an agreed rehabilitation plan, so that they can meet their rehabilitation goals. This also has the benefit on the health care system in freeing acute & major trauma centre facilities. A joint rehabilitation plan between acute staff and RM staff allows for automatic pathways to be set up to rehabilitation facilities including ambulatory care, via early supportive discharge team and eventually community rehabilitation teams. It also allows for patients with complex needs to be processed separately and ensures that post-acute rehabilitation facilities have the competence among their staff to take quite unwell patients early on. Admission criteria from acute to post-acute rehabilitation are that patients should be medically stable, as well as be able, have the mental capacity and are motivated to participate in rehabilitation programmes. They should also have clear rehabilitation goals. Patients should be transferred to specialist community rehabilitation programmes as soon as possible, but those with the following attributes do need to remain in hospital for their rehabilitation. - Those who require 24h nursing/medical care for their rehabilitative needs - Those with capacity for, require and will benefit from rehabilitation - Those severely disabled people with needs only met by a multi-professional team practising inter- disciplinary rehabilitation; i.e. those with complex needs, who require >2 professionals working within a team. Thereafter, the organisation of specialist community rehabilitation should remain under the responsibility of a PRM specialist, who will develop systems to ensure that people with unmet needs of care will be identified and bring specialist assessment and attention, when this is required.

IL09

THEORIES OF DECISION-MAKING IN MEDICINE

Mirjam Körner, Dr
Department of Medical Psychology and Medical Sociology, Medical Faculty, University of Freiburg, Freiburg, Germany

Several theories of decision-making prevail in the field of medicine, since certain tasks call for a specific approach. Nowadays, the most well-known approach for involving patients in medical decisions is that of shared decision-making (SDM). SDM is one of the predominant treatment decision-making models, located between the paternalistic and informed decision-making model [1]. The main criteria for categorization of the models are information exchange, deliberation, and deciding which treatment to implement [1]. The paternalistic model corresponds to the traditional approach, where the physician informs the patient, deliberates and decides. Its counterpart is the informed decision-making model, where the physician gives all relevant information to the patient, who then deliberates and decides alone. SDM can be placed between these two models. It involves a reciprocal flow of information, and a mutual deliberation and decision-making process [1]. For this type of decision-making to be relevant and practical for the rehabilitation setting, a multidisciplinary approach involving all health care professionals in the decision-making process is required [2]. To this end Körner et al. [2] developed an expanded treatment decision-making model with the following key principles for SDM in the interprofessional context: (1) Decision-making involves the patient and all health care professionals participating in the treatment. (2) Decision-making is based on exchange of information between the health care professionals and patient and among the health care professionals in the treatment team, (3) Treatment decisions are taken between the physician or team and patient (external participation) following communication on and coordination of the patient's treatment plan in the interprofessional team (internal participation) [2, 3].

[1] Charles C, Gafni A, Whelan T. Decision-making in physician-patient encounted: revisiting the shared treatment decision-making model. Social Science and Medicine 1999 ; 49: 651–661.
[2] Körner M, Ehrhardt H, Steger A-K. Designing an interprofessional training program for shared decision-making. Journal of Interprofessional Care 2013; 27: 14–154.
[3] Körner M, Ehrhardt H, Steger A-K, Bengel J. (in press). An expanded decision-making model for interprofessional settings. In M. Keating, K. Montgomery & A. McDermott (Eds.) Patient-centred health care: Achieving co-ordination, communication and innovation. Hampshire: Palgrave Macmillan.

IL10

THE PATIENT AND DOCTOR IN SHARED DECISION MAKING IS THIS A WAY FORWARD?

Angela McNamara, Mb, BCh, FRCP(UK), FRCPI, ABPM&R, FEBPRM
National Rehabilitation Hospital, Dublin, Ireland

Medicine today has much more to offer than 50 years ago when there were battles between competing interests. Today new challenges exist as patients have growing expectations for future health care. A key relationship is between the patient and the doctor that traditionally has been hierarchical and paternalistic. While well intentioned, doing things for patients instead of with them can be profoundly disempowering and may undermine their capacity to look after them-selves. Dominance elements include professional knowledge, technical skills and professional experience, with over-dependence on technical solutions. Recently more patient involvement in planning one's own care occurs. Over-treatment and incorrect treatment may be a greater threat to the public than under-treatment. Policy makers are trying to shift the balance from complex technological hospital care towards the community with limited success. The challenge is to balance supply and demand for effective affordable health care, organized around and responsive to, the needs of those who use it. Part of the answer may rest with the patient in shared decision-making with their doctor around goals and treatment. Many see this as a non evidence-based fanciful idea. Others see it as something that leads to better decisions, quality care, and overall outcomes. This model is being increasingly used in Rehabilitation Medicine to some good effect. Effective teamwork, goal setting and good communication strategies are essential to success. Doctors must promote the concept that "we are in this together". They must be aware of roles and responsibilities, barriers to teamwork, be open to their limitations and be prepared for reflection and new learning. A focus for the future is to try to restore an appropriate balance between the way professionals and services interact with patients. Instead of being passive recipients of care, patients must be seen as partners in the business of treatment, promotion of health care and using their own expertise. Problems continue to exist as the patient moves towards the centre of the decision making process. This requires new thinking and education for all stakeholders.

IL11

INCLUSION OF PATIENTS IN REHABILITATION RESEARCH

Rolf Buschmann-Steinhage, Dr
German Federal Pension Insurance

Introduction: Politics advocate the integration of patients in coordination processes within the health care system as well as in decision-making about diagnostic and therapy – both as a means of individual participation. The UN Convention on the Right of Persons with Disabilities (UNCRPD) focuses on inclusion in all relevant decisions and processes around disability. Patients' and disabled persons' participation in research projects is a next step to fulfil this democratic goal. *Material:* Concepts essential for rehabilitation are introduced that are germane to the context of participatory rehabilitation research. They are based on the results of two workshops where researchers, patients and those working in the field developed ideas for patients' participation in research and for a screening of relevant literature. The workshops were organized by the German Association for Rehabilitation (DVfR) and the German Society for Rehabilitation Sciences (DGRW). *Result:* A stage model allowing design and documentation of patient participation is introduced. Consultation, collaboration and control describe the role of the patients and their organisations respectively within the research process, from giving helpful information to working together on equal basis up to full control over the research process. Recommendations for the practice of participatory research are given: • thinking about participation as early as possible • planning additional time and resources • explicit and clear agreement on rights and duties of patients and researchers. *Conclusion:* The presentation ends with a list of open questions that need to be addressed in the future: • influence of participation on the quality of research (results) • demanding participation vs. freedom of research • how to decide who should participate in a given project? • what do participating patients need (resources, knowledge, advice etc.)? • how to secure genuine participation (instead of merely formal)?

1. Buschmann-Steinhage R, Jäckel W. Teilhabe und Teilhabeforschung. Die Rehabilitation 2012; 51 (Supplement 1): S1–S2.
2. Kirschning S, Pimmer V, Matzat J, Brüggemann S, Buschmann-Steinhage R. Beteiligung Betroffener an der Forschung. Die Rehabilitation 51 (Supplement 1): S12–S20.

SYMPOSIUM 1: RESEARCH METHODS IN PHYSICAL AND REHABILITATION MEDICINE: QUALITATIVE RESEARCH IN REHABILITATION, WHY, WHEN AND WHAT FOR? (IL12-IL15)

IL12

INTRODUCTION TO QUALITATIVE RESEARCH IN REHABILITATION

Monika Löfgren, PT, PhD
Karolinska Institutet, Stockholm, Sweden

In rehabilitation medicine the interest about qualitative research is growing. Knowledge about how people adjust from being healthy and independent to live and cope with impairments and dependency influence rehabilitation methodology. Qualitative methods provide us with knowledge beyond the traditional measurements. With qualitative methods, knowledge increases on experiences, attitudes and perceptions. With qualitative methods we are able to study the rehabilitation process, from the view both of patients and of caregivers. This will help in improving clinical rehabilitation for the future. The presentation will give an overview of important aspects when conducting qualitative research, in the underlying scientific perspective, common qualitative methods, scientific rigour and advantages and disadvantages. Finally, examples of studies will be presented, illustrating qualitative rehabilitation research.

IL13

APPLICATION OF QUALITATIVE METHODS IN REHABILITATION: GOAL-SETTING IN REHABILITATION

Diane Playford, MD, FRCP
UCL Institute of Neurology, London, UK

This session will consider what has been learned about goal setting from qualitative studies using a range of methodological approaches. Themes that will be developed include barriers and facilitators to

goal setting, staff and patients needs and the structures needed for successful goal setting. The advantages and disadvantages of goal setting will be considered.

IL14

A QUALITATIVE RESEARCH STUDY ON DECISION-MAKING PROCESSES IN DISABILITY ASSESSMENT PROCEDURES

Susanne Bartel, Dipl-Päd, Heike Ohlbrecht, Dr, Dorothea Tegethoff, Dr, Ernst von Kardorff, MD
Humboldt-University, Berlin, Germany

While granting the full or limited benefit of disability pension or rejecting such application, the physicians of the German Statutory Pension Insurance Scheme follow the procedure relying exclusively on the data available in the applicants file, in contrast to the Regional German Statutory Pension Insurance Scheme where a face-to-face examination of the insured also is possible. The main objective of this research project was to analyse this paper-based disability assessment procedure conducted by physicians of the German Statutory Pension Insurance. This specific field of disability assessment requires more investigative research because it has its wide-reaching impact on the persons concerned, as well as on the German Statutory Pension Insurance Scheme and society as well. The aim was to systematically identify the latent patterns, criteria and other influential factors of these decision-making processes. Taking into consideration individual, professional, organisational and societal determinants, we wanted to concretise and understand the general and specific framework of the disability assessment processes. For this purpose, the collection and evaluation of data were conducted with several qualitative research methods: file analyses (n=130), guided-interviews with experts (n=6) and physicians (n=19) and the Think-Aloud method (n=80). It was observed that these processes of decision-making are very complex and challenging for the physicians; decisions about granting disability pension benefits are influenced by many other factors as well, other than only medical reasons. Though medical reasons play a vital role, it became evident that, to mention a few, varying emphasis on context factors (e.g. age, professional biography, labour market), as well as on individual factors (e.g. experience, attitude), and on organisational factors (e.g. internal rules, amount of daily work, role in the institution) influence the decision-making. Furthermore, different strategies of working with the applicant files could be identified. The results of the study led up to a description of the limitations of a fully standardised disability assessment procedure and at the same time a pointing out of the importance of a specific expertise of physicians in the field of Social Medicine.

IL15

INTERDISCIPLINARY COOPERATION IN MEDICAL INPATIENT REHABILITATION: A QUALITATIVE ANALYSIS

Vera Kleineke, BSc, Maren Stamer, Dr, Marlen Zeisberger, Dipl-Psych, Thorsten Meyer, MD
Hannover Medical School, Hannover, Germany

Background: The analysis is part of the project MeeR that aims to identify characteristics of rehabilitation clinics related to successful rehabilitation. Six clinics were sampled by a quantitative analysis based on quality assurance data. Concerning the rehabilitative success, three participating clinics were sampled from the upper and three from the lower 10% of case-mix adjusted rankings. Treatment in medical rehabilitation in Germany is provided by multidisciplinary teams. Therefore, daily operation requires cooperation among persons of different professions. Interdisciplinary cooperation has been identified as one possible factor for rehabilitative success. *Objective:* The aim of the present analysis is to describe the employees' perceptions of the realization of interdisciplinary cooperation in rehabilitation clinics and to determine whether there are differences between successful and less successful clinics regarding characteristics of interdisciplinary cooperation. *Method:* In the course of the project MeeR, six group discussions were conducted at four orthopaedic and two cardiologic clinics. Participants were employees of different professional background (physicians, nurses, psychologists, physiotherapists, occupational therapists, nutritionists and social service officers). Group discussions were recorded via audiotape and transcribed verbatim. For the present analysis, these group discussions will be analysed with regard to interdisciplinary cooperation. Referring to Bohnsack, the documentary method will be applied. This method contains content analysis as well as an analysis of the interaction of participants during group discussions, which is of special interest when considering interdisciplinary cooperation. Due to the mode of sampling, it will be possible to compare the characteristics of interdisciplinary cooperation between successful and less successful clinics. *Result:* The special design of the MeeR-project will be presented. Derived from the material at hand, empirically based conclusions will be made about interdisciplinary cooperation in medical rehabilitation clinics based on the viewpoint of the employees. Furthermore, a comparison concerning interdisciplinary cooperation between successful and less successful clinics will be presented. *Discussion:* In a subsequent analysis, findings will be linked with further results of the MeeR-project, where other possible factors for rehabilitative success will be analysed and a triangulation of the material is planned. *Key word:* interdisciplinary cooperation, interdisciplinary communication, qualitative research, rehabilitation. *from the MeeR project funded by the German statutory pension insurance scheme.

SYMPOSIUM 2: TEAM COOPERATION IN REHABILITATION MEDICINE (IL20–IL22, IL36–IL38)

IL20

WHAT ARE CRITERIA OF EFFECTIVE COMMUNICATION IN REHABILITATION TEAMS?

Marie-Louise Schult
Stockholm, Sweden

Report from pre-conference workshop A.

IL21

HOW TO AVOID "MONOPROFESSIONAL THINKING AND INTERPROFESSIONAL COMPETITION" IN TEAM WORK

Stefanie Lurz
Hamburg, Germany

Report from pre-conference workshop B.

IL22

WHO COULD BE THE LEADER OR MODERATOR OF REHABILITATION TEAM IN DIFFERENT SETTINGS?

Daniel Kuhn
Halle, Germany

Report from pre-conference workshop C.

IL36

HOW TO BE SUCCESSFUL IN TEAM WORKING IN ACUTE REHABILITATION: TRAUMATIC BRAIN INJURY?

Catharina Nygren de Boussard, MD, PhD
Stockholm, Sweden

Report from pre-conference workshop D.

IL37

HOW TO BE SUCCESSFUL IN TEAM WORKING IN POST-ACUTE ACUTE REHABILITATION: MULTIPLE TRAUMA?

Rolf Keppeler
Hamburg, Germany

Report from pre-conference workshop E.

IL38

HOW TO BE SUCCESSFUL IN TEAM WORKING IN VOCATIONAL REHABILITATION?

Gunilla Östlund, Psychol, PhD
Stockholm, Sweden

Report from pre-conference workshop F.

SYMPOSIUM 3: MANAGEMENT OF PATIENTS WITH MRSA INFECTION IN REHABILITATION (IL23–IL27)

IL23

EPIDEMIOLOGY AND CLINICAL SIGNIFICANCE OF MRSA INFECTION

Iris Chaberny
Hannover, Germany

Abstract is missing.

IL24

PREVALENCE AND MOLECULAR EPIDEMIOLOGY OF MRSA IN REHABILITATION UNITS IN GERMANY

Alexander Friedrich
Groningen, The Netherlands

Abstract is missing.

IL25

HYGIENE GUIDELINES FOR PATIENTS WITH MRSA IN REHABILITATION UNITS IN GERMANY

Renate Volbracht
Oldenbrug, Germany

Abstract is missing.

IL26

PREVALENCE AND MOLECULAR EPIDEMIOLOGY OF MRSA IN NURSING HOME RESIDENCE IN NORTHERN GERMANY

Wilfried Bautsch
Braunschweig, Germany

Abstract is missing.

IL27

HEALTH-CARE ASSOCIATED INFECTION IN LONG-TERM CARE FACILITIES. GERMAN RESULTS OF THE EUROPEAN PREVALENCE STUDY HALT

Claudia Ruscher
Berlin, Germany

Abstract is missing.

TRACK 2: MULTIPLE TRAUMA – CHALLENGES FOR REHABILITATION MEDICINE ("FROM ACUTE REHABILITATION TO LONG-TERM CARE) (IL28–IL35, IL51–IL54)

IL28

INTRODUCTION AND CLASSIFICATION OF MULTIPLE TRAUMA

Hermann Josef Bail, PD, Dr
Trauma and Orthopaedic Surgery, Clinic Nuremberg, Germany

The treatment of a polytraumatized patient is performed in phases (1): Phase I Acute- and resuscitation phase: 1st–3rd hour (vital sign maintenance, ATLS algorithm, immediate OR, "Treat first what kills first") (2). Short primary surgery should stop bleeding, release body cavities and prevent contamination. The injury causes the "first hit", the surgery the "second hit" (3). The higher the initial damage is, the lesser the "second hit" is tolerated. Conceptual "Damage-Control Surgery" is distinguished from "Early-Total Care" (4, 5). "Damage-Control Surgery" should be performed in patients who meet certain criteria of instability. Phase II Stabilisation: 3rd hour-3rd day (urgent OR indications: e.g. vascular injury, intracerebral injury, thoracic and abdominal injury, spinal cord decompression, high grade open fractures). In phase II the patient may suffer from Systemic Inflammatory Response Syndrome (SIRS) or the Compensatory Anti-inflammatory Response Syndrome (CARS). With these syndromes, the patient is in the "vulnerable phase" (6). Surgery should reduce the "antigenic load", long-time lasting orthopaedic operations should be avoided. The beginning of the third phase is highly individual. Phase III Regeneration: 3r–10th day (e.g. maxillofacial fractures, fractures of the upper extremity, joint reconstruction; > 8. day: Reconstruction of soft tissue injuries, plastic surgery, bone transplantation). Based on vital and serum parameters, an individual decision making is necessary when and how the surgical treatment can be continued (7). Phase IV Rehabilitation: > 10th day. Its start is also highly variable; however, it has to begin as early as possible (8). It is of utmost importance, that all medical experts share their knowledge about the patient to initiate a specific rehabilitation process which is meeting the patient's needs.

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IL29

THE GERMANY TRAUMA NET-WORK – CONCEPT AND RESULTS

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Marburg, Germany

Abstract is missing.

IL30

ACUTE REAHBILITATION IN MULTIPLE TRAUMA PATIENTS

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There has been a tremendous progress in primary treatment of multiple trauma at the accident site and in the Accident Emergency departments in the last 20 years. Mortality has dramatically decreased. Trauma networks like in Great-Britain, Germany and in the Netherlands are responsible for the improvement of survival and primary care. On the other side, the burden of disease after trauma is still very high. Systematic and institutionalized acute rehabilitation and postacute rehabilitation programs are still quite different from hospital to hospital, from region to region and even from country to country. The Center of Rehabilitation Medicine Hamburg is part of the Workmen's Compensation Trauma Clinic and a competence-centre for specialised trauma rehabilitation. Rehabilitation starts as early as possible, on the Intensive Care Unit (ICU) with a multidisciplinary mobile team of highly skilled therapists and rehabilitation consultants. The patient is then taken over as soon as possible into the "Acute Rehabilitation Department" even if still ventilator-dependent. Meanwhile an increasing number of polytraumatised patients are transferred from Intensive Care Units in the Northwestern part of Germany to this unit for acute rehabilitation and subsequent post-acute rehabilitation. Focus is not only put on management of the airways / prophylaxis of pneumonia, prophylaxis of contractures and decubital ulcers but also on mobilisation, weaning from the respirator and treating swallowing problems. Besides this the patients with traumatic brain injury get a special program to regain attention, alertness and speaking, as well as motricity of the limbs. Functional recovery is monitored by regular assessments and the multiprofessional approach aims to (*i*) earlier and more frequent out-of-bed exercise, (*ii*) increased physical activity, (*iii*) increased confidence in the patient's own abilities. Acute rehabilitation after multi-trauma shortens the length of stay in ICU and general hospital stay. There is a clear evidence for the fact that long-term outcome depends on satisfaction with medical and psychological treatment during hospital stay concerning fears, socioeconomic distress, pain and much more. This is why acute rehabilitation requires a high level of multidisciplinarity of the medical subspecialities due to concomitant medical problems, and interdisciplinarity of the therapeutic team, as well as extraordinary motivation and commitment.

IL31

EARLY REHABILITATION OF MULTI-TRAUMA PATIENTS

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Early rehabilitation of multi-trauma patients is the process whereby rehabilitative treatment is given within the first few days/weeks following injury (1). Depending on the organization of the trauma rehabilitation care in the region and the availability of resources, both human and material, treatment can be given in the hospital and/or the rehabilitation centre. The treatment of multi-trauma patients in the Netherlands has improved considerably in recent decades. The arrival of eleven national trauma centres has allowed the treatment of multi-trauma patients to be concentrated and structured and the quality of multi-trauma patient treatment has improved. For example, two innovative treatments were developed: 'Early Rehabilitation of Trauma Patients in Intensive Care' and 'Supported Fast Track Trauma Rehabilitation Service' (2). In other countries, different but comparable systems of trauma rehabilitation care exist (3, 4). In this lecture the focus will be on the 'Supported Fast track multi Trauma Rehabilitation Service'. In this service, the rehabilitation physician is routinely involved in a very early stage post-trauma, facilitating early start of multidisciplinary rehab treatment involving a) early non-weight bearing physical therapy, psychological and social counselling, b) early transfer to a centralised, specialised trauma rehab unit equipped with facilities for early training programs, c) early individual rehab goal setting, d) close collaboration between the trauma surgeon, the rehabilitation physician and the rehab team and e) well documented treatment protocols. . The service was evaluated in a multi-centre, non-randomised clinical trial with a follow-up of 12 months. The quality of life of multi-trauma patients and the cost-efficiency of this service have been examined. The results of this study will be presented in this lecture along with a discussion of the clinical implications.

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IL32

REHABILITATION AFTER LIMB AMPUTATION

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Bad Rothefelde, Germany

Abstract is missing.

IL33

REQUIREMENTS AND CONCEPTS IN POST ACUTE REHABILITATION

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BGU Murnau, Deutschland

The survival chances of multiple trauma patients have continually improved over the last decades. Therefore the question does not arise whether the patient survives a severe accident, but rather how the patient survives it. Consequences of accidents are found not only on physical, but also psychological and social fields. Subjective experiences of severely injured patients during and after hospitalization have a major impact on the subsequent quality of life. Knowledge of these factors is essential for the planning, organization and implementation of rehabilitation after severe injury. An optimal rehabilitation process places high demands on the rehabilitation facilities and the rehabilitation team, which can be fulfilled only by specialized facilities. The phase model of trauma rehabilitation demands early initiation of therapy even during acute treatment as so-called early rehabilitation. After a specialized post-acute rehabilitation, additional therapeutic offers are often required. Besides pain management, the focus lays especially in the work-related rehabilitation and psychological support, which is also decisive for the success of rehabilitation of accident victims. The aim of all efforts is, beside the best possible quality of life, the reintegration into working and social environment.

IL34

A RETROSPECTIVE REVIEW OF PATIENTS' REHABILITATION AFTER POLY-TRAUMA – A TWO-PHASE MODEL

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Introduction: Poly-trauma (multiple trauma) is a medical term describing two or more severe injuries in at least two areas of the body. Patients need a long period of rehabilitation in these conditions. Such injuries have bio-psycho-social consequences, often causing disability. Appropriate and timely rehabilitation can alleviate bio-psycho-social disorders. Aim. To perform a retrospective analysis of poly-trauma patients, and to evaluate the effectiveness of the rehabilitation programmes used. *Materials and methods:* The study group was comprised of patients who suffered from poly-trauma during 2007–2001 to 2013–2001. According to a decision by the health minister, in-patients' rehabilitation course was divided into two phases; the first phase is before the patient can stand, the second when the patient can bear weight on lower extremities. In the period when patients were staying at home, home- rehabilitation programmes were given. The data on patients' functional status and parameters of the rehabilitation programme were collected and analyzed. *Results:*. All patients participating in rehabilitation during a 6-year period (67% males and 33% females) were evaluated. The average age was 43.24 (SD 15.77) years. The causes of trauma were: road accidents 60%, fall from height 25%, sport 5%, other 10%. Patients for in-patient rehabilitation arrived after treatment and acute rehabilitation in the traumatology ward - PRM care was provided by a mobile multidisciplinary team. At arrival average of Barthel Index was 39.72 (SD 18.96), after the first phase of rehabilitation 53.92 (SD 26.22). The rehabilitation programme consisted of: physiotherapy, occupational therapy, measures taken by a psychologist and a social worker, massage were applied in 100% of the participants, physical modalities in 60%. The average duration of the first phase of the rehabilitation was 20.4 (SD 10.6) days. The second phase of rehabilitation took 17.5 (mean) (SD 6.57) days. Barthel index at arrival was 69.93 (mean) (SD 19.04), and after the course of rehabilitation 69.90 (SD 17.73). The applied programme (according to patients' needs) consisted of physiotherapy and occupational therapy in 100% of the patients, massage in 77.8%, physical modalities in 66.6%, psychological and social work measures in 88.9% of the patients. *Conclusion:* In this study we found that the main cause of poly-trauma in our region is road accidents. All patients need the intensive multidisciplinary rehabilitation programme. The second phase was a shorter period of time than the first phase. Moreover, the patients' functional conditions after the 2-phases-rehabilitation course was better compared with the patient group for whom only one phase of in-patient rehabilitation course was provided.

IL35

CLASSIFICATION OF SERVICES AND ASSIGNMENT OF PATIENTS IN TRAUMA REHABILITATION

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The most accepted definition of a multiple trauma is a "potentially life threatening trauma (ISS >= 16)", although there is no consensus (Champion 1989, Butcher 2013). Butcher proposes a new anatomical definition: an AIS (abbreviated injury scale) score of greater than 2 in at least two ISS body regions (Butcher 2013). However, with regard to rehabilitation services we usually aim at patients with complex multiple injuries on both lower extremities, a combination of one upper and one lower extremity injury, or complex pelvis/acetabulum fractures (Kosar 2009). Patients with traumatic brain injury, spinal cord injury, burns or amputation of an extremity will usually be referred to a pathology specific rehabilitation programme. As in Belgium there is only a diagnosis based assignment to a heterogeneous and incoherent web of rehabilitation services, a study was performed to assess the organisation and financing of musculoskeletal and neurological rehabilitation (MNR) and make recommendations (Kiekens 2007). It was concluded that the organization is mostly historical and resource driven without clear criteria for assignment. A conceptual stratified rehabilitation model for MNR has been developed around four dimensions: 1) phase: acute, post-acute and chronic, 2) setting: inpatient versus ambulatory, 3) mono- or multidisciplinary approach, 4) required rehabilitation activities: simple or complex. The modell is composed of three differentiated types of rehabilitation services: 1) general, 2) specific and 3) highly specific rehabilitation services, in a collaborative network. Patient referral is based on the complexity of the rehabilitation needs and goals, and the incidence and prevalence of consequences of health conditions. Patients with less frequent pathologies and complex needs are concentrated in highly specific services in order to have sufficient 'critical mass'. The implementation of this model requires a systematic assessment of patients' rehabilitation needs by means of a patient classification system (PCS), preferably within the ICF framework, that preferably can be used for clinical purposes as well as managerial aims. As a polytrauma patient can clinically present in various ways, depending on the type of injuries, personal and environmental factors, the development of such a PCS is crucial to assign patients to the correct level of rehabilitation care.

IL51

PSYCHOLOGICAL ASPECTS IN REHABILITATION OF PATIENTS WITH MULTIPLE TRAUMA – POSTTRAUMATIC TRAUMA

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Background: Patients with severe multiple trauma suffer from reduced mental functioning in addition to their physical problems for years after being injured. The main focus of multi trauma rehabilitation is on the recovery of physical functioning. However, patients may also have needs concerning their mental health and functioning. The aim of this study was to assess the patients' mental health and post-traumatic stress symptoms (PTSS) at 2 years and their mental functioning over the 5 years after injury. *Method:* 105 patients with New Injury Severity Score (NISS) >15, 83% men, mean age 35 years were included from January 2002–June 2003. Post-injury functioning was measured by the SF-36 (including the Mental Health (MH) scale and Mental Component Summary (MCS), Post-Traumatic Symptoms Scale-10 (PTSS-10) indicating post-traumatic stress disorder (PTSD), WHODAS II, BACQ for coping and questions from structured interviews. General population SF-36 norms were used as a reference. *Results:* At 2 years postinjury PTSS-10 score was 25.6 (SD 12.2). A PTSS-High score indicating PTSD was shown in 20%, and a MH score indicating depression was shown in 27% of the patients. Over 5 years, the proportion with poor mental health (≤40 points on the MCS) had decreased from 43% to 31%. In the multivariate linear regression, predictors of PTSS at 2 years were female gender, younger age, avoidant coping, and more pain, worse MH, and worse cognitive functioning shortly after discharge to home. This model explained 70% of the variance in the PTSS-10 score. Predictors of MH at 2 years were older age, better coping strategies, and better MH and cognitive functioning shortly after discharge. This model explained 60% of the variance in the MH at 2 years. Furthermore, predictors

of general mental functioning on the MCS over the 5 year period were male gender, higher education, better cognitive functioning and participation in society. *Conclusion:* The disease burden related to mental health was higher for the multiple trauma patients than found in the general population. The continued rehabilitation process in the community after the return home should focus on mental health and psychological consequences of multi trauma.

IL52

REHABILITATION OF TORTURE VICTIMS – ASPECTS OF SOMATIC AND MENTAL TRAUMA

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University of Southern Denmark, Odense

What is the goal of management of torture victims? They usually present with somatic (chronic pain, cognitive difficulties) as well as mental (posttraumatic stress disorder) problems. Moreover, recent studies indicate that 40% or more of refugees to the west from third world countries have been subjected to torture in their previous home countries. These persons are obviously also subject to social deprivation. Whom should we treat? Can we achieve permanent freedom of symptoms or just temporary relief? Can we eliminate important maintaining factors for the presenting symptoms? Or should we rather aim at diminishing the consequences of symptoms in a certain context, i e catastrophizing, fear avoidance, kinesiophobia, sleeplessness or aggressive outbursts? The diagnostic issues and labels are manifold. In the International Classification of Functioning, Disability and Health (WHO 2001), chronic pain and anxiety may be considered as impairments, without necessitating a diagnostic label from the ICD-10. Importantly, according to the ICF, impairments in relation to context, may give rise to activity limitations and participation restrictions, i e various types of disability. The indications for rehabilitation may be adequately derived from the ICF approach, assessing the impairment, the activity limitations and participation restrictions in the context at hand and to focus rehabilitation to those who are distinctly limited or restricted by their problems. The first part of an interdisciplinary rehabilitation program is to make a functional assessment by minimum a physician, a cognitively-behaviourally oriented psychologist and a social worker should be made, including interview of a significant other. Problems in moving about often necessitate a physiotherapeutic assessment. There should be a conference with feedback to the patient.

IL53

LONG-TERM OUTCOME OF MULTIPLE TRAUMA PATIENTS - A REVIEW OF DECISIVE PREDICTORS

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In Germany about 35,000 people are suffering each year from a multiple trauma. While multiple trauma research primarily was focused on mortality, morbidity and survival of the patients, there has been a paradigm shift in the last 20 years to research of outcome and long-term quality of life. Based on international literature of the past 10 years, we currently find contradictory predictors to long-term quality of life for patients with multiple trauma. Some authors are propagating higher age, low socioeconomic status and severe injury of extremities as significant predictors of a reduced quality of life, some put the focus on living situations, such as family, partnership, leisure and occupation, and still some others point out the correlation of traumatic brain injuries and the duration of ICU-treatment with a reduced quality of life. With a brief presentation of different studies on this subject we want to show differences of prognostic factors authors have identified. We equally look into parameters they consider necessary for a better outcome, what importance they attach to individual parameters, where they see gaps and how they rate the care of injured far beyond the end of rehabilitation.

IL54

MANAGEMENT OF LONG-TERM COMPLICATIONS AND CRPS

Anselm Reiners
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Abstract is missing.

SPECIAL ISSUE SESSION 2: SPORTS MEDICINE AND PHYSICAL AND REHABILITATION MEDICINE (IL39–IL46)

IL39

SPORTS IN PERSONS WITH DISABILITIES – WHAT CAN WE LEARN IN REHABILITATION MEDICINE?

Jan Lexell, MD, PhD
Department of Health Sciences, Lund University; Department of Rehabilitation Medicine, Skåne University Hospital, Lund, Sweden

Sport has become an effective means of augmenting rehabilitation outcomes for people with disabilities. It involves recreational exercise as well as competitive activities all the way up to elite sports. Since the start some 60 years ago, the Paralympic Movement and its governing body the International Paralympic Committee (IPC), has experienced exponential growth in the number of sports as well as the number of athletes competing in the Paralympics, the second largest sporting event in the world. This has led to an increased knowledge of exercise and sports for disabled people. Research focussing on the positive aspects of health, equality, social integration and accessibility for the disabled population is an evolving area. Awareness is therefore growing about how to engage disabled people in sports and using sports in rehabilitation. This lecture will present an overview of the clinical and scientific aspects of sports for people with disabilities, the importance of sports and how it can be incorporated in rehabilitation to enhance outcome in both a short- and long-term perspective.

IL40

SKELETAL MUSCLE ATROPHY AND THE NERVOUS SYSTEM

Reinhard Dengler
Hannover, Germany

Abstract is missing.

IL41

RECONDITIONING OF SKELETAL MUSCLE ATROPHY – EFFECTS OF ENDURANCE OR RESISTANCE TRAINING AND NEUROMUSCULAR ELECTRICAL STIMULATION

Uwe Thegtbuur
Hannover, Germany

Abstract is missing.

SYMPOSIUM 4: GAIT ANALYSIS – RESEARCH AND CLINICAL PRACTICE (IL42–IL46)

IL42

EVIDENCE OF GAIT ANALYSIS SYSTEMS

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Physical examination and clinical observation are often not sufficient to fully understand gait abnormalities. At the ICF level of body functions and structures, 3D gait analysis is a powerful tool to explicitly quantify joint kinematics and kinetics during gait. By adding surface-EMG, information of muscle activity can be obtained as well. 3D gait analysis is used to support clinical decision-making on treatment in complex cases by providing detailed information on gait abnormalities that must be linked to information obtained by physical examination. Furthermore, repetitions of 3D gait measurements over time can serve to document change in gait due to disease progression as well as to evaluate the outcome of interventions. 3D gait analysis has gained broad application in clinical practice and for research purposes in a wide range of diagnoses both in children and adults. In the context of treatment, evaluating interventions at the level of gait kinematics and kinetics can be regarded as a quality check of the intervention itself. Especially for complex clinical questions, and for scientific purposes, measuring this construct has shown its value. The clinical relevancy of interventions which aim to influence gait abnormalities, is judged at the ICF-levels of activity and participation. The outcome measures most closely related to gait changes capture aspects of walking and may include measurements of walking speed, walking distance, energy cost of walking, stability and obstacle avoidance and daily walking activity. Studying relationships between parameters obtained with 3D gait analysis and measurements of walking are needed to obtain better insight in the clinical effectiveness of interventions.

IL43

THE SIGNIFICANCE OF GAIT ANALYSIS IN PATIENTS WITH ENDOPROSTHESIS

Tilman Calließ
Hannover, Germany

Abstract is missing.

IL44

THE SIGNIFICANCE OF GAIT ANALYSIS IN PATIENTS WITH EXOPROSTHESIS

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Clinical gait analysis nowadays is an established and increasingly more accessible tool for the objective evaluation of a patient's functional performance with respect to locomotion or for determining the individual level of impairment. Video-based systems with an array of cameras usually allow for a detailed 3-dimensional analysis of temporal-spatial, kinematic and kinetic parameters. A combination with electromyographic analysis can shed further light on the underlying causes for movement disorders and may be useful for tailoring individualized physiotherapeutic treatment. However, most of these technologies rely on laboratory-based measurements. Recently, various inertial sensor systems have been developed and marketed that overcome these limitations and allow for measurements in the patients' clinical environment during rehabilitation or even in their home surroundings to assess the actual activities in daily life. The various options will be presented with respect to their possibilities and limitations.

IL45

GAIT ANALYSIS IN PARKINSON'S DISEASE

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It is common clinical knowledge that gait in Parkinson´s disease (PD) is characterized by reduced stride length, increased step frequency and prolonged double leg support, parameters that are easily assessed by standard gait analysis techniques. However, the topic of gait is associated with and superimposed by highly relevant additional aspects, which should be taken into account to give a more complete picture of the gait disorder. First of all, before starting to walk, we have to be able to stand. PD patients exhibit difficulties in keeping the body's centre of mass within the support base. These difficulties manifest themselves in larger sway areas, higher variability of sway, reduced time-to-contact, and reduced smoothness of the sway movement. There is a lack of anticipatory postural adjustments, for example when reaching for something. As these adjustments are especially important for the transition from standing to walking, gait initiation is difficult in these patients. Gait itself is characterized as above, but a special emphasis should also be put on the analysis of the variability of those parameters. Mean and variance tell nothing about the dynamical structure of a time series (is it regular, random or chaotic?), which a sequence of e.g. step lengths represents. Methods from nonlinear dynamical systems theory are helpful in describing such time series more adequately. Also, measures of symmetry of gait parameters and accompanying arm swing may give important additional information. In addition, performance in dual tasks (walking plus a cognitive task) should be measured whenever possible, because this captures more adequately everyday requirements and is an important index for the risk of falling. To sum up, pure gait analysis in PD patients should be complemented by additional movement analysis whenever possible. Advances in technology (e.g. accelerometry) provide the clinician with easy-to-use devices to collect precise diagnostic information as early as possible.

IL46

PHYSIOTHERAPY INTERVENTION GUIDED BY GAIT ANALYSIS IN LOWER MOTOR NEURON DISORDER

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Muscle weakness in lower limb muscles is common in patients with lower motor neuron disorder. Due to compensatory neuromuscular mechanisms, there is often a non-linear association between muscle strength and walking ability in this patient group. The increase of slow-twitch muscle fibres and a loss of fast twitch muscle fibres,

reported in post-polio patients (PPS), may decrease the ability to rapidly avoid obstacles when walking and may be the background for the subjective feeling of reduced balance and fear of falling. Furthermore, PPS patients often display drop-foot which will necessitate compensatory changes in gait pattern. 18 patients with PPS and 11 healthy controls were evaluated by 6-Minute Walk Test (6MWT) combined with 3D kinematic analysis. The two groups were equal regarding gender and age. Each subject was evaluated with simultaneous 3D movement analysis during 6MWT in the Human Physiological Laboratory Karolinska Institutet at Danderyd University Hospital. The total distance of the test was recorded as well as heart rate. Borg scales were used for evaluation of exertion, leg tiredness and dyspnea immediately before and after the test. For the spatio-temporal and the kinematic gait parameters, data were obtained in the beginning and end of a 6MWT by a Vicon motion capture system. Mean values of controls´ both legs were compared with patients' most affected leg. The 6MWT showed to be fatiguing for PPS patients, also reflected in the kinematic data. Walking speed was negatively correlated with the increased hip flexion, but not with the ankle plantar-flexion at foot off (FO), seen in the PPS patients. The 3D results underscore the importance of hip function in this patient group. Based on the present results and earlier reported data that deficient hip extension during gait is the primary kinematic factor that distinguished the gait of elderly fallers from healthy young and elderly adults, it is likely that the deficient hip extension noted in the PPS patients is of clinical significance. Improved gait ability may be achieved by physiotherapy interventions focused on the function of the hip.

SYMPOSIUM 5: "REHABILITATION ACROSS BORDERS": TRANSITION OF PHYSICAL AND REHABILITATION MEDICINE ("FROM RESTORATIVE TREATMENT TO COMPREHENSIVE REHABILITATION PROGRAMS") (IL47–IL50)

IL47

DEVELOPMENT OF COMPREHENSIVE REHABILITATION IN LITHUANIA 1990-2012 – AN EXAMPLE FROM THE BALTIC STATES AREA ABOUT RECENT CONCEPTS OF REHABILITATION MEDICINE AND THE WAY TO REACH INTERNATIONAL STANDARDS

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Introduction: The independent period from 1990 allowed implementing a new model of multidisciplinary rehabilitation in the health care system of Lithuania. The previous Soviet restorative medicine model was not useful for disabled persons' rehabilitation anymore. There was a need of new laws on social integration of disabled persons, a new model for rehabilitation, team members' training and a net of PRM departments and institutions. *Purpose:* The aim of the present lecture is to describe an evaluation of the process of implementation of comprehensive rehabilitation in Lithuania. *Method:* Comparisons and analyses were done about law, PRM services, structures, numbers of professionals, organization and management of rehabilitation in different steps. *Results:* A law on social reintegration of disabled persons was accepted by the Lithuanian Parliament in 1991. The health minister's orders improved step by step a more adequate PRM care. In the beginning of the first decade of independent time, retraining of staff (including teaching staff) started with support of colleagues from Western Europe, including a new training programme for the new generation of specialists in rehabilitation medicine. In 1997 accreditation procedures of PRM departments and institutions were made, according to an order of the health minister of Lithuania from the end of 1996. Up to 2012 a net of PRM departments and institutions (about 100) for in- and out-patient rehabilitation have been organized in Lithuania. The positive trend – growing of outpatients PRM services (with an increasing number of rehabilitation team members of the new generation) from 2003 is still visible, and the accessibility of PRM services has become more equal for inhabitants in different areas. The development of the net of PRM- and nursing services has also led to achievements in terms of economical results: the inpatients' stay in general hospitals decreased in average from 22 till 7 days, severe disabled persons' (e.g. due to SCI) return-to-work rate increased from 0 to 34%, and the decrease of inpatients' places in general hospitals (and number of hospitals) was more than 33 % during the period 1990–2012. The opportunity to be a member of UEMS PRM (from 2006) gave instruments to compare the level of PRM services with European standards. Up to 2012 there are in Lithuania UEMS PRM Board certified: 32 physicians (26 by UEMS Board examination), 1 training centre out of 2 in Lithuania (Rehabilitation, Physical and Sports Medicine Department of Faculty of Medicine, Vilnius University). Four PRM-care programmes are accredited by CAC of UEMS PRM Section, too. *Conclusion:* The findings demonstrate that the model of comprehensive rehabilitation is already implemented in the health care system of Lithuania, but future actions are needed to achieve an adequate level in all PRM institutions, e.g. rural areas need to be focused more.

IL48

SITUATION AND PERSPECTIVES OF PRM IN RUSSIA

Ekaterina Ivanova, MD, Viktoria Badtieva, MD
Russia

Abstract is missing.

IL49

SITUATION AND PERSPECTIVES OF PRM IN UKRAINE

Marina Gulyayeva, MD
Ukraine

Abstract is missing.

IL50

SITUATION AND PERSPECTIVES OF PRM IN GEORGIA

Nelly Kakulia, MD
Georgia

Abstract is missing.

SPECIAL ISSUE SESSION 3: MANAGEMENT OF FATIGUE AND DEPRESSION IN PHYSICAL AND REHABILITATION MEDICINE (IL55–IL58)

IL55

EVIDENCE OF PSYCHOLOGICAL INTERVENTIONS IN MANAGEMENT OF FATIGUE AND DEPRESSION

Gunilla Östlund, PhD
Division of Rehabilitation Medicine, Department of Clinical Sciences, Danderyd Hospital, Karolinska Institutet, Stockholm, Sweden

Background: Fatigue is common in the general population (10-20%) as well as a primary symptom related to e.g. stroke, post-polio, inflammatory conditions or a secondary symptom related to pain, stress, sleep deprivation or depression. There are different types of fatigue e.g. general-, muscular-, physical- and mental fatigue. Healthy subjects experience fatigue after mental or physical exhaustion and recover after rest and sleep. Subjects suffering from fatigue related to illness or a disease do not recover. Disease/illness-related fatigue interacts with fatigue experience in healthy subject and interacts also with fatigue related to pain, stress, sleep deprivation and depression. Depression is a common condition and can be related to life experiences like loss, crisis and stress but can also be direct related to stroke, traumatic brain injury and chronic pain. One common symptom in depression is low level of energy and sleep disturbances. Both fatigue and depression are common in rehabilitation. *Aim:* To identify evidence for psychological interventions in management of fatigue and depression. *Method:* Combination of the words depression/fatigue, psychological, management and intervention were used when searching PubMed, Cochrane. Literature about depression and fatigue and the Swedish Council on Technology Assessment in Health Care reports were also consulted. Only studies and reports where a psychological intervention and fatigue and/or depression were improved were included. *Results:* For fatigue, Graded Exercise Therapy and Cognitive Behavioural Therapy (CBT) had some beneficial effects for Chronic Fatigue Syndrome/ME. Mindfulness-based psychotherapy have a positive effect for fatigue related to inflammatory joint disease, and mental fatigue related to stroke and traumatic brain injury. Iyengar yoga reduced general fatigue in MS. Acceptance and Commitment Therapy reduced fatigue in a general population. CBT, Interpersonal therapy, Psychodynamic short-term therapy, behavioural activation and internet based treatment programs were beneficial for depression. *Conclusion:* For depression there are several short-term evidence-based methods. For fatigue there are few. More research is needed in the treatment and management of fatigue.

IL56

EVIDENCE OF EXERCISE IN MANAGEMENT OF DEPRESSION

Boya Nugraha, MSc, Christoph Gutenbrunner, MD, PhD
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Depression is a type of disease which is commonly found either as primary disease or as comorbidity to another disease. Millions of people worldwide are affected by depression. Moreover, up to 25% of women and 12% of men and are in a highly chronic condition (Galenberg, 2010). Depression has significant negative effect on ability of working and quality of life (Galenberg, 2010). Common treatments of depression are antidepressant medication and/or psychotherapy. Other alternative methods are also often used in managing depression, such as acupuncture, music therapy, light therapy and exercise. Benefit of exercise on depression has been demonstrated both in full research articles and meta-analyses. However, some studies could not show superiority benefit of exercise in reducing depression as compared to controls. Of course, these differences may need to be interpreted with 'caution', because methodological approaches could influence the results of the studies, such as type of exercise, assessment tools, and others. I here intend to address the effect of exercise in management of depression and discuss the differences of the results of some studies. Additionally, it would be of interest to address the effect of exercise on biological mediators related to depression, such as neuroimmunological parameters, cytokines, and others. Taken together, exercise can be one of the methods for managing depression by considering several parameters, including type of exercise, intensity, and others. Furthermore, future studies should consider biological mediators to monitor the progress of exercise treatment for depressed patients.

Galenberg AJ. The prevalence and impact of depression. J Clin Psychiatry 2010; 71(3): e06.

IL57

EVICENCE OF PHARMACOLOGICAL THERAPIES IN MANAGEMENT OF FATIGUE AND DEPRESSION

Kai Kahl, Dr
Hannover, Germany

Abstract is missing.

IL58

COMPREHENSIVE REHABILITATION AND PATIENTS' GOALS IN MANAGEMENT OF FATIGUE

Veronika Fialka-Moser, MD, PhD
Vienna, Austria

Abstract is missing.

REFLECTIONS AND OUTLOOK: THE BALTIC AND NORTH SEA FORUM ON PRM (IL59–IL61)

IL59

THE BALTIC AND NORTH SEA CONFERENCE ON PRM (BNCPRM) – ACHIEVEMENTS AND PERSPECTIVES

Kristian Borg, MD, PhD
Stockholm, Sweden

Comments on the present conference.

IL60

THE BALTIC AND NORTH SEA FORUM ON PHYSICAL AND REHABILITATION MEDICINE – FROM AN IDEA TO REALITY

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Regional associations focus on the communication within a continent or world area. The international bodies, however, have to

work on a global level. Thus the communication and exchange at the interfaces of regions or areas sometimes are neglected even if they seem to have great significance for certain areas. One example for bridging across areas is the Mediterranean Forum on Physical and Rehabilitation Medicine that includes members from Southern Europe, Northern Africa and the Eastern Mediterranean region. However, in Northern Europe the situation is much different; some interface problems with relevance for rehabilitation medicine are still obvious even if the Iron Curtain does not exist since more than 20 years. On one hand the tradition of rehabilitation medicine was very much different in different countries around the Baltic and North Sea and on the other hand the common languages in the scientific and medical communities are different (English in western parts, Russian in eastern parts). From these and other reflections the idea was born to create a Forum to exchange knowledge and experience in the field of Physical and Rehabilitation Medicine and to discuss about future concepts for rehabilitation services in the Baltic and North Sea area. After a first draft of the idea from October 2003, the idea was presented in March 2004 for the first time in Dublin (Ireland) and in 2006 a first assembly of the Baltic and North Sea Forum (BNF-PRM) was held in Riga (Latvia). The first Baltic and North Sea Conference on PRM (BNC-PRM) was held in Stockholm (Sweden) in April 2010. Some basic principles were developed to structure the BNC-PRM, e.g. to discuss about topics of recent interest on the highest scientific level available and to include sessions to share experience and ideas within the area. In the second congress in Vilnius (Lithuania) an additional track about multi-professional team cooperation was included and in the third congress in Hannover (Germany) for the first time English-Russian translation will be provided. Even if the BNF-PRM had to struggle with many barriers in the building-up phase (e.g. legal registration, finances), it seems that some of the initial ideas became reality. These are to establish a forum of communication and to provide exchange of knowledge and concepts, to strengthen the involvement of Eastern European countries in the activities of European bodies and the discussion about specific topics at a high scientific level. Additionally, the collaboration with the Journal of Rehabilitation Medicine gave the activities of the BNF-PRM a good visibility in the international PRM community. On the other hand it cannot be denied that many good and important projects are still under development and not yet realised (e.g. an interactive website, summer schools, young scientists' exchange programmes) and that there are no assets to finance larger projects. We hope that the initiative will continue to grow in the future and that more colleagues from all countries around the Baltic and North Sea will actively involve into the activities of the BNF-PRM.

IL61

THE FUTURE OF BNF-PRM AND ANNOUNCEMENT OF THE 4TH BNCPRM IN RIGA 2015

Aivars Vetra
Riga, Latvia

Information about the forthcoming conference.

PRE-CONFERENCE WORKSHOPS ON TEAM CO-OPERATION

IL62

TEAM MODELS IN REHABILITATION MEDICINE

Carl Molander, MD, PhD
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Patients with complex impairments typically need help from several medical and paramedical professionals for appropriate and coordinated investigations, assessments and interventions, throughout the rehabilitation process. The forms in which these professionals collaborate represent distinct team models. There are plenty of publications on different team models but surprisingly few with direct application in rehabilitation medicine. This lecture is an introduction to different team models with relevance for patients in different phases of rehabilitation and different degrees of complex needs. The meaning of terms such as multi-, inter- and transdisciplinary teamwork, multiprofessional teams, and multimodal rehabilitation will be explained and clinical examples for their use given. Advanced rehabilitation teams are prepared to shift between team models in order to serve patients with different needs, without in a costly and time consuming work redundancy. Team work is indeed an acquired skill similar to other techniques in rehabilitation. Hence, team members need a theoretical base and updates for maintenance of teamwork skills. Furthermore, teams are fragile constructions that need professional team leadership and preparedness to handle unconstructive conflicts, questions on treatment responsibility and undue prestige. Examples of teamwork pitfalls and suggestions for team maintenance and development based on available evidence will be presented.

ORAL FREE PRESENTATIONS

GAIT ANALYSIS, PROSTHESES AND LYMPHOEDEMA AND TEAMWORK (OP01–OP08)

OP01

RELIABILITY OF WALKING CAPACITY MEASURES ASSESSED WITH 2 DIFFERENT WALKING TESTS IN FORMER POLIO PATIENTS

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Department of Rehabilitation, Academic Medical Center, University of Amsterdam, Amsterdam, The Netherlands

The 6-minute walk test (6MWT) and the walking energy cost test (WECT) are commonly used instruments to assess functional walking capacity. Although, the reliability of these tests has been established in persons with postpolio syndrome (PPS), studies included small sample sizes, restraining the accuracy of reliability estimates. The aim of this study was to establish the reliability of the 6MWT and WECT for measurement of walking capacity in a sufficiently large group of patients with PPS. Our goal was to include 30–40 patients with PPS, aged 18 to 75 years. Participants were assessed for walking capacity on 2 separate days with the use of the 6MWT and WECT. The 6MWT comprised walking for 6 minutes at a self-preferred fast speed, and the ECWT walking for 6 minutes at a self-preferred comfortable speed with simultaneous assessment of oxygen uptake. The primary outcome included the walked distance (m). Furthermore, from the WECT, gross energy cost (EC, J/kg/m), as a measure of walking strain, was derived. Reliability was determined using the ICC and standard error of measurement, from which the smallest detectable change (SDC) was derived. So far, sixteen PPS patients (8 males), aged 29 to 72 years, participated. Reliability was good for the walked distance on both tests (ICC 0.94 for the 6MWT [95% CI 0.84–0.98] and 0.92 for the WECT [95% CI 0.77–0.97]), as well as for gross EC (ICC 0.94). Measurement errors were small (3.6% [distance 6MWT], 5.3% [distance WECT] and 4.6% [gross EC]). The SDCs for the walked distance were 9.9% and 14.5% for the 6MWT and WECT respectively, and 12.8% for gross EC. Reliability of the 6MWT and the WECT for the measurement of walking distance in patients with PPS is high. Moreover, both tests show good estimates of precision, based on the SEM, although precision was slightly higher for the 6MWT, compared to the WECT. The precision of gross EC is also high and sufficiently sensitive to detect a 5% change in walking strain following intervention in groups of patients with PPS. To evaluate individual change, the present study established a 13% change to be clinically meaningful.

OP02

RELIABILITY OF 3-DIMENSIONAL GAIT ANALYSIS IN PERSONS WITH A TRAUMATIC BRAIN INJURY

[1]Arve Opheim, PhD, [1]Tone Stokstad Weider, MSc, [1]Grethe Månum, PhD, [2]Rolf Moe-Nilssen, PhD

[1]Sunnaas Rehabilitation Hospital, Nesoddtangen, and [2]Department of Global Public Health and Primary Care, University of Bergen, Norway

Introduction: Persons with a traumatic brain injury (TBI) commonly have sensory-motor impairments resulting in gait deviations. Thus proper assessment tools of gait for planning and evaluation of rehabilitation interventions, as well as for research is important. There is a lack of published studies investigating reliability of kinematic variables from three-dimensional gait analysis (3DGA) in persons with TBI. The aim of this study was to investigate the test-retest reliability of kinematic gait variables in the sagittal plane in persons with TBI. *Method:* Ten adults with moderate to severe TBI were tested on two successive days at the Gait laboratory at Sunnaas Rehabilitation Hospital, Norway. Data was collected using six Vicon MX13 infrared cameras and two force plates (AMTI OR 6-7). Reflective markers were placed on the lower extremities and the Plug-in-gait model (Vicon Motion Systems, Oxford, UK) was used to calculate kinematic variables from pelvis, hip, knee and ankle. The marker placement was marked with waterproof pencil to minimize tester error. Participants walked a 10 m walkway at self-selected, comfortable speed, of which data was obtained from the middle section of 5 meters. Clinically relevant points from the kinematic curves of the gait cycle from pelvis, hip, knee and ankle joints were selected for statistical calculation. Relative reliability was calculated with the intraclass correlation coefficient (ICC). Absolute reliability and standard error of measurement was calculated with the within-subject standard deviation (Sw). *Results:* Within-session reliability was high (ICC $\geq$0.82) for all variables except moderate for ankle dorsi flexion at toe-off (ICC = 0.75). Between-session reliability was high (ICC $\geq$0.85) for all variables, except moderate for left ankle dorsi flexion at initial contact and toe off (ICC = 0.73 and 0.72). The standard error of measurement was low with Sw $\leq$2.8°. *Discussion and conclusion:* Overall results indicate a high within- and between-session reliability for the kinematic variables in the sagittal plane among persons with TBI. The measurement error was generally low. Tester errors were experimentally minimized, indicating a low day to day variation of gait. These findings suggest that 3DGA may be an appropriate tool for gait evaluation, treatment planning and research in persons with TBI.

OP03

RELIABILITY OF THREE-DIMENSIONAL GAIT ANALYSIS IN ADULTS WITH SPINAL CORD INJURY

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Background: Incomplete spinal cord injuries (ISCI) result in varying degrees of impaired gait. Three-dimensional gait analysis (3DGA) has been recommended as part of a standardised gait assessment in people with ISCI. However, to our knowledge, the reliability of 3DGA has not been established for this population. The aim of this study was to investigate intra- and inter-session reliability of gait kinematics in an ISCI population, with emphasis on subject variability. *Methods:* Fifteen adults with an acquired ISCI (American Spinal Injury Association Impairment Scale - D) were consecutively recruited from an in-patient hospital ward to perform two 3DGA test sessions on two separate days. Six infrared cameras, 16 reflective markers and the Plug-in gait model were used (Vicon Motion System, Oxford, UK). Five gait trials from both sessions for each subject were included in the analysis. The Gait Profile Score (GPS) and the Gait Variable Score (GVS) were used as outcome measures. Reliability was assessed with intraclass correlation coefficient (ICC), standard error of measurement (SEM), Bland-Altman plots and minimal detectable change (MDC). *Results:* ICC values for GPS and GVS variables were above 0.90 and SEM values were below 1°, except for rotation of the left and right hip (ICC=0.50 and 0.64, SEM=3.7° and 2.7°), and left knee flexion/extension (ICC=0.83; SEM=1.7°). Intra-session reliability was found to be high, and was generally slightly better than inter-session. MDC for all GPS variables were below 2.2°. MDC for all GVS variables were below 5.0°, except for hip rotation, which were below 10.2°. *Conclusion:*

In general, the results showed high intra- and inter-session reliability, indicating that there is only a small trial to trial and day to day variation of gait in the study population. Thus 3DGA seems to be a reliable assessment tool for adults with ISCI (AIS-D). These results can be used to interpret 3DGA findings in relation to the minimal change required to exceed measurement errors. Caution is warranted when evaluating hip rotation.

OP04

GAIT PERFORMANCE INDOORS IS STRONGLY ASSOCIATED WITH WALKING ABILITY OUTDOORS IN PERSONS WITH LATE EFFECTS OF POLIO

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Background: Muscle weakness and muscle fatigue are common impairments in persons with late effects of polio which can affect gait performance. Walking ability outdoors may differ from gait performance indoors because the surface is uneven and persons with late effects of polio have an increased risk for falls and fear of falling. Therefore, walking ability tests, such as the 6-Minute Walk Test (6MWT), usually assessed indoors, needs to be compared with walking ability outdoors. *Objective:* To assess if gait performance indoors is associated with walking ability outdoors in persons with late effects of polio. *Design:* Descriptive analysis of a convenience sample. *Setting:* A university hospital rehabilitation department. *Participant:* Sixty-three individuals with verified post-polio (32 men and 31 women, mean age 68 ± 6 years) participated in the study. *Main Outcome Measure:* The 6MWT and a 340 m distance were used to assess gait performance indoors and walking ability outdoors, respectively. The Borg Rating of Perceived Exertion (RPE) Scale was used to assess perceived exertion after the tests. *Result:* Significant correlations ($p < 0.01$) were found between gait performance indoors and walking ability outdoors with regard to gait speed ($r = 0.92$) and perceived exertion ($r = 0.68$). Participants walked significantly ($p < 0.001$) faster outdoors than indoors; the average gait speed was 1.3 ± 0.3 m/s outdoors and 1.2 ± 0.3 m/s indoors. No correlation ($r = –0.08$) was found between the mean gait speed of the two tests and the differences in gait speed, indicating that all participants walked faster outdoors regardless of their walking speed. There was no significant difference in perceived exertion; RPE was 13.8 ± 2.1 after the walking test outdoors and 13.6 ± 2.0 after the gait performance test indoors, respectively. *Conclusion:* The strong relationship between gait speed indoors based on the 6MWT and gait speed outdoors implies that the 6MWT is a useful test to predict walking ability in everyday life in ambulatory persons with mild to moderate late effects of polio.

OP05

NEW IMPLICATIONS FOR LOWER LIMB PROSTHESIS AND REHABILITATION TECHNOLOGY THE RUBBER FOOT ILLUSION

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Introduction: In literature several reports about dissatisfaction and psychological maladaptation with lower limb prostheses in amputees could be observed. Because the functional adaption of the prosthesis to the body schema starts within two weeks after wearing it and becomes only close to normal after two years, this period is critical for the satisfaction with the prosthesis and a possible psychological maladaptation. Due to new technological perspectives (e.g. user in the loop concept) in rehabilitation of lower limb amputees, we investigate the mechanism of how to integrate an artificial limb (foot) into the body scheme. The basic paradigm was the rubber hand illusion (RHI), which describes an illusionary perception of an artificial "rubber" hand as one's own hand after the visually covered real hand and the seen rubber hand were stimulated synchronously with a brush. This paradigm was transferred experimentally to the lower limb. *Methods and Result:* In two studies subjects were placed in front of a desk. $n = 39$ subjects participated in the first study. The stimulated foot (SF) was located on a table while the other, not stimulated foot (NSF) maintained in the normal sitting position. An artificial "rubber" foot (RF) was located 15 cm beside the SF. The SF was covered and the SF and AF were stimulated with a brush in a time range of 0.5 Hz in a synchrony, asynchrony or only visual condition. In the first study only a weak illusion could be observed in up to 64% of all participants, regarding a modified questionnaire for the measurement of illusory perceptions from Longo et al. (2007). In the second study the stimulated path on the skin of the foot was varied between high (H) and low (L) resolution in $n = 19$ subjects. H and L were identified with the two point threshold method. There was no difference in the perceived illusion regarding the use of a high or low resolution path on the skin. *Discussion:* The results are discussed regarding theoretical implications of body scheme integration, functional aspects regarding the design of new prosthesis technology and possible preventions of psychological maladaptation in the rehabilitation process.

OP06

PSYCHOLOGICAL DIMENSIONS FROM AN EXPERT PERSPECTIVE: EFFECT ON SURVEY DESIGN TO ENHANCE PROSTHESIS TECHNOLOGY

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In literature several surveys are presented to assess psychological dimensions of the prosthesis user regarding satisfaction, health and the feeling of support (Legro et a.l, 1998; Deans et al., 2008,). New research in the field of prosthesis showed a lack of satisfaction of amputees with their prosthesis and the prosthesis shaft, despite of the technology that is used (Christ et al., 2012; Theeven et al., 2012). Until now no development methodology is presented for the design of a measuring instrument that aims to assess human as well as technical factors, including biomedical aspects and aspects of body schema integration. The former describes aspects for technical interventions, while the latter describes the feeling of incorporation of the artificial limb in the body schema. Both aspects influence the satisfaction with the prosthesis during the rehabilitation process, while recent literature presents conflicting results. For example Christ et al. (2012) showed significant positive correlations between user satisfaction and the experiences of problems due to a swollen stump in $n = 29$ transfemoral amputees. At the same time satisfaction with the transition from standing to walking was also positively correlated to the experiences of problems due to a swollen stump. These inconsistent results indicate that users may accept a certain amount of dissatisfaction and hence show the relevance of satisfaction as a human factor. To find a holistic approach to include important psychological dimensions and solutions regarding inconsistent results in surveys, we present a methodology which aims to present a holistic view of the psychological dimensions. Starting with ideas from the critical incidence technique, we first present results of an expert study. Over 20 prosthesis experts with different academic background (engineering, medical sciences, etc.) were asked to select items and put them into different dimensions. This was realized in a web-based sorting game. Some results indicate

an influence of the academic background on the meaning of words that are presented in the items. A general discussion of how the design of items may or may not reflect the psychological profile of an amputee is presented.

OP07

ACUTE INPATIENT TREATMENT OF LYMPHOEDEMA WITH INTENSIVE COMPLEX DECONGESTIVE THERAPY (CDT) IS HIGHLY EFFECTIVE AND SUSTAINABLE IN MEDIUM-TERM FOLLOW-UP

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Background: Intensive therapy of limb lymphoedema has to be carried out in an acute inpatient setting under certain circumstances. Those include acute exacerbation of unknown cause, inflammatory or wound complications, (relative) contra-indications against parts of the CDT, and others. *Method:* In a retrospective study we analysed 104 consecutive cases of 89 patients (age 60.9 ± 17.6 years, 70.8% female, BMI 38.9 ± 3.8, 13 ± 5 days of intensive CDT) pre and post intensive CDT by means of body weight (data could be retrieved in $n = 48$ cases), circumference ($n = 23$) and optoelectronic limb volume (sum of bilateral measurements, $n = 41$) measurement. Medium-term follow-up at 2 to 6 months after discharge was compared to post measurements ($n = 14$) to analyse the sustainability of CDT effects. Wilcoxon signed-rank test was used to assess significance of pre/post intensive CDT difference of the median. *t*-test was used to test significance of pre/post differences of the mean values and of post intensive CDT/follow-up. *Result:* Intensive phase CDT resulted in a median decrease of volume of 1836 ml, IQR 2191 ml ($p < 0.005$), an average decrease of maximum difference of circumference of 6.9 ± 4.02 cm ($p < 0.005$) and an average decrease of body weight of 5.4 ± 4.9 kg ($p < 0.005$). Comparing limb volume post intensive CDT and 2 to 6 month after discharge we could not show a significant change of values ($p > 0.81$). *Conclusion:* The presented data shows a clinically relevant and significant effect of the CDT inpatient regime. Medium-term follow-up compared to time of hospital discharge shows a persistent effect in patients with subsequent lymphological outpatient care.

OP08

INTERDISCIPLINARY TEAM WORK: TEAM COOPERATION OR A FIGHT FOR THE PLACE?

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This paper is focusing on interdisciplinary team as "unity environment", essential for patient/client participation in the decision making process. This concept requires essential changes in the preparation of the specialists in health and social professions. The paper presents results of an analysis of studies implemented at Vytautas Magnus University during the last 10 years. The methods applied in the studies were content analysis and interpretation. The main goal of the paper is to explore educational and learning possibilities of the different professionals working together in a team. The analysis was based on a theoretical framework (Bourdieu 1990, 1994, Coleman 2005, Gendron 2005) and methodological principles of learning and empowerment, highlighting the position of an active and responsible team member and the need for communication, collaboration, cooperation, conditioning the success of teamwork. In the first stage of analysis, emphasis was put on the importance of the educational premises for communication and learning to communicate during health and social studies at the universities. The second stage of the analysis of intercultural collaboration between different professionals highlighted problems arising from differences in approaches to the health phenomenon. The third group of results was characterized by a discussion on practical experience of team working as premise for the development of the "unity environment", as basis for interdisciplinary cooperation. It is important that team members work effectively and know how to cooperate. The task-oriented model (working together, keeping traditions, exact place and time for everyday meeting) supports effective team work and makes input to the active participation of the patient/client in the rehabilitation process. *Summarizing:* political, management and educational questions should be solved in order to develop communication, collaboration and cooperation competence of interdisciplinary teams. It means that those three processes need political decisions which define responsibilities. Also, there are need for the institutions as learning organizations.

SPINAL CORD INJURY, AND CP AND LIFE SATISFACTION AND PARKINSON'S DISEASE (OP 09–OP 16)

OP09

EXPLORING FAMILY RESILIENC: A QUALITATIVE APPROACH

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A widely held cultural assumption is that acquiring a severe physical injury is a devastating event and that a return to normal life is improbable. Individuals with disabilities are often met with strong prejudices and pity in society. However, those with a severe injury are themselves often surprised by their ability to adjust to the physical change and to reclaim a relatively normal life. This is in accordance with the insider – outsider distinction. An important difference between the two perspectives is that the insiders generally see their situations in more favorable terms than do outsiders by redefining goals and values. The family of the patients play a major role both during rehabilitation and for the rest of their lives. But what do we know about family resilience? And is the construct a useful one? Firstly, the presentation will define the construct of family resilence, and secondly, describe how family resilience was explored in an ongoing qualitative study where patients with spinal cord injuries, acquired brain injuries and their family members participated.

OP10

THE IMPACT OF TRAUMATIC SPINAL CORD INJURY ON HEALTH RELATED QUALITY OF LIFE

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Introduction: Traumatic SCI often results in profound and long-term disability, which is life changing for the injured individual and family. The SF-36 Health Survey is one of the most widely used measures of health related QOL. *Aim:* To investigate the impact

of traumatic SCI on health related QOL. *Method:* A prospective study was done in the National Rehabilitation centre "Vaivari". SCIM was determined by the multidisciplinary team. All the participants filled in the SF-36 questionnaire form. SPSS was used for statistical analysis. *Result:* 40 adult male patients with traumatic SCI were enrolled in the investigation. The average age was 36.48 (SD 10.09) The causes of SCI were 21 traffic accidents, 10 diving cases, 9 falls from heights. Time period since SCI was 1 month to 25 years (average 5.85 years). According to the level of injury there were 18 (45%) paraplegic and 22 (55%) tetraplegic patients. Degree of injury according the ASIA Impairment Scale (AIS): there were 13 (32.50%) AIS A, 15 (37.50%) AIS B, 11 (27.50%) AIS C and 1 (2.5%) AIS D. The average SCIM for tetraplegic patients (60.67±21.16), was significantly ($p=0.02$) lower than for paraplegic patients (71.73±12.41). The SF-36 Health Survey scale score for all eight dimensions: physical functioning (PF) 32.75; role limitations caused by physical health problems (RF) 50.84; bodily pain (BP) 64; general health perception (GH) 59.93; vitality (VT) 71.5; social functioning (SF) 72.19; role limitations caused by emotional health problems (RE) 70 and mental health (MH) 73.57. Summary Scores were higher in total mental health (MCS) 55.02 than physical functioning (PCS) 35.32 ($p<0.001$). *Conclusion:* The results showed that the lowest scores of health related QOL are in the domain of physical functioning. The best results are in the domain of mental health. Further research is needed to determine the impact of particular factors of SCI, SCIM score and time period since trauma on the QOL. *Key words:* Spinal cord injury (SCI), quality of life (QOL), spinal cord independence measure (SCIM).

OP11

FALL PREVENTION AFTER SPINAL CORD INJURY - A NORWEGIAN-SWEDISH RESEARCH PROJECT

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Medical improvements, comprehensive rehabilitation management systems and life-long follow-up have increased both acute and long-time survival after spinal cord injury (SCI). In addition, prevalence of elderly affected by a SCI and incidence of incomplete injuries increases. Accidental falls are therefore a growing health concern. Falls may lead to fractures, hospitalization, increased dependency and avoidance of physical activities. At present knowledge concerning risk factors for falls in this group is scarce. To bridge this gap a new Norwegian-Swedish research project has been established. Aim. To identify individuals with SCI at risk of falling, to establish methods for prediction of falls in this patient group and to develop better preventive intervention programs. *Method:* Falls will be studied in a longitudinal research project in collaboration between Sunnaas Rehabilitation Hospital, Rehab Station Stockholm/Spinalis, and Karolinska Institutet. 200 individuals with SCI, walkers and wheelchair users, will be recruited and followed for one year by SMS every other week and a telephone interview after every reported fall and at 4, 8 and 12 months. Data will be collected through surveys, interviews, clinical tests and medical records. *Results:* Inclusion of patients started in February 2013 and 50 patients has been included between February and May. Results from the study will be presented at conferences and in peer-reviewed journals throughout 2014–2016. *Conclusion:* The project may give valuable knowledge beneficial for early identification of individuals at risk of falling and for developing better preventive interventions. We foresee an immediate need to implement the results in SCI care in both Norway and Sweden. The project will also contribute to new clinical tests to predict risk of falling in this group.

OP12

MAKING DECISION ON THE METHOD OF BLADDER DRAINAGE FOLLOWING SPINAL CORD INJURY: ROLES OF PATIENTS, DOCTORS AND FAMILY

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Objectives: To explore the actual decisional roles of patients, doctors and family when making decisions on the method of bladder drainage following spinal cord injury *Design:* Descriptive qualitative study. *Method:* We conducted semi-structured individual interviews with patients who had spinal cord injury requiring long term catheterization ($n=17$), health professionals involved in neurogenic bladder management ($n=10$), and family members ($n=4$). Interviews were audio-recorded, transcribed verbatim and analyzed using a thematic approach. *Results:* Two themes emerged from the data. Firstly, there was 'no participation' from the patient, where treatment decisions were made without seeking their opinion or consent. The decision was imposed on them and they had no choice but to follow doctors' order. In the second theme, the patients had the final say on whether or not to agree with the physician's decision. The discussion that occurred before reaching the final decision varied; some would agree without questioning while some were more inquisitive. Healthcare professionals' roles reflected paternalism. They have decided on the most appropriate option for the patient and implement it immediately. This applies mainly to those whom they thought would be best treated with intermittent catheterization. Some health professionals suggested a treatment option to the patient and it is up to the patient to decide whether or not to accept the suggestion. When patient refused, it was associated with negative reaction from the HCP and most would try to convince the patient to take up the recommended option. Family tended to support patient's choice even when they did not agree with the option that patient chose. They also commented that patients did not asked their opinions when making the decision. *Conclusion:* Treatment decision-making in this area reflected the dominance of HCP paternalism. Patients' participation is limited to consenting the pre-decided option rather than choosing the option from an array of available options whilst family played a passive role.

OP13

INTER-RELATIONSHIP BETWEEN GROSS MOTOR FUNCTION, MANUAL ABILITY AND COMMUNICATION FUNCTION CLASSIFICATION SYSTEMS IN PRE–SCHOOL CHILDREN WITH CEREBRAL PALSY

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Objective: to explore the relationships among the Gross Motor Function Classification System (GMFCS), Manual Ability Classification System (MACS), and Communication Function Classification System (CFCS) in pre-school children with cerebral palsy (CP). *Material and Method:* 227 families of pre–school children (aged

2–7 years) with a primary diagnosis of CP, receiving services from two rehabilitation centres and one hospital in Latvia, were surveyed for this descriptive study. The child's physician characterized the type of CP. Children's GMFCS, MACS and CFCS levels were classified based on parents and professional (physiotherapist, occupational therapist and speech therapist respectively) consensus decision during their clinic visits. Pair relationships among the three systems were assessed using Spearman's correlation coefficients (rs). *Results:* Correlations among pairs of the three functional assessments were strong. GMFCS levels were correlated with MACS (rs = 0.68) and CFCS levels (rs = 0.66). MACS and CFCS were also strongly correlated (rs = 0.69). The strongest correlations between functional assessments were found in children with bilateral spastic CP ($p < 0.01$). There were no statistically significant correlations among functional assessments in children with ataxic CP, between CFCS level and other assessments in children with dyskinetic CP, and between GMFCS and CFCS levels in children with unilateral CP. *Conclusion:* Although ability to walk, communicate, and handle objects is not functionally related, data revealed relationships among functional assessments in these areas. These findings may be important in establishing functional profiles for children with CP. However our results need to be interpreted with caution. Future research by enlarging sample size, especially in the group of children presented with dyskinetic and ataxic CP is needed. *Key words:* cerebral palsy, functional assessments.

OP14

CARDIOVASCULAR RESPONSES DURING TREADMILL AND CYCLE EXERCISE TESTS IN PERSONS WITHINCOMPLETE SPINAL CORD INJURY

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Introduction: Weight-bearing aerobic exercise, as during walking or running, at high intensity is most beneficial for increasing physical capacity. Persons with spinal cord injury (SCI) are recommended to exercise regularly to maintain or increase physical capacity in order to prevent secondary health problems and premature mortality. It is uncertain, however, if persons with incomplete SCI with a reduced walking function can perform weight-bearing high intensity aerobic training due to physical constrains. The objectives of this study were to investigate if the cardiovascular responses at maximal workloads during a treadmill walking exercise test differed from that during exercise test on a stationary cycle in persons with incomplete SCI, and to compare the responses with that of able-bodied persons. *Method:* Fifteen subjects (twelve men and three women, age 37±12 years) with chronic incomplete SCI (AIS D) and eight able-bodied control subjects (six men and two women, age 39±10 years) were included. All subjects performed two incremental exercise tests until exhaustion, one on a treadmill and one on a stationary cycle, on two separate days and in a randomised order. Oxygen uptake (VO_2) and heart rate (HR) were measured continuously during both tests. *Results:* In the SCI group, no statistically significant differences between the exercise modes were found in peak VO_2 (2.42 ± 0.67 l/min, vs. 2.58 ± 0.76 l/min, $p = 0.19$) and maximal HR (181 ± 9 beats/min, vs. 183 ± 12 beats/min, $p = 0.34$) for the cycle and treadmill tests, respectively. In the control group, the corresponding results were for peak VO_2 3.28 ± 0.67 l/min vs. 3.74 ± 1.01 l/min, $p = 0.07$, and for maximal HR 165 ± 23 beats/min vs. 170 ± 20 beats/min, $p = 0.34$. Comparing the mean differences in peak VO_2 between the test modes revealed no statistically significant differences between the groups ($p = 0.39$). *Conclusion:* The results indicate that persons with incomplete SCI who have a reduced walking function, possibly are able to perform weight-bearing aerobic exercise at high intensity by walking or jogging. Further studies with larger groups are recommended. This might give implications on how clinicians will design optimal aerobic training programs for persons suffering incomplete SCI.

OP15

TELECONSULTATION – SPECIALIST AND MUNICIPAL HEALTH SERVICES; A COLLABORATIVE WORK IN THE PATIENT'S HOME

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Background: This study follows the "Telemedicine pressure ulcer project" at Sunnaas Rehabilitation hospital where specialists and municipal nurses regularly meet for consultations with patients through a screen in his/hers own home. The aim of this project is to follow-up and treat patients with spinal cord injury (SCI) and pressure ulcer and if possible, avoid hospitalization. The project members at Sunnaas are well aware of the medical complications considering patients with SCI. The project team consists of a physician, a nurse with special competence in ulcer-treatment and an occupational therapist. The University of Oslo wished to follow this project and scrutinize topics that emerge when technology is utilized through collaborative work in health services. *Aim*: The aim is to investigate what occurs in the collaboration phase with emphasis on the interaction between the parties involved. This is useful in order to see what impact the technology has on developing new health services in rehabilitation. *Method:* To observe teleconsultations at Sunnaas rehabilitation hospital as well as in the patient's home. Informal and formal interviews. *Discussion:* Preliminary results indicate that dialogue in real-time build confidence for patients and health workers in the municipality. The dialogue develops through regular meetings which create trust, coordination and cooperation. Close collaboration using teleconsultation between the specialist and municipal health services in the patient's home is also a source of learning. Health professionals exchange information and knowledge, and they learn more about the challenges that patients with pressure ulcers have in daily life. On the other hand, there are often many persons involved in the teleconsultation so there may be limitations to what kind of information the patient want to share, or which questions the health professionals can ask. Sensitive and sometimes complicated questions need to be answered abruptly, without much time to think. In addition, technical support play an essential part when organizing teleconsultations – ICT services are invisible until system breakdown is a fact.

OP16

LIFE SATISFACTION AND THE RELATIONSHIP WITH SENSE OF COHERENCE AND PERCEIVED PARTICIPATION IN LIFE SITUATIONS IN PEOPLE WITH PARKINSON'S DISEASE

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Objective: To assess life satisfaction, sense of coherence, perceived participation in life situations, and mental and emotional status, and to evaluate the relationship between them in people with Parkinson's disease (PD). *Method:* A total of 76 persons with diagnostically verified PD answered questionnaires with background information, the Swedish versions of the Satisfaction With Life Scale (SWLS), the Sense of Coherence scale (SOC-13), the Reintegration to Normal Living Index (RNLI) and the Geriatric Depression Scale (GDS-20). The participant's self-appraisal of their PD was assessed with two supplementary questions. *Results:* Life satisfaction varied considerably, but was in general around the midpoint between satisfied

and dissatisfied with life. From the hierarchical multiple regression analyses, the participant's self-appraisal of their disease and sense of coherence had the strongest relationship with life satisfaction, whereas years since diagnosis contributed weakly. Persons who rated that their PD has had a greater importance in relation to other events in life, and that their PD has affected their life quite considerably, had generally lower life satisfaction. In addition, those who had a strong sense of coherence rated their life satisfaction higher. *Conclusion:* In persons with PD, their perception of the importance of the diagnosis in relation to other events in life and sense of coherence, are determinants of their life satisfaction. These results confirm that life satisfaction in people with PD is a complex phenomenon dependent on several factors that are important targets for health professionals.

HEALTH CARE SYSTEM, STROKE, TRAUMATIC BRAIN INJURY (OP17– OP24)

OP17

WHAT CONTRIBUTES TO A SUCCESSFUL REHABILITATION? – AN INTER-DISCIPLINARY QUALITATIVE SURVEY

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Background: In Germany, medical rehabilitation is characterized by intensive, short-term, interdisciplinary, predominantly inpatient services. Analyses of rehabilitation outcome in terms of success shows marked differences between rehabilitation facilities. The project „MeeR", funded by the German pension insurance scheme, aims to identify those characteristics that differ between highly successful and low successful rehabilitation facilities. In fall 2011, an interdisciplinary, open paper-pencil survey with staff members from rehabilitation facilities has been conducted as one part of the MeeR-project. It aimed to explore the scope of interdisciplinary experiences, perceptions and stances of the professionals on what contributes to a successful rehabilitation. *Method:* Eight hundred questionnaires with open response format were sent to 80 cardiac and 80 orthopedic rehabilitation clinics (5 questionnaires to each clinic). People from different professions were asked to fill them in (physicians, psychologists, nurses, physiotherapists, occupational therapists, speech therapists, and officers from quality management, social and/or pedagogic services). Professionals from 36 cardiac (45%) and 43 orthopedic clinics (54%) have participated in the survey, resulting in 134 and 136 questionnaires, respectively. Responses were analysed by means of qualitative content analysis. *Results:* Respondents answers could be subsumed under the following themes: flow of information prior to rehabilitation, conditional factors of the institution in relation to interventions (e.g. human resources) as well as to non-personal service aspects (e.g. clinic atmosphere), diagnostic procedures, goals orientation, ways of providing interventions, empathy, motivation, interdisciplinary communication and cooperation, communication and interaction among professionals and patients, preparation of after-care, consideration of social and health policy specifications. Within these themes experiences, perceptions and stances of the professionals could be quite heterogeneous. For example, within the theme related to goals orientation there were statements on goal setting by therapist as well as shared-decision making by therapists and patients. *Discussion:* The results of this survey as well as the results of a parallel systematic literature review and an expert workshop provide the conceptual basis of the main part of the MeeR-project, a qualitative study comprising 1-week visitations in six rehabilitation clinics applying participatory observations, expert interviews, group discussions with patients as well as staff, and document analyses.

OP18

TRANSFORMATION OF TRADITIONAL FUNCTIONAL INDEPENDENCE TESTS RESULTS INTO ICF CORE SETS RESULTS

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Introduction: Spinal cord injury and stroke dramatically impact functional status and quality of life of persons. International classification of functioning, disability and health (ICF) gives opportunity to evaluate problems of different populations applying the same method. From 2009 the number of studies that apply ICF for patient evaluation is increasing and nowadays it has become a popular evaluation tool. Before ICF other tests were widely applied for evaluation, so in order not to lose data of the earlier period, it is important to create formulas that will help to transform data into the new way. *Aim:* Create methods for transforming data from traditional tests of functional independence of patients (Barthel index, Functional independence measure) to ICF points in patients after stroke and spinal cord injury. *Method:* Totally 248 patients after stroke and 772 after spinal cord injury were included in this study. Patients were evaluated at admission and before leave from the rehabilitation unit. The total scores of ICF, Barthel index, and FIM tests were counted. *Results:* Analysis of the state of patients after SCI revealed that average age was 36.53 ± 15.52 years in 1994–2007 and 35.68 ± 12.51 years in 2007–2010 and did not differ significantly. In both periods SCI was more frequent in men than women. Analysis of the state of patients after stroke showed that average age was 66.88 ± 10.9 years in 1999–2004 and 70.08 ± 10.48 years in 2010–2011 and did not differ significantly. In both periods stroke was more frequent in men than women. Patients in both periods were similar if comparing their functional status and applying the traditional methods. Performance of linear regression made it possible to create transformation formulas. For patient after SCI these formulas were more precise than those of stroke, but all of them were statistically significant and reliable. Application of formulas makes it possible to transform Barthel index and FIM total scores into ICF core set total score. *Conclusion:* ICF is a useful rehabilitation effectiveness evaluation tool, because it reflects changes in body functions, activities/participation. Application of the created methods gives an opportunity not to lose earlier collected data.

OP19

APPLYING THE COMPREHENSIVE ICF CORE SET FOR STROKE SURVIVORS LIVING IN A CITY DURING HOSPITAL BASED OUT-PATIENT MULTIDISCIPLINARY REHABILITATION

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Background: Qualitative interviews have shown to be a useful tool for validation of the ICF Core Set for stroke earlier in a community living rural population in Sweden. The aim of this study was to confirm the validation of the ICF core sets for stroke in another setting; a community-living population in a Finnish city during an active out-patient rehabilitation. *Method:* Qualitative interviews were performed with 22 persons following stroke (age range 31–61 years) and analysed using content analysis method together with

ICF linking rules. Background data was gathered and Health Related Quality of Life was assessed with SF-36. *Results:* A total of 372 condensed meaning units were extracted from the transcripts. Meaningful concepts from 302 condensed meaning units were linked to ninety-eight of 130 second level categories in the Comprehensive ICF Core Set for stroke and to fourteen additional ICF categories. Ten meaningful concepts were classified as not-definable mental health, three as not-definable physical health and four as a health condition. Concepts, "I manage positive aspects of recovery", a personal factor a coping style (in fourteen interviews), and "need of assistance", not covered by the ICF (in seven interviews), was identified from 44 meaningful concepts. The health related quality of life was lower than for the reference population. *Conclusion:* The Comprehensive ICF Core Set for stroke could be confirmed in this Finnish city living sample. *Key word:* Stroke, Qualitative study, ICF.

OP20

WHAT COMES FIRST, SPASTICITY, REDUCED RANGE OF MOTION OR PAIN IN PATIENTS AFTER STROKE?

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Introduction: Pain, reduced range of motion (ROM) and reduced motor function has been found to be associated with spasticity in persons with stroke, but the developments of these impairments over time are less known. The aim of the study was to describe the development of spasticity, pain, ROM, sensibility and sensory motor function in persons with first stroke during the first year after stroke. *Method:* 117 patients with first ever stroke was recruited for the study. No selections apart from reduced arm function on day 3 were made. The patients were assessed six times during the first year, at day 3, 10, week 4, month 3, 6 and 12. Upper limb spasticity was assessed with the modified Ashworth scale (MAS), and a MAS score ≥ 1 was regarded as presence of spasticity. Sensory motor function was assessed with the Fugl-Meyer Upper-Extremity scale (FM-UE). The presence of pain, reduced sensibility and range of motion (ROM) was regarded if lower than maximum scores on the non-motor domains of the FM-UE. *Results:* The proportion of persons with spasticity increased from 0.25 at day 3 to 0.44 at week 4 and was stable up to 12 months. Sensory motor function improved from 28 (SD 25) at day 3 to 47 (SD 23) at 3 months and was stable up to 12 months. The proportion of persons with reduced ROM was 0.45 at day 3, was stable up to 3 months and increased at 6 and 12 months, 0.55 and 0.61, respectively. The proportion of patients with reduced sensibility decreased from 0.55 at day 3 to 0.36 at 12 months. *Discussion:* Pain, spasticity and sensory motor function seemed to develop in about parallel the first 3 months. The proportion of persons with pain continued to increase during the first year. The proportion of patients with reduced ROM was unchanged during the first three months, but increased at 6 and 12 months. Based on this, reduced upper limb ROM seems secondary to pain and spasticity.

OP21

SOMATOSENSORY ABNORMALITIES ARE COMMON AFTER STROKE BUT HAVE ONLY A SMALL IMPACT ON POST-STROKE SHOULDER PAIN

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Background: Post-stroke shoulder pain (PSSP) is a common impairment which occurs in about one third of an unselected stroke population. It is often reported during arm movements, but can also occur during rest. PSSP is a complex and multifactorial phenomenon. It has been associated with severe motor impairments, sensory abnormalities, spasticity and decreased passive range of motion. Traditionally, PSSP has been considered as nociceptive, but newer findings indicate that somatosensory abnormalities may contribute to the development and maintenance of PSSP. In order to optimize the treatment of PSSP after stroke, neuropathic mechanisms are important to identify. *Objective:* The aim of this study was to investigate if somatosensory abnormalities are more common in individuals with PSSP in comparison to individuals without PSSP and healthy controls. *Participants:* A convenience sample of 49 individuals with stroke; 24 with PSSP and 25 without PSSP (mean age 64 years) and 11 age- and sex-matched healthy controls were included in the study. *Methods:* Perception and pain thresholds for cold, warm and heat (thermal thresholds), and pain thresholds for pressure and pin prick (mechanical thresholds) were assessed using Quantitative Sensory Testing (QST). Passive range of motion (by a goniometer), motor function (by modified Motor Assessment Scale), resistance to passive movements (by Modified Ashworth Scale), light touch and proprioception were assessed in upper extremity. Shoulder pain characteristics were recorded in the PSSP group. *Results:* The PSSP group had higher cold perception thresholds (p=0.05) and increased self-reported cold sensitivity (p=0.02) than the group without PSSP. Both stroke groups had generally higher thermal thresholds and more extreme low or high mechanical thresholds than the healthy controls. *Conclusion:* Somatosensory abnormalities are common among individuals with stroke compared to healthy controls. The small differences in QST thresholds between the individuals with and without PSSP indicate that somatosensory abnormalities have only a small impact on post-stroke shoulder pain.

OP22

SUNNAAS INTERNATIONAL NETWORKS STROKE STUDY

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Background: Stroke rehabilitation can successfully be administered in the general hospital, in specialized rehabilitation hospitals, in nursing facilities or at home. Some persons with stroke have severe complications and are in need of specialized rehabilitation. However, services provided in specialized rehabilitation centers are not standardized or described as services in an acute stroke unit. Inpatient stroke rehabilitation services may differ widely from clinic to clinic, and from country to country. The present study aims to get an overview of the specialized stroke rehabilitation services in nine different institutions in seven countries, and to study the outcomes of stroke patients served in these institutions. *Purpose and aim:* 1. A descriptive study of the stroke rehabilitation content in specialized clinics in seven countries: procedures for admission to rehabilitation, services available and provided to patients, as well as length of stay and discharge routines. 2. An observational study of changes in regard to physical function, quality of life and psycho-social factors in stroke patients before and after specialized rehabilitation. *Material:* Patients with a primary diagnosis of stroke as defined by the World Health Organization and irrespective of age are invited to be consecutively enrolled in the study. Inclusion criteria are stroke patients in need of specialized rehabilitation and voluntary participation. Exclusion criteria are subarachnoid hemorrhage, tumor, or other severe medical conditions in combination with stroke. Participation in the study is voluntary, and subjects must be able to cooperate for performing the planned measurements. *Methods/Outcome measure:* A general description of centers participating in the study, and par-

ticular description of the content of "specialized rehabilitation" is presented, as well as priorities for admission, time delay between stroke debut and admission, waiting lists, determinants for and length of stay, follow up procedures etc. National Institutes of health stroke Scale (NIHSS), a quantitative measure of stroke-related neurologic deficit, Modified Rankin Scale (MRS) measuring the degree of disability or dependence, Barthel Index (BI) alternatively Functional Independence Measure (FIM), measurement of activities of daily living, Life Satisfaction Scale (LISAT-11), and a semi-structured interview with focus on the social situation are registered before and after rehabilitation and six months post rehabilitation. *Results:* The study is ongoing with patient enrolment until end of March 2013. Preliminary data will be presented at the conference.

OP23

VALUES OF LIFE AS CONDITION FOR COPING WITH COGNITIVE IMPAIRMENT

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Background: Cognitive impairment from acquired brain injury can be hard for those affected. Difficulties caused by memory deficits, attention problems, reduced tempo, emotional changes and poor mental health, usually complicate the interaction with others. However, some patients find satisfying ways to live, in accordance with research on resilience. Knowledge about how they master their lives can help therapists and supporters to find approaches that may help other brain injured patients in their coping attempts. *Objective:* This study aimed to explore how patents cope with cognitive impairments in a successful way. *Method:* The study was based on 16 late-term rehabilitation patients, with mild to moderate brain injuries. Ethnographic methods with 26 in-depth interviews and 4 months' participant observation were conducted. Data from interviews and field notes were transcribed and systematized, and analyzed using qualitative content analysis. *Results:* The patients aimed to achieve a state of continuity and control. The sense of continuity contributed to improved mental state. However, continuity was also important for being able to enter into relationships with other people. The patients thus sought to avoid situations with interruptions. To manage this, they had to orient themselves towards a life with new values. The new life emphasized the distance to material values and career ambitions, and promoted human values such as proximity to the closest family or friends, peace and tranquility, and contact with nature. *Conclusion:* Having control over own functions and behavior will promote mental health and influence the possibility to be accepted as competent by others. Thus continuity and control is important for being able to participate in a community. Damage of cognitive functions creates the need for a life with customized tempo and affordable tasks that do not challenge the cognitive failure. The coping patients in this study did find a lifestyle that took care of those needs. They relied on values that could help them being protected against disruptions. Those chosen values are appreciated in the Norwegian society. Hence, they are high-value meaning areas these people could communicate with pride.

OP24

CARING FOR PATIENTS WITH POST TRAUMATIC AMNESIA (PTA) FOLLOWING TRAUMATIC BRAIN INJURY

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Purpose: Investigation of nurse's experiences with patients with posttraumatic amnesia (PTA), to highlight their tasks and responsibilities in the rehabilitation care of these patients. *Method:* The study has a qualitative and explorative design. Eight experienced nurses were in-depth interviewed. The data were analyzed descriptively by Giorgis phenomenological method (1985). *Results:* Nurses describe the care of patients in PTA as both somatic and psychiatric. As PTA is a transient stage in the post acute phase of recovery from a traumatic brain injury, it is similar to delirium or an acute confusional state. Patients in PTA have widespread cognitive impairment; the most salient features are disturbances in orientation, attention, and memory, with a significant proportion of patients also showing agitated behavior. The state is considered to have resolved when continuous memory returns. While in the PTA state, the literature suggests isolation and protection as paramount care, and active rehabilitation at a low intensive level. Very few studies have examined the role of the nurses in rehabilitation of patients with PTA, and this study shows that rehabilitation nurses face challenges in meetings with patients with PTA as the care often is burdensome and stressful, and the team collaboration often is limited to counseling and feedback, with little therapeutic intervention from other team members. *Conclusion:* Analysis and descriptions from the eight participants revealed seven interrelated themes; Six themes describes how the nurses assess the confused patients with them selves as instruments, how they collaborate with the rehabilitation team, how they perceive the mental state the patients are in, how they intervene both at close and at distant levels, how they deal with agitation and unpredictable behavior and how they come to make change in and move the patients out of rigid patterns. The seventh theme describes the care for the family and how the family is involved in the rehabilitation process. This study contributes to health care providers´ understanding and knowledge of nurses tasks and responsibilities of caring for the cognitive, emotional and behavioral seqelae in patients with PTA, and supports the need for continued research in this area.

PAIN, MUSCULOSKELETAL DISORDERS, AND SERVICE FOR RARE DISORDERS (OP25–OP32)

OP25

IMPLEMENTATION OF "STANDARDS OF REHABILITATIVE INTERVENTIONS" FOR PEOPLE WITH CHRONIC LOW BACK PAIN: COULD VARIATION IN REHABILITATIVE PRACTICE AMONG CLINICS BE REDUCED?

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Background: Rehabilitation, like medicine in general, should be based on evidence to provide patients with the best care possible. Guidelines are a way to implement evidence into practice in rehabilitation and to reduce variation between clinics that cannot be accounted for by patients' characteristics or different rehabilitation concepts. In rehabilitation, the German statutory pension insurance scheme (DRV) followed a different path. They implemented standards, which should secure a certain base of evidence-based interventions for all patients of the indication within each clinic. The DRV made therapy standards publicly available, introduced them in workshops and sent out information about their fulfilment to the institutions. *Objectives:* To test whether, in the course of the implementation of therapy standards, variation among rehabilitation clinics was reduced and standards were met better. *Method:* We used data from the quality assurance program of the DRV, which included data of chronic low back pain patients from the years 2003/2004 and 2007–2011. We compared standard-fulfilment and intraclass-correlation-coefficients as a measure for variation before and after

the implementation. *Results:* The 2003/2004 sample consisted of 14.075 patients, whereas the 2007–2011 sample included 21.369 patients. Overall, variation was reduced for seven of the eleven modules of the standards. Most striking was the reduction in the module "work-related therapies" from 76.2% to 36.2%. Three modules saw a slight increase in variation, but standards were met better for all modules. *Conclusion:* Our findings support the hypothesis that the implementation has been successful. The increase in variation in three modules has its origin in the lack of interventions in these modules before the implementation. Through an increase in the application of those interventions, variation and standard realisation rose at the same time. Further research will focus on the impact on relevant outcomes. *Key word:* quality management, evidence based rehabilitation, standards of rehabilitative interventions, intraclass-correlation-coefficient

OP26

CATASTROPHIZING MEDIATES THE EFFECT OF DEPRESSION ON PAIN INTENSITY

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Objectives: Depression is not only a frequent comorbid diagnosis in chronic pain patients, but also known to influence chronicity and intensity of pain in a negative way. According to Beck's Cognitive Theory, depression is characterized by cognitive distortions. So far, research focused on the association of depression and pain, but not on a possible mediating role of single cognitive distortions. Catastrophizing is a cognitive distortion which has been shown to correlate with chronic pain and disability. Therefore, the aim of our study was to analyse the mediating role of catastrophizing in the association of depression and pain. *Method:* We included patients with chronic musculoskeletal disorders at the beginning of their outpatient rehabilitation aftercare. Depression (PHQ-9), catastrophizing (CSQ-D), pain intensity (numeric rating scale) and mental health (SF-36) were assessed. Sobel's test was used for mediator analyses in order to estimate the direct and indirect effect of depression/mental health (independent variable) on pain (dependent variable) when considering catastrophizing as mediator of their association. *Results:* 305 persons were included in our analyses (54.4% women; mean age: 46.3, SD 10.4). Depression had a significant influence on pain intensity if catastrophizing was not considered as a mediator ($\beta = 0.347$, $p < 0.001$). Catastrophizing was also associated with pain intensity ($\beta = 0.368$; $p < 0.001$). Mediator analyses showed that 70.5 % of the effect of depression was mediated by catastrophizing. The direct effect of depression on pain intensity was not significant ($\beta = 0.101$; $p = 0.148$). Analysis of the association of mental health, catastrophizing and pain intensity resulted in similar findings. If not considering catastrophizing as mediator, mental health had a significant influence on pain ($\beta = -0.323$, $p < 0.001$). After including catastrophizing as mediator in the analyses, the association of mental health and pain intensity was not significant ($\beta = -0.074$, $p = 0.265$). Catastrophizing mediated 77.1 % of the effect of mental health on pain intensity. *Conclusion:* Catastrophizing seems to mediate the association of depression and pain intensity in patients with chronic musculoskeletal disorders. However, longitudinal studies are needed to clarify the association of depression, catastrophizing and pain intensity.

OP27

DEVELOPMENT AND EVALUATION OF A PHYSICAL PERFORMANCE SCREENING FOR IMPROVED ASSIGNMENT TO EXERCISE THERAPY DURING RHEUMATOLOGIC-ORTHOPEDIC REHABILITATION

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Introduction/Background: During rheumatologic-orthopedic rehabilitation, exercise therapy is often prescribed without consideration of the person's prior physical capacity. For an optimal assignment to performance-oriented exercise therapy, an initial screening of individual's physical performance is required. *Aim:* To develop and evaluate a short group screen that distinguishes between patients with moderate and high physical performance in order to form homogeneous training groups. *Methods:* The screen was developed in collaboration with experts (physicians and sports therapists) and based on a sample of 447 patients with inflammatory and non-inflammatory musculoskeletal diseases (ICD-10: M05-07, M45-46, M51-54). This one-hour group test of maximum 10 patients under the direction of a sport therapist includes four simple subtests (6-minute walk test, squat test, sit-up test, Biering-Sørensen-test), patient's self-assessment and assessment by the sports therapist. In the evaluation phase, 272 patients were screened and assigned either to a high (HP) or a moderate (MP) performance group at rehabilitation outset. Both groups conducted a standard rehabilitation program and eight additional interventions with different demands on physical performance. The screen was repeated before discharge. *Results:* After screening, 118 patients were assigned to the MP-group and 154 to the HP-group. The groups differed in age and gender (MP: 51 ± 7 years, 48% female; HP: 48 ± 8 years, 38% female). The HP-group demonstrated better health-related quality of life physical function scores (SF-36), physical fitness (FFb-Mot) and the index for the assessment of health impairments (IMET) ($p < 0.001$). The concordance between physicians' judgements regarding MP/HP assignment and screening results was low: Cohen's Kappa = 0.21 (95% CI 0.07-0.33). After three weeks of rehabilitation, both groups had improved performance in all four subtests. Patients and sport therapists judged the screening as reliable method for individual performance assessment. *Conclusion:* The screening provides additional information to the judgement based only on the physicians' examinations and led to an improved allocation to training groups with different demands on physical performance. As a consequence, the patient-centered load control in exercise therapy during rheumatologic-orthopedic rehabilitation was enhanced. This simple resource efficient screening is suitable for group application and for the documentation of changes of physical performance over time.

OP28

ASSOCIATION BETWEEN JOB STRAIN AND THE OCCURRENCE OF WORK-RELATED MUSCULOSKELETAL DISORDERS AMONG COMPUTER PROFESSIONALS IN INDIA

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Introduction: Job demands and job control are the two aspects of psychosocial work environment that are often studied in oc-

cupational health psychology. The demand and control model of Karasek and colleagues proposes that job strain is a combination of high demands and low control. Little research has explored the psychosocial work environment of the computer professionals in India. The occurrence of Work-related Musculoskeletal Disorders (WRMSDs) is also a cardinal outcome to study among computer professionals. WRMSDs have consistently been associated with job strain in other populations. *Aim:* (*i*) To determine the job strain among computer professionals. (*ii*) To explore whether job strain leads to an increased occurrence of WRMSDs. *Method:* In this cross-sectional study, 424 computer professionals with at least 1 year of experience were recruited using convenience sampling technique. After obtaining informed consent, data regarding personal characteristics, computer usage, job strain and occurrence of WRMSDs were collected by face to face interview method using a valid, reliable and pretested questionnaire. Job strain was assessed with scales from Job Content Questionnaire. Participants with high demands and low control were classified as having job strain. NIOSH case definition for musculoskeletal disorder was used in this study to determine the occurrence of WRMSDs. *Statistical analysis:* Descriptive statistics was produced for personal characteristics, computer usage, job strain and the occurrence of WRMSDs. The effect of personal characteristics, computer usage and job strain on the occurrence of WRMSDs was analyzed using independent-sample t tests for continuous variables and the chi-square test of association for categorical variables. 5% level of probability was used to indicate statistical significance. *Results:* 17.2% of subjects were classified as having job strain. The occurrence of WRMSDs (based on case definition) in any body region was 35%. A great proportion of symptoms were experienced in the spine. Job strain was associated with the occurrence of WRMSDs of low back ($p<0.05$). *Conclusion:* The results of this study indicate that job strain increases the likely hood of WRMSDs. Computer professionals should consider the psychosocial work environment, along with other factors when choosing a job. *Key word:* computer professionals, job strain, Work-related Musculoskeletal Disorders.

OP29

ASSESSMENT OF INFLUENCE OF BODY POSITION ON KYPHOSIS AND LORDOSIS IN FEMALE PATIENTS WITH DIAGNOSED IDIOPATHIC LAEVO-SCOLIOSIS

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Introduction: Civilisation and technology development create a change in children's and adolescents' lifestyle by prolonging the time spent in sitting position. This trend may apply to patients with spine deformations, too. Aim. The aim of this work is to evaluate the body position effect on kyphosis and lordosis in female patients treated for idiopathic laevo-scoliosis (IS). Materials and methods. A group of 30 girls between 11–17 years of age, with lumbar laevo-scoliosis of Cobb angle ranging between 10–210, who have not been treated with the bracing method, has been investigated. The control group consisted of 30 healthy girls in the age of 11–17 years. Evaluation has been carried out in standardized standing position (P1) and sitting position (P2), with the use of ZEBRIS CMS-10 measuring apparatus from Zebris Medical Gmbh company. Mean value of kyphosis and lordosis angle in individual groups, kyphosis and lordosis angle difference depending on a change of body position was analysed. This work has been approved by the Ethics Committee. All patients gave their written consent prior to their inclusion in the study. *Results:* In a group of girls with IS, the mean kyphosis value was higher than in the control group in both positions; however, the differences were not statistically significant. The mean value of lordosis angle in P1 position in the sample group was statistically more significant than in the control group. The difference between average kyphosis angle in P1 and P2 positions in the sample group in relation to the control group was not statistically significant. The difference between average lordosis angle in positions P1 and P2, in juxtaposition with the control group was statistically significant. Estimated level of statistical significance was $p<0.05$. *Conclusion:*. Existence of low-grade scoliosis in the lumbar region influences progression of lumbar lordosis in standing position. Presence of low-grade scoliosis in the lumbar region has no significant influence on kyphosis angle measured in standing and sitting position. *Key word:* scoliosis, sagittal plane, lordosis, kyphosis. Acknowledgement*:* This work was partially supported by the research fund of Polish Ministry of Science and Higher Education for 2011–2014.

OP30

A CROSS-SECTIONAL STUDY ON FUNCTIONING IN PATIENTS WITH AMYOPLASIA - THE MOST COMMON FORM OF ARTHROGRYPOSIS

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Introduction: Amyoplasia is the most common form of arthrogryposis and is characterized by typical deformities of the joints and replacement of skeletal muscles by fibrous tissue and fat. Little is known about adults with this diagnosis. The purpose of this study, performed at TRS National Resource Centre for Rare Disorders, was therefore to describe function and functional strategies for adults with amyoplasia, as this knowledge is important for relevant function-enhancing measures. *Method:* ICF was used as a theoretical reference. Body structures, body functions and activities were all mapped with reliable and valid instruments. Twenty-two adults (15 women) aged 20–91 years were included. Demographical variables, pain and clinical history were registered. Body proportions, active and passive movement of joints and muscle strength were all measured. Functional Independent Measure (FIM) was used to assess the ability to perform daily activities. Compensatory strategies were described. Body structures and body functions were mapped and compared to relevant reference data. Correlations between function and activity were studied. *Results:* Nineteen participants were affected in all extremities. The majority had undergone comprehensive conservative and surgical treatment. Considerable variation was seen in most variables measured. Mean height was 15 cm below the norm. Median for passive range of movement was below lower limit of normal in most joints. Extension of wrists and flexion of knees were most decreased (74° and 89° below norm). For all movements except in forearms, wrists and ankles which had contractures, passive range was larger than active. Highest difference was presented in flexion of elbows (median of passive movement was 59° higher) and lowest for extension movements (range 0–11°). Muscle strength was reduced for all movements in upper extremities, and below 5 percentile. However, seven participants were independent in all FIM areas. Need of assistance was highest regarding bath and dressing. Level of passive movement and ability to move against gravity correlated with degree of independence. *Conclusion:* 1) Adults with amyoplasia represent a heterogeneous group regarding body functions and activities of daily living. 2) The results indicate that independence in daily activities require a combination of ability to passive range of motion, adequate strength of muscles, compensatory strategies, adaption and relevant helping aids

OP31

VIBRATION TRAINING MAY INCREASE MAXIMAL MUSCLE VELOCITY AND POWER - A CONTROLLED RANDOMISED TRIAL

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Introduction: Vibration training has become of increasing interest to health professionals. The aim of this ongoing study is to compare training on vibrating machines with a conventional training on the same machines without vibrations. The vibration training devices of Wellengang® permit simultaneous training of upper and lower limbs which increases participant acceptance and therefore this equipment was chosen. *Method:* Here we present results of 38 anamnestic untrained men and women (32.2 ± 6.2 years, 172.5 ± 8.5 cm, 73.5 ± 11.6 kg). They participated in a controlled and parallelized randomized intervention to increase maximal power, velocity and jump height. Sessions lasted max 30 min (including warming up and cool down). Participants trained over 5 weeks, twice/week 30 min on vibrating machines (VIB) or on not-vibrating devices (CON). VIB underwent different forms of squats (24–26 Hz and 4–8 mm range) and crooking of arms. The muscular performance was investigated by counter movement jumps and squat jumps using a ground reaction force platform (Performance Tester®). At baseline and at the end of intervention data of body weight, resting pulse and blood pressure were measured. Statistical evaluations were done for inter-group differences (Δ, as mean ± SD) with paired and unpaired *t*-tests and significance level $p<0.05$. *Results:* Compared to the CON we observed in the VIB group a mean increase of all test parameters, however, with significant inter-group differences for the maximal velocity (VIB: 0.16* ± 0.24 m/s; CON: –0.07 ± 0.16 m/s. In VIB we observed higher body weight (VIB: +0.61* ± 1.2 kg; CON: –0.53 ± 1.7 kg), lower data for resting pulse (VIB: –4.18* ± 4.18 1/min; CON: +4.13 ± 9.54 1/min) and diastolic blood pressure (VIB: –4.55* ± 8.99 mmHg; CON: +1.17 ± 9.81 mmHg). *Discussion and Conclusion:* The results give the impression that vibration training may produce higher maximal velocity and power, apparently in combination with a more sufficient recovery, but further evidence is needed. *Disclosure statement:* Authors are not affiliated with any commercial companies.

OP32

AN APPROPRIATE WAY OF ORGANIZING SERVICES FOR RARE DISORDERS

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Introduction: Low frequency diagnostic groups require services from a large group of professionals. However, in the ordinary health care system they experience a lack of knowledge about their diagnoses and they are often forced to co-ordinate their own treatment. TRS is a national resource centre offering services to seven diagnostic groups of rare, congenital disorders; osteogenesis imperfecta, arthrogryposis multiplex congenital, short stature (dwarfism), limb deficiency, Marfans syndrome, Ehlers-Danlos syndrome and myelomeningocele. The centre is part of Sunnaas Rehabilitation Hospital, and is located just outside Oslo, Norway. The centre works to increase knowledge about the diagnoses, and offers guidance and counseling on medical, psychological, social and educational issues. TRS is designed to supplement, not replace, the ordinary health care – and social services. No medical referrals are required to use the services of the centre, and all services at TRS are free of charge for the users. Interdisciplinary approach is used, and the centre offers life-long services to all age-groups. Tasks for the centre: (*i*) Individual follow-up at TRS and in the community. (*ii*) Counseling by letter, email and telephone - the individuals who have the diagnoses and their professionals. (*iii*) Regular courses with specific relevant topics aimed at a wide array of target groups. Users and family members or relevant professionals may reside at the centre while attending different courses. (*iv*) Develop new knowledge about the target groups through; -clinical work, scientific studies (in collaboration with others). (*vi*) Disseminate knowledge about the target groups to individuals with the diagnosis, their relatives, professionals and the society. *Scientific work:* All scientific projects emanate from the clinical work, and they are always planned in collaboration with the patient-organizations connected to the centre. In this presentation this way of working will be exemplified by a population-based study carried out on adults with osteogenesis imperfecta - a rare, genetic disorder. *Conclusion:* This way of organizing services for people with rare disorders has proven to be useful and efficient for the users of the centre and their relatives, but also in terms of professional collaboration and research regarding these conditions.

VOCATIONAL REHABILITATION, AND CULTURALLY ADJUSTED NORM VALUES (OP33–OP39)

OP33

REHABILITATION AFTERCARE: FINDINGS OF A SURVEY IN OUTPATIENT REHABILITATION CENTRES AND IMPLEMENTATION OF A WORK-RELATED AFTERCARE STRATEGY

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Objectives: In Germany, rehabilitation aftercare is missing a vocational perspective that relates therapies to the demands of the job. With the aim of improving the conventional intensified rehabilitation aftercare (IRAC), patients were surveyed to determine the proportion of aftercare patients with severe limitations of work-related functioning. Additionally, preferences for work-related interventions during rehabilitation aftercare were assessed. The results of this survey were used to develop and implement a work-related aftercare strategy for orthopaedic patients in outpatient rehabilitation centres. *Method:* In 11 outpatient rehabilitation centres, workers with musculoskeletal disorders completed a questionnaire at the beginning of an orthopaedic IRAC. Severe limitations of work-related functioning were assessed by validated screening instruments. *Results:* 320 patients participated in the survey. We excluded 40 respondents from the analyses because of more than 30% missing values in the questionnaire or non-musculoskeletal diagnoses. 54.6 % of the 280 remaining patients were female (mean age: 49.2 years, SD = 9.6). 29 to 44% of the respondents had severe limitations of work-related functioning. These patients rated the importance of work-related interventions, like vocational functional capacity training (b = 0.476; 95% CI 0.188; 0.763), social counselling (b = 1.112; 95% CI 0.720; 1.504) and work-related psychosocial groups (b = 0.494; 95% CI 0.110; 0.879) higher than rehabilitees without severe limitations of work-related functioning. Moreover, they showed also a higher

interest in initiation of further services (b = 1.413; 95% CI 1.062; 1.764) and meetings with the employer (b = 1.034; 95% CI 0.518; 1.549). *Conclusion:* From the evaluation of this survey's findings, a work-related aftercare strategy was developed and implemented in 12 outpatient rehabilitation centres. This program includes the interventions which were rated as important by the rehabilitees and is completed by relaxation training. These interventions replace 20 to 30 % of the common exercise therapy in IRAC. The addition of rehabilitation aftercare by work-related interventions is of high relevance for patients with severe limitations of work-related functioning. Currently, this work-related aftercare is evaluated in the participating centres in a randomised controlled trial.

OP34

THE RELEVANCE OF MULTIPROFESSIONAL TEAMWORK IN WORK-RELATED MEDICAL REHABILITATION

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Objective: In Germany, work-related medical rehabilitation (WMR) is an effective strategy to improve work ability of persons with severe work-related problems. Since the multimodal approach requires close cooperation of all involved professions, the following research questions were examined: 1. Which relevance has multiprofessional teamwork (MPT) in WMR? 2. Which aspects characterize effective MPT in WMR? 3. How is MPT realized in the daily WMR routine? *Method:* The questions aroused in the course of a larger research project, which aimed to evaluate the implementation of the 2010 published WMR guideline. Among other methods of data collecting, focus groups with WMR teams from seven orthopaedic rehabilitation centres were conducted to gain information about their experiences with developing a WMR program along the requirements of the guideline. The focus groups were explored by qualitative content analysis using an unconstrained categorization matrix. *Results:* MPT emerged inductively as a meaningful theme and was included into the categorization matrix with the following subcategories: relevance of MPT in WMR, team development in course of WMR implementation, success factors of effective MPT and realizing MPT in daily routine. All teams described MPT as one WMR success factor, referring to its relevance for the holistic treatment of the multifactorial impaired target group. Since conventional medical rehabilitation does not requiring MPT in the same extensity and intensity, the implementation of WMR initiated team building. Even though all teams named similar indicators for effective MPT (e.g. mutual agreed treatment goals), these indicators were accomplished to a different degree in their daily routine. We found three team types: 1. "Consultative Involvement", 2. "Inclusive Participation" and 3. "Joint Performance". These types were associated with different context factors (e.g. case numbers) and differed in three major aspects: 1. participation in managing the treatment, 2. way of providing the treatment and 3. communication practice. *Conclusion:* The study shows the outstanding relevance of MPT for WRM. The impact of team structures on WMR outcomes has to be examined in the future. To strengthen MPT team building and organisational development programs should be carried out in WMR centres.

OP35

IMPLEMENTATION OF THE GERMAN GUIDELINE FOR WORK-RELATED MEDICAL REHABILITATION: A FEASIBILITY STUDY

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Objective: To investigate how German inpatient rehabilitation centres are implementing the newly developed guideline for work-related medical rehabilitation (WMR) that describes additional therapies that should be performed in patients with poor work ability. *Method:* Implementation of the WMR guideline was evaluated in chronic back pain patients (ICD-10: M50 to M54) at seven inpatient rehabilitation centres. Patients completed questionnaires assessing health- and work-related variables at beginning of rehabilitation, at discharge and three months after discharge. Details regarding the treatments provided were extracted from the standardised discharge report. *Results:* Of the 375 patients (mean age: 50.0±8.1 years, 55.5% female) surveyed at baseline, 327 (87.2%) completed the questionnaires at discharge and 267 (71.2%) three months after discharge. Mean sick leave duration during the last three months was 6.6±5.6 weeks. At the end of treatment, patients stated that work ability and work-related themes were a central component of their rehabilitation. Rehabilitation programmes comprised an average 82.9 hours of therapy; 11.2 hours (13.5%) had specific work-related contents. The recommended frequency and duration of social counselling and work-related psychosocial therapy measures were appropriate. There were discrepancies regarding the recommended duration and frequency of functional capacity training in four rehabilitation centres while three rehabilitation centres provided more functional capacity training than the recommended minimum amount. The standardised mean difference (SMD) between baseline and follow-up sick leave duration indicated an almost medium-sized effect (SMD = 0.47; 95% CI 0.28 to 0.66). Effects on SF-36 pain (SMD = 0.78; 95% CI 0.61 to 0.94) and SF-36 physical role (SMD = 0.71; 95% CI 0.48 to 0.94) were almost large. Linear regression showed that additional 5 hours of work-related therapies were associated with a 1.2-week decrease in sick leave duration three months after discharge (95% CI –2.38 to –0.03). *Conclusion:* The WMR guideline was for the most part successfully implemented, and implementation of the guideline seems to improve rehabilitation outcomes. However, higher graded evidence of the effects of the guideline implementation needs a pragmatic randomised controlled trial.

OP36

PREDICTIVE VALIDITY OF A SCREENING INSTRUMENT FOR THE IDENTIFICATION OF EXTENSIVE WORK-RELATED PROBLEMS IN PATIENTS WITH CHRONIC DISEASES (SIMBO-C)

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Introduction: Work-related medical rehabilitation (WMR) has become an integral part of rehabilitation offered by the German Federal Pension Insurance (GFPI). Studies showed concordantly the effectiveness of WMR with focus on patients with extensive work-related problems. Since the identification of such problems is of great importance regarding an effective access management, a screening instrument for the identification of extensive work-related problems (SIMBO-C) was developed. The question was

whether the instrument can predict critical events in the context of return to work after rehabilitation. *Method:* The SIMBO-C score is composed of the weighted sum of seven single items (range: 0 to 100). Patients with musculoskeletal, psychiatric and internal diseases were recruited. A questionnaire at admission to rehabilitation and at the three months follow-up was filled in. To test the predictive quality, Area Under Curve (AUC) coefficients were calculated concerning the following events: claim for further interventions or early retirement (FI), sick leave for more than six weeks continuously in the follow-up (AU6), job loss in the follow-up (JL). Additionally the combined index considering all three events (ALL) was tested, too. Optimal cut off points were defined using the Youden Index. *Results:* Complete datasets were obtained from 283 patients (age 46.3 ± 9.0, 66% female) with prevalences for the critical events: AU6 = 17%, JL = 9%, FI = 22% and ALL = 36%. AUC coefficients were significant for all outcomes (AU6 = 0.846, $p = 0.027$; JL = 0.727, $p = 0.049$; F = 0.783, $p = 0.029$; ALL = 0.858, $p = 0.022$). The range of optimal cut off led from 27 (FI) to 38 pts (AU6). For the combined index the optimal cut off was 27 pts with a sensitivity of 78% and a specifity of 80%. *Conclusion:* The study outlines the ability of the SIMBO-C to make predictions about critical events, which qualifies it as an effective screening for access management to WMR. Following these results the SIMBO-C was implemented in the access management of the GFPI identifying patients with a need for WMR based on their subjective ratings.

OP37

THE WORK ABILITY INDEX PREDICTS APPLICATION FOR DISABILITY PENSION IN CHRONIC BACK PAIN PATIENTS AFTER WORK-RELATED MEDICAL REHABILITATION

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Objective: The Work Ability Index (WAI) assesses the degree to which workers consider their state of health adequate to cope with their job demands. The aim of our study was to investigate whether the WAI identifies chronic back pain patients at risk of disability pension application, other adverse work-related criteria and referrals for further treatment. *Method:* Chronic back pain (ICD-10: M50 to M54) patients recruited at seven German inpatient rehabilitation centres completed the WAI at beginning of rehabilitation. Disability pension applications and other work-related outcomes were assessed by postal questionnaires three months after discharge. Referrals for further treatment at discharge were extracted from the standardised discharge report. *Results:* The baseline sample included 294 patients (mean age: 49.9 years, 57.1% female). The mean WAI score was 26.2 ± 7.5 points, 158 (53.7%) had poor (7-27 points), 111 (37.8%) moderate (28–36 points) and 25 (8.5%) good to excellent (37–49 points) work ability. 211 of 294 (71.8%) returned the 3-month follow-up questionnaire. Receiver operating characteristic curve analysis of the association of the continuous baseline WAI rating and a subsequent disability pension application revealed an area under the curve equal of 0.80 (95% CI 0.62 to 0.97). Youden's J was highest when the WAI cut-off was ≤ 20 points (sensitivity: 72.7%, specificity: 82.2 %; total correct classification: 81.7%). A WAI rating of ≤ 20 points was associated with 15.6 times higher odds of a disability pension application (95% CI 3.6 to 68.2) and 4.9 times higher odds of unemployment (95% CI 1.5 to 16.8) after three months. Moreover, a WAI rating of ≤ 20 points was associated with 2.1 times higher odds of a referral for further vocational rehabilitation (95% CI 1.0 to 4.2) and 3.6 times higher odds of a recommended additional psychological counseling (95% CI 1.8 to 7.3) as documented in the standardised discharge reports. *Conclusion:* The WAI could help rehabilitation professionals identify back pain patients with a high risk of application for disability pension.

OP38

ORGANISATIONAL JUSTICE, HEALTH-RELATED QUALITY OF LIFE AND WORK ABILITY: CROSS-SECTIONAL FINDINGS FROM THE SECOND GERMAN SOCIOMEDICAL PANEL OF EMPLOYEES

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Objective: Epidemiological research on the psychosocial determinants of work ability has increasingly focused the concept of organisational justice (OJ), especially the dimensions of procedural justice (PJ) and relational justice (RJ). However, overlaps with the effort-reward imbalance (ERI) model were criticised. We examined whether both models are empirically distinguishable, and whether both constructs complement each other in the prediction of work ability. *Method:* Cross-sectional data were used from the Second German Sociomedical Panel of Employees. The sample was drawn from the insurants register of the federal German Pension Insurance Fund. For measuring PJ and RJ, the scales of the Organisational Justice Questionnaire (OJQ) were applied. Furthermore, the ERI Questionnaire (ERIQ), the Work Ability Index (WAI) and the Short-Form Health Survey (SF-36) were part of the survey. Additionally, sociodemographic and health behavior data were assessed. Confirmatory factor analyses were used to test the multidimensionality of the OJQ and the ERIQ. Multiple linear regression models were calculated to estimate the influence of both work stress concepts on the WAI and health-related quality of life. *Results:* The sample included 1217 persons with at least half-time employment (mean age: 50.9 years, SD 4.0; 52.7% women). Seven items from both constructs were deleted on basis of the modification indices. The final model fitted well ($Chi^2/df = 700.241/202 = 3.467$; $p < 0.001$; NFI = 0.951; CFI = 0.964; RMSEA = 0.047). For regression analyses, modified scales were calculated. After adjusting for social demographics, health-related behavior as well as effort and reward, PJ and RJ were still associated with the WAI (adjusted $R^2 = 0.379$; $\beta PJ = 0.09$; $\beta RJ = 0.12$) and the SF-36 mental health scale (adjusted $R^2 = 0.276$; $\beta PJ = 0.13$; $\beta RJ = 0.08$). Additionally, PJ ($\beta = 0.10$) was associated with the SF-36 general health scale (adjusted $R^2 = 0.379$). *Conclusion:* The dimensions of OJQ and ERIQ are distinguishable indicators of psychosocial stress and useful for complementing the explanation of work ability. Research on the relevance of psychosocial factors for work ability and health-related quality of life should consider organisational justice as an additional characteristic of the work situation.

OP39

IS THERE A NEED TO DEVELOP CULTURAL ADJUSTED NORM VALUES?

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Aim: The aim of this study was to investigate if nationally based norm values are adequate to use in other cultural contexts than where they were first developed. For illustration the Pediatric Evaluation of Disability Inventory (PEDI) was used to compare the original American norms applicability in a Norwegian context. *Method:* Data from 224 Norwegian children without disability, in 10 half-year groups covering ages 1.0–5.9 years was used. These person and item data were compared to those of the original American normative sample ($n = 412$, age 0.5 to 7.5 years) and to the American subsample ($n = 313$) falling within the more limited age span employed in the Norwegian sample. Consistent with the original PEDI construction, person ability measures and item difficulty calibrations were computed with Rasch analysis (WINSTEPS). *Results:* All function domain measures significantly increased with age in the Norwegian sample and was parallel to the corresponding curves of the American PEDI material. A significant sample difference was observed for functional skill domains of self-care and mobility, but not for social function. Thus, Norwegian children do not master all skills at the same age level as the American, and also do not learn them in the same order. *Conclusion:* Data from the Norwegian sample appear to be suitable for constructing national PEDI norms for the age groups involved. Differences between the American and the Norwegian normative samples are substantial. Accordingly, the Norwegian age norms and item difficulty scores that have been calculated from our sample should be preferred in Norwegian practice.

SATELLITE SYMPOSIUM 1: GERMAN SOCIETY FOR RHEUMATOLOGY

SAT A

NEW INSIGHTS INTO MOLECULAR EFFECTS OF PHYSICAL MEDICINE IN RHEUMATIC DISEASES: ANKYLOSING SPONDYLITIS

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Physical medicine is indispensable in the treatment of ankylosing spondylitis and can have priority before initiating a pharmacological treatment. Furthermore, different methods of physical medicine can have profound effects on inflammatory activity. The mechanisms of these favourable effects are not completely understood. Over the past few years it has become possible to explore the modes of action of different methods of physical medicine on the cellular and moleculat levels. Methods of cellular and molecular medicine facilitate the analysis of the key players in the inflammatory process, the interactions between cells of the immunse system and bone and the influence of physical therapy on these processes. Therefore, the lecture focuses on the effects of serial application of thermotherapy (whole-body cryotherapy, mild whole-body hyperthermia) in patients with ankylosing spondylitis. Based on the presented results of a significant influence of physical medicine on inflammatory cytokines, and a remarkable amelioration of clinical parameters/disease activity, the methods of physical medicine should be integrated into the multimodal treatment concept of ankylosing spondylitis. In summary, modern molecular medicine offers new insights into pivotal mechanisms and mediators of the inflammatory process and into interactions between cells of the bone and the immune system.

SAT B

NEW INSIGHTS INTO MOLECULAR EFFECTS OF PHYSICAL MEDICINE IN RHEUMATIC DISEASES: OSTEOARTHRITIS AND INFLAMMATORY RHEUMATIC DISEASES

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Numerous types of peloids are currently available for balneotherapy, but in terms of effects and efficacy therapeutic peat has been more frequently studied. Recent studies have shown that both thermal and physical affects of therapeutic peat are comparable and synergistic. The thermal effects of all types of peat are very similar but the chemical effects differ. Some hypothetical aspects of these chemical effects have to be investigated in future clinical studies but clinical experience with mud therapy allows preliminary conclusions to be drawn. This statement is especially supported by recent molecular investigations. The lecture focuses on the therapeutic use of serial mud applications (local mud packs and whole-body application by mud bath) in patients with osteoarthritis and inflammatory rheumatic diseases. Serial mud applications (local mud packs as well as whole-body mud bath) as part of a multimodal therapy programme in patients with osteoarthritis have resulted in a significant reduction of pain, a significant improvement of functional parameters as well as a significant reduction of the serum levels of pivotal cytokines ("bone protection"). The same effects were found in patients with inflammatory rheumatic diseases. Serial mud baths reduced the levels of antiinflammatory cytokines and significantly improved functional parameters.

POSTER PRESENTATIONS

HEALTH SERVICES, SYSTEMS AND POLICIES – REHABILITATION PROGRAMMES

PP01

COGNITIVE-BEHAVIOURAL THERAPY VS. AEROBIC EXERCISE VS. MULTIMODAL THERAPY IN PRIMARY FIBROMYALGIA: PRELIMINARY RESULTS OF A RANDOMIZED-CONTROLLED TRIAL

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Objectives: Since fibromyalgia syndrome (FMS) patients have multiple symptoms, a multimodal therapy approach has been recommended in current guidelines. It consists of the combination of pharmacological and non-pharmacological interventions. In first line aerobic exercise and cognitive-behavioural therapy (CBT) are recommended to treat chronic pain and concomitant symptoms like fatigue, unrefreshing sleep or other cognitive symptoms. The aim of our study is to evaluate acceptance and effectiveness of this therapeutic approach. *Methods:* One-hundred and twenty-five female patients with primary fibromyalgia, who matched the definition of FMS by the 1990 ACR criteria, were randomized into four groups: control group, exercise-only-, CBT-only-, and combination- (CBT and exercise, ‹multimodal›) groups for 12 weeks of therapy. CBT was performed 1 hour once a week as group therapy, aerobic exercise twice for 30 min on ergometer. Minimum required attendance was 60%. Fibromyalgia status was assessed with Fibromyalgia Impact Questionnaire (FIQ) before (t0) treatment and after 12 weeks of treatment (t1). Data were processed by intention-to treat analysis. *Results:* Exercise intervention was completed with a minimum attendance of 60% by 35.5%, CBT by 48.4% and combination therapy by 51.6% of the patients. Regarding FIQ score, there were no differences between the four groups at t0 (p=0.935), but scores differed highly significantly at t1 ($p<0.001$). Patients who completed the 3-month intervention had a reduction of FIQ score (exercise-only: –5.2 d=0.26, $p=0.307$ vs. CBT:–14.9 d=0.96, $p=0.001$ vs. combination (CBT and exercise): –12.2 d=0.91 $p<0.001$), while the control group increased by 2.1 ($p=0.49$). *Conclusion*. A 3-month intervention containing cognitive-behavioural therapy is potent to lower the impact of fibromyalgia for patients with primary fibromyalgia with high effects. Compliance is poor, especially in single-exercise training, but improves when linked with CBT. 6-month follow-up data is needed to investigate long-term results.

PP02

ESTABLISHING A HEALTH CARE PROGRAM FOR ADULTS WITH CEREBRAL PALSY

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Background/Objectives: Approximately 70% of individuals with cerebral palsy (CP) achieve walking ability. Many, however, experience a premature deterioration in their walking ability. Studies on adults with CP have revealed several factors that reduce their level of independent mobility, i.e. impaired gross motor function, muscle stiffness, spasticity or weakness, contracture, skeletal deformity, reduced balance, obesity, pain, fatigue, reduced fitness and insufficient use of compensatory modalities. To regain or maintain walking ability, or adopting appropriate compensatory modalities, may have implications for employment, independence, and health-related quality of life (HRQOL). There is a need for a structured rehabilitation program that target specific aspects of mobility in order to increase participation and HRQOL for adults with CP. Our facility is working to identify and implement the appropriate characteristics, in organization as well as in content, of such a service. Our current clinical assessment of individuals with CP generates information that will serve the continuous improvement of the program as well as providing a valuable source of data for ongoing research. *Description of the program to be implemented:* Walking difficulties in adults with CP may have several different, but interrelated, causes; therefore a multidisciplinary rehabilitation approach seems necessary. The program includes mapping of walking patterns, muscle strength, joint status, cardio-respiratory level, level of pain and fatigue, as well as walking performance, coping-styles and preferred and prioritized activities in daily life. Facilities for three-dimensional gait analysis, X-ray, and cardio-vascular capacity testing are parts of the program. Our team includes physicians of different specialties (e.g. PRM-physician, orthopaedic surgeon, and radiologist) physiotherapist, prosthetist/orthotist, occupational therapist as well as social worker, nurse and psychologist. This broad approach seems fruitful for development of research and evidence-based clinical practice for adults with CP. *Significance*: By establishing a systematic, multidisciplinary health care program, important factors for walking deterioration and mobility restrictions will probably be identified, assisting in the future identification of appropriate rehabilitation interventions for individuals with CP, as well as guiding subsequent research.

PP03

FIRST RESULTS OF A NEW OBESITY INTERDISCIPLINARY OUTPATIENT TREATMENT PROGRAM - LEICHTER DURCH LEBEN (LIGHT THROUGH LIFE) A SINGLE-ARM FOLLOW-UP STUDY

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Introduction: Over the last two decades, prevalence of obesity has tripled in Europe up to 20% of the population. The WHO is discussing obesity as a “global epidemic” and the fastest growing health problem causing enormous social costs. A multimodal treatment program was set up, including nutritional advices, exercise, and behavioural therapy, each delivered by members of specialized departments. The general aim was to develop a holistic approach to sustained weight loss based on recent scientific findings. A first purpose was a weight reduction via targeted training on nutrition and physical activity. Additionally, a reduction of obesity-associated

comorbidity and symptoms as well as improved self-management skills and quality of life were aimed at. *Methods*: According to medical/psychological examination, a total of 55 group interventions (82.5 h) over 6 months for a fee (€ 1,350/participant) were offered. Body weight, metabolic parameters, activity (pedometer, Exercise Diary), eating behaviour, and "quality-of-life" were evaluated during the program. The study group consisted of 80% females; age: 50 ± 11years; BMI: 37 ± 7 kg/m^2. *Results:* Within the 6 months, there was a significant reduction in bodyweight of the participants with an average reduction of 10 kg (p<0.001). The weekly physical activity (189 vs. 256 min./week) as well as the daily amount of steps (43,821 vs. 56,318 steps/day) slightly increased. In the 2 km walking test, as an indicator of physical fitness, there was a significant improvement of 22 vs. 19.5 min. (p < 0.001). The metabolic parameters (LDL minus 7 ± 28 mg/dl p < 0.02; oGGT 2h BZ 6.1 ± 1.6 vs. 5.5 ± 1.4 mmol/l p < 0.01) and the liver values showed a significant improvement (p < 0.02). Psychometric evaluation showed a significant improvement of subjective quality of life (p < 0.05) and perceived physical fitness (p < 0.01). Already after the first half of the program significant alterations of "Flexible Control" (p < 0.001) as well as "Irritability" of eating behaviour (p < 0.001) were identified as possible mediator variables. After one year, 9 out of 10 patients had a lower weight than at the beginning, furthermore psychometric improvements also continued after completing the program. *Conclusions*: Participating in an interdisciplinary multimodal outpatient obesity treatment program may lead to a sustained weight loss, improved physical fitness, and eating habits, as well as increased motivation and quality of life.

PP04

DOES THE REHABILITATION-MOTIVATION CHANGE DURING AN INPATIENT CARDIAC REHABILITATION?

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Backround: Motivational factors to undergo a cardiac rehabilitation and the change of these factors during inpatient rehabilitation are seldom assessed and it is known that only few patients take part in an aftercare-program. The purpose of this study was to identify patient's rehabilitation motivation and their changes during an inpatient cardiac rehabilitation. *Method:* In 2012, 84 patients (mean age 56 years, sd 6, range 34–65; 66% men) filled in the PAREMO-20, a German measure of rehabilitation-motivation at the beginning and the end of an inpatient cardiac rehabilitation to conduct a pre-post comparison. PAREMO-20 consists of the scales "emotional distress", "physical limitations", "social support and gain from illness", "readiness for change", "level of information regarding rehabilitation" and "scepticism". The patients were divided into 3 clinical groups (myocardial infarction [n=24], hypertension, angina pectoris [n=28], coronary-heart-disease [CHD; n=30] in order to examine whether there were differences in rehabilitation-motivation between the groups. *Results*: The level of information regarding rehabilitation improved statistically significant (p<0.0001), emotional distress (p=0.028) and physical limitations (p=0.039) decreased. Women showed higher emotional distress (p=0.034) at the beginning and higher level of information (p=0.001) at the end of rehabilitation. The comparison between the 3 groups showed that patients with myocardial infarction had the highest scores on the scale "Social support and gain from illness" at the beginning of rehabilitation. At the end of rehabilitation, patients with CHD described obvious physical limitations. Only 6 patients reported 12 weeks after completion of inpatient rehabilitation from attending an outpatient aftercare program. *Conclusion*: The results showed that rehabilitation-motivation changed during inpatient cardiac rehabilitation: the patients elevated their level of information regarding rehabilitation, they also reduced emotional distress and physical limitations. Gender differences in terms of rehabilitation-motivation were barely detectable, as well as differences between the three clinical groups. It was noticeable that less than 10% of patients attending an outpatient aftercare program. For this reason, during the inpatient rehabilitation significantly more information should be given about outpatient aftercare programs to increase the participation in these activities.

PP05

COMPLEX REHABILITATION AND FUNCTIONING OF THE MUSCULOSKELETAL SYSTEM, PAIN, AND DISEASE ACTIVITY IN PATIENTS SUFFERING FROM RHEUMATOID ARTHRITIS

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Introduction: Rheumatoid arthritis affects about 3% of the Polish population. Progression of the disease leads to joint damage and progressive severe disability. Rheumatoid arthritis is associated with joint pain and functional disturbances. The aim of this project is to evaluate the influence of complex rehabilitation on severity of pain, activity of the disease and functioning of the musculoskeletal system in rheumatoid arthritis patients. *Materials and methods*: 56 women aged from 24 to 65 years participated in the study. All patients underwent individual kinesiotherapy, instrumental kinesiotherapy. In addition to that, 35 patients underwent general and local cryotherapy, whereas 21 others underwent kinesiotherapy in the pool, magnetotherapy and electrotherapy. The rehabilitation lasted 3 weeks. The patients were examined three times: before rehabilitation, immediately after the rehabilitation and 3 months after the end of the rehabilitation. The following questionnaires were used in the study: DAS – 28 index to assess activity of the disease, HAQ-DI index to assess functioning of the musculoskeletal system and VAS index to assess severity of pain. *Results*: The analysis of average values of studied parameters showed decrease in activity of the disease and severity of pain in both groups of patients, both immediately after 3 weeks' rehabilitation and 3 months after the end of rehabilitation. The advantageous pain reducing effect lasted longer in the group of patients who were rehabilitated with added cryotherapy treatment. In this group of women the improvement in functioning of the musculoskeletal system was better, compared with added water treatment, as well immediately after 3 weeks rehabilitation as 3 months after the end of rehabilitation. *Conclusions*: The results indicate that after implementation of added cryotherapy treatment during rehabilitation of patients suffering from RA, a lowered pain intensity level and improved functioning of the musculoskeletal system may last longer when compared to added hydrotherapy treatment.

PP06

SHORT TERM-RESULTS OF AN OUTPATIENT REHABILITATION PROGRAM AFTER OPERATION OF HIP, KNEE, SHOULDER AND BACK PAIN

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Objective: Presentation of results of examining 481 patients in the period from fall 2011 until Spring 2013 after shoulder, knee, hip, or spinal surgeries followed by a phase 2 outpatient rehabilitation program. A survey has been conducted during the indication

oriented treatment of the patients, based on time- and field tested questionnaires and specific questions on the subjective and objective goal attainment scores, in order to analyze short-term improvements concerning pain, specific well-being (WOMAC, DASH, Roland Morris), and life quality (EQ5D). The questionnaires were obtained at baseline and after rehabilitation in the pre-post design. *Conclusion*: The patients showed significant improvement in the fields of subjective pain perception, functional outcomes and goal attainment scores. Positive changes were observed in every field and in all patient groups. The improvement of the survey scores and functional status scores were statistically significant. Overall, there was a significant benefit from the patients' perspective. Further research and longitudinal studies with comparison groups are needed to prove the long-term effectiveness of outpatient rehabilitation.

PP07

INTERDISCIPLINARY PAIN REHABILITATION USING ACCEPTANCE AND COMMITMENT THERAPY PRINCIPLES - A ONE-YEAR FOLLOW-UP

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Introduction: The principle behind Acceptance and Commitment Therapy (ACT) is briefly that by trying to control pain and difficulties related to pain, quality of life decreases; instead, by accepting life and focus on what is important to the individual, quality of life will increase. Aim: To report on a one-year follow-up of an interdisciplinary rehabilitation program for patients with long-term pain. *Methods*: A consecutive series of patients (n=30) with long-term muskuloskeletal pain were included in the study. Eighty percent of the patients were female, 40 % were born outside Europe and 60 % were unemployed. The patients participated in an eight-week interdisciplinary rehabilitation program using ACT principles. The rehabilitation team consisted of psychologist, occupational therapist, physical therapist, social worker, physician, and nurse. The program included theoretical and practical work, individually and in group, 3-4 days a week. Data collection was done using instruments of the Swedish national quality register for pain rehabilitation (NRS) at the start of the programme and one year after completing the program. Data included health related quality of life (EQ5D), avoidance of movement (Tampa Scale) and acceptance (CPAQ). *Results*: At the one-year follow-up a decrease in avoidance of movement and increase in quality of life and acceptance were found. The results of subgroup analyses of gender and ethnicity showed variation in results; in particular, data indicated that the program was less successful for persons born outside Europe. *Conclusion*: The outcome instruments used showed improvement at the one-year follow-up after the rehabilitation program based on ACT principles. For an analysis of the effectiveness of rehabilitation programs based on ACT principles, further research with comparison group is needed.

PP08

STATE OF THE ART OF TRANSFEMORAL SOCKETS IN COLOMBIA

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In Colombia, most of the amputees have difficult access to rehabilitation services because they are located on the countryside and have low incomes. The quality of life of transfemoral amputees depends mainly on the level of comfort brought by the socket because this is the element that has direct contact with the residual limb. Sockets are custom made elements of transfemoral prosthesis that work as the interphase between the residual limb and the prosthesis. Due to this fact, that component requires the presence of the amputee for its fabrication; therefore, they can only be developed by the local rehabilitation centers. Those centers are located in the main cities of the country where they manufacture, basically, thermoformed sockets with materials like polypropylene. The typical fabrication process in Colombia starts with a negative cast from the residual limb, which is used afterwards to create the positive cast where the polymer is thermoformed. The polymer is not thermoformed following the exact shape of the residual limb, but has some differences in order to apply or relief pressure according to the limb form. Hence, this process depends primarily on the expertise of the prosthetic technician. Additionally, there have been no big improvements on this field in the last decade, in Colombia as well as in other developing countries. In this article the state of the art of transfemoral sockets in Colombia is established as a first step on the developing of a new design that can improve the quality of life of Colombian amputees. *Key words:* transfemoral amputee, socket, quality of life.

PP09

BARRIERS TO INVOLVING PEOPLE WITH SPINAL CORD INJURY IN MAKING DECISIONS ON BLADDER DRAINAGE: HEALTH PROFESSIONALS' PERSPECTIVES

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Objectives: To explore the barriers to involving patients with spinal cord injury in making a decision on the method of bladder drainage as perceived by the health professionals. *Design*: Descriptive qualitative study. *Methods*: We conducted semi-structured individual interviews with 10 rehabilitation health professionals (9 rehabilitation doctors and 1 nurse). All participants were involved in bladder management for patients with spinal cord injury at the time of interview. The interviews were audio-recorded, transcribed verbatim, and analyzed using a thematic approach. *Results:* The identified barriers were categorized into 3: clinician-related factors (time constraints, lack of health information resources for patients); patient-related factors (state of denial, capacity to understand health information, competency to make decision, attitude on decisional role) and family-related factors (family role, sharing the decision). The clinicians perceived that to involve patients with treatment decision, they needed extra time to give a 'detailed explanation', and would require a separate consultation from the routine ward round. Thus only selected patients had the opportunity to attend these additional sessions. There was also a lack of health information on bladder care for the patients, and that verbal information alone was insufficient in making patients understand their condition. The clinicians also perceived that it was difficult to engage patients who were in denial state to participate actively in the decision-making process. Some believed that patients' capacity to understand the disease and the treatment options were limited, partly due to the complexity of the disease. The psychological impact of the injury affected the patients' interests to participate in decision-making. On the other hand, some patients were contented to delegate the

decision-making role to either the doctors or their family. Family posed as barrier when they thought that they were in the position to make decisions for the patient. *Conclusions*: Health professionals viewed that clinician, patient and family play significant roles in preventing patient from active involvement in treatment decision-making. These results provide insights into the type of interventions needed to improve patients' participation.

EDUCATION

PP10

IMPLEMENTATION OF PHYSICAL AND REHABILITATION MEDICINE TEACHING IN UNDERGRADUATE MEDICAL TRAINING IN UNIVERSITY OF LATVIA

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The right to rehabilitation is the human right set out in the United Nations Convention on the Rights of Persons with Disabilities. The barriers to rehabilitation service provision can be overcome through promoting understanding among young generation of doctors about disability and its impact on individuals and society, promoting specialists' understanding of the idea and necessity of rehabilitation. In Latvia, medical doctor speciality can be obtained in Rīgas Stradina University and Latvian University. In the year 2010, a study course "Physical, rehabilitation and sport medicine" was developed for 2nd year medical students, providing 2 creditpoints. Hannover model for implementation of physical and rehabilitation medicine teaching in undergraduate medical training, was used as a base for developing the study course and it was adapted to local conditions. The textbook "Rehabilitation, Physikalische Medizin, Naturheilverfahren" with the authors Gutenbrunner and Glaesener, has been translated into latvian for the purpose of educating the new specialists. The course aims to provide basic knowledge in physical and rehabilitation medicine. Course objectives: 1) to enable students to learn the theoretical foundations of physical and rehabilitation medicine, to develop understanding of physical medicine and rehabilitation goals, objectives and practical application in various stages of health care; 2) creating understanding of the physical and rehabilitation medicine interventions (physiotherapy, ergotherapy, speach therapy, psychological interventions, electrotherapy, magnetoherapy, phototherapy, massage, hydrotherapy, heat and cold therapy, acupuncture, balneology, resort medicine), indications and contraindications; 3) to develop knowledge and practical skills for physical fitness and work capacity evaluation, use of physical exercises for health promotion and physical capacity building; 4) to know the medical rehabilitation strategies in various stages of health care, the ICF, understanding of the rehabilitation process as a multidisciplinary teamwork. During the time period from 2010–2013, 343 students have attended the course, 67 of them where foreign students. The study course was evaluated by students, using a standardised questionnaire. The questionnaire includes 13 questions, which are answered on a 6-point scale. The overall course assessment was "good": 56.3 % gave the evaluation "good", 42.3% - "medium", 1.4% - "bad". Concluding remark regarding the study course 'Physical, rehabilitation and sport medicine'. As a result of implementing the course, the future physicians acquire the necessary knowledge of rehabilitation medicine, and they value the knowledge they gain during this study course. By improving and refining the course it will become a necessary part of the undergraduate student education.

PP11

TEACHING DISABILITY AND REHABILITATION MEDICINE IN CROATIA

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The aim of this manuscript is to describe recent changes in the rehabilitation medicine education in Croatia, and to highlight the efforts that were made at University of Split School of Medicine, as well as at University Hospital Split in order to improve training in rehabilitation medicine. Academic setting such as Physical and Rehabilitation Medicine training centre Split enables education for different health professionals at the same place and time, which provides opportunities for learning about competencies of other team members and development of future collaboration. Also, a uniform approach to education in Rehabilitation Medicine is provided for all health professionals. All of this sets a solid foundation for education of integrated rehabilitation team and achieving excellence in contemporary Croatian Physical and Rehabilitation Medicine. *Key words*: physical medicine, rehabilitation, curriculum, education, disabled persons, Croatia

MENTAL FUNCTIONS – STROKE

PP12

EXPLORATION OF SOME PERSONAL FACTORS OF THE INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH CORE SETS FOR STROKE

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Introduction. The aim of the study was to explore the influence of personal factors on the International Classification of Functioning, Disability and Health (ICF) Core Set (extended version) for stroke. *Methods*. The design was cross-sectional. Data from 243 community dwelling persons (53 % men) with prior stroke (6 months to 13 years) was used. The average age at assessment was 68 years (range 24 to 95 years). Data was gathered from different areas of Sweden: a city, towns, communities and countryside. The data was gathered through interviews and observation of the persons by a health professional trained in the ICF. The personal factors explored were age, gender, place of residence and time since onset of stroke. Regression analysis of these four personal factors was used to explore the influence on different components, domains and categories of functioning and environmental factors in the extended version of the Comprehensive ICF Core Set of Stroke. *Results*. The personal factors had statistically significant predictive values for almost all categories, domains and components of functioning and environmental factors used in this study. These factors influences self-perceived functional outcome and environmental factors in terms of being barriers or facilitators in various ways. Reports of restrictions in 'activities and participation' were more typical in older patients. Gender was shown to influence functioning, where more problems are reported by males. Time since onset was found to be a factor that influences 'activities and participation' and from environmental factors only the perception of attitudes. Those who

lived in the city reported facilitators in 'support and relationships' and 'attitudes' to a higher degree than those who lived in rural setting. *Conclusion*: Personal factors such as age, gender, place of residence and time since onset of stroke influence self-perceived functioning and environmental factors.

PP13

CLINICAL FEASIBILITY AND USEFULNESS OF THREE DEPRESSION SCALES IN ACUTE STROKE PATIENTS

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Objectives: To investigate clinical feasibility and usefulness of three depression scales, which are Beck depression inventory (BDI), aphasic depression rating scale (ADRS), and emotional behaviour index (EBI) in acute stroke patients. ADRS looks like a modified form of Hamilton depression scale. *Methods*: Twenty stroke patients, 2 weeks to 4 weeks after onset, were prospectively recruited. Beck depression inventory was recorded by self or caregiver with yes/no question. ADRS and EBI were checked by observing patient's behaviour for three days. EBI which recorded behaviours most frequently observed, had 7 domains such as sadness, aggressiveness, disinhibition, adaptation, passivity, indifference, and denial. Descriptively we analyzed two rating scales and one behaviour index. *Results*: Thirteen patients had left hemisphere lesions, and 7 patients had right hemisphere lesions. For Beck depression rating inventory, only 9 patients could be evaluated because 11 patients had communication disorder, global aphasia or cognitive dysfunction (MMSE <20). In 9 patients, three patients had severe depression (BDI score > 16) and 6 patients did not have depression. For ADRS, all patients could be evaluated. Twelve patients had depression by ADRS score (> 10). Among them, ten were from BDI unfeasible 11 patients and two were from BDI feasible 9 patients. For EBI, 6 patients showed sadness, 5 aggressiveness, 2 disinhibition, 1 indifference. Six patients were not observed to have specific emotional behaviour. *Conclusion*: It is difficult to assess depression by BDI in patients with communication deficiencies or severe cognitive disorders. ADRS and EBI could help access to emotional changes in these patients. Further research of large sample size and good design is needed for appropriate depression rating scale in acute stroke patients including ADRS, EBI.

PP14

EFFICACY OF CONVENTIONAL NEUROREHABILITATIVE THERAPY USING TC-99M HMPAO SINGLE PHOTON EMISSION COMPUTED TOMOGRAPHY IN PATIENTS WITH SUBACUTE LEFT MCA INFARCTION: A PILOT STUDY

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Introduction: The purpose of this study was to objectively assess the efficacy of neurodevelopmental therapy on rehabilitative unit using Tc-99m HMPAO single photon emission computed tomography (SPECT) in patients with subacute left MCA infarction. *Method*: A total of seven subacute stage patients with left MCA infarction were included in this study. These patients received conventional neurorehabilitative therapy including physical and occupational therapy, twice per day for 3–5 weeks on admitted condition. Brain perfusion SPECT images obtained at pre-Tx and post-Tx were reconstructed using statistical parametric mapping in these patients. A voxel with an uncorrected p-value of less than 0.01 was considered to be statistically significant. *Result*: Seven patients (mean age, 66 years± 10 [SD], 5 male and 2 female) with subacute left MCA infarction were examined. First SPECT scans were performed at 31 days ± 22 [SD] after stroke onset and second SPECT scans were performed at 27 days ± 9 [SD] after first study. The overall regional cerebral blood flow (rCBF) in the left cerebral hemisphere was increased on pre-Tx SPECT images in comparison to that observed on the post-Tx SPECT images. The rCBF in the left temporal, parietal, and frontal cortices was increased on the post-Tx SPECT images in comparison to the pre-Tx SPECT images. These findings indicate that mild improvement in the rCBF can be expected after conventional neurorehabilitative therapy. *Conclusion:* Improvements in rCBF following neurodevelopmental therapy were objectively demonstrated in the patient group through SPM analysis of brain perfusion SPECT images, which also correlated well with the clinical symptoms in these patients. Because the number of patients we studied was limited, further study is necessary.

MOVEMENT FUNCTIONS – STROKE

PP15

EFFECTIVENESS OF PHYSIOTHERAPY USING GAIT TRAINER AFTER STROKE

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Introduction: Stroke is one of the leading diseases causing disability. One of the most common problems after stroke is balance disability. Loss of walking ability and large changes in gait parameters determine settled lifestyle of people after stroke. Over the past few decades, a large amount of research effort has been put into developing exoskeletons and robotic assistive devices. *Aim*: To investigate the effectiveness of physiotherapy using gait trainer after stroke. *Materials and methods:* A total of 50 stroke subjects (31 women, 19 men) who underwent rehabilitation at Vilnius University Hospital Santariškių klinikos, Rehabilitation, Physical and Sports Medicine Centre in 2011–2013 were recruited in this study. Subjects were randomly assigned to either the experimental group or the control group. All subjects received a routine individual physical therapy (basic and functional) for 30–45 min, 5 times a week. The subjects in the control group also received additional about 20 min gait training with traditional compensatory measures. The subjects in the experimental group also received additional about 20 min gait training with gait trainer. Balance parameters were assessed using Berg Balance Test. Gait parameters were collected using a 10 m walking test and measuring walking distance. The independence parameters were collected using functional independence measure scale (FIM) and Barthel index. All statistical analyses were performed using "SPSS Windows 17" and "Excel 2010" programs. *Results*: The results of the control and experimental groups increased significantly during the research project. At the end of the study the average Berg Balance test result was significantly higher in the experimental group than in the control group ($p < 0.05$). After the research period, 96% of the experimental group and 64% of the control group patients could walk with assistance. The walking speed increased in both groups, however no significant difference was found between the groups ($p > 0.05$) at the end of the study. Patients of the experimental group could walk twice as long distance as patients in the control group ($p < 0.05$) at the end of the study. The test results of the patients' autonomy increased significantly in both groups, and the autonomy test results were significantly higher in the experimental group ($p < 0.05$) at the end of the study. *Conclusions*: The findings demonstrate that the physiotherapy procedure using gait trainer is more effective than

physiotherapy procedure using traditional compensatory measures in improving balance, gait distance and independence.

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PP16

LUMBAR SYMPATHETIC BLOCK WITH BOTULINUM TOXIN TYPE B IN A PATIENT WITH DYSTONIA OF LOWER EXTREMITIES – A CASE REPORT

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Background: Dystonia is a neurological movement disorder, in which involuntary muscle contractions cause repetitive movements, or abnormal postures or pain. These abnormal contractions cause pain in most patients with dystonia. Muscle ischemia and depletion of energy in muscle fibres could be a reason of this pain. The lumbar sympathetic block (LSB) is held to be an effective method for treating chronic pain of the lower extremity in several ways including raising the blood flow and washing out the inflammatory substances. For longer therapeutic effect of LSB, sympathetic destruction with alcohol or radiofrequency has been used. The botulinum toxin (BTXBT) could be considered because it inhibits the release of acetylcholine at the cholinergic preganglionic sympathetic nerve terminals and its effect lasts longer than local anaesthetics therefore the LSB with BTX could be an alternative way of lumbar sympathectomy. *Case presentation*: A 40-year-old woman, affected by bilateral lower extremity dystonia was referred to our department because of the pain associated with involuntary movements for 26 years. We performed bilateral LSBs using local anaesthetics. After confirming the effect of LSBs, BT type B with local anaesthetics mixture was injected. Both pain intensity and the frequency of involuntary muscle contraction were decreased at 6 months follow-up. We report a case of a dystonia patient who was well managed with LSB with BTX type B. *Conclusions:* In case of lower extremity pain associated with dystonia, LSBs with BT type B may be an alternative treatment.

PP17

THE EFFECT OF VISUAL AND TACTILE STIMULATION ON POSTURAL PATHWAY IN STROKE PATIENTS

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Objective: Patients with stroke compensate for motor and sensory impairments with great dependence on visual and tactile information for postural control. The aim of this study is to explore the effect of visual and tactile vertical stimulation on standing pressure distribution and postural pathway in stroke patients. *Subjects and Methods*: Twenty-three stroke patients were recruited. We measured left/right standing pressure differences and the trajectory area of centre-of-pressure (COP) for each patient under three different conditions: no stimulation, visual and tactile stimulated conditions. First, patients stood on the static posturography platform with their eyes blindfolded. After a rest period, the patients stood on the platform with their eyes focused on a 1.5 m luminous rod, which was placed at a vertical position in front of the patients. After a rest period, the patients again stood holding a cane in their nonhemiplegic hand in a vertical position, but with their eyes blindfolded. In each condition, we collected the signals coming from the platform with the feet and obtained the balance indices. *Results:* Our results showed that there was decreased left/right standing pressure differences when visual stimulation was given (16.15 ± 13.14%), compared to tactile stimulation (18.65 ± 19.53%), but these differences were not statistically significant ($p = 0.401$). However, considering the trajectory COP area, there was a statistically significant difference ($p = 0.022$) between visual (59.22 ± 117.34 mm^2) and tactile (285.00 ± 476.28 mm^2) stimulation. When we compared the trajectory COP area between visual stimulation (59.22 ± 117.34 mm^2) and no stimulation (213.30 ± 431.00 mm^2), we found no statistical significance ($p = 0.061$), although a decrease of the trajectory COP area was observed with visual stimulation. *Conclusions:* Our findings suggest that visual vertical stimulation is superior to tactile vertical stimulation in postural stability in stroke patients.

PP18

NONHEMIPLEGIC HAND STRENGTH IS WEAKER IN THOSE WITH DEGLUTITION PROBLEMS AT INITIAL ONE MONTH AFTER STROKE

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Introduction: Dysphasic stroke patients with nasogastric feeding tubes (NGT) are more at risk of malnutrition. Malnutrition can result in prolonged hospital stay and can limit patients' functional recovery. Hand grip strength can be used as a marker of the body lean muscle and can be useful to detect patients' nutritional status at an early stage, even before these changes are manifested in serum or anthropometric measurements. *Objective*: The objective of this study was to determine if hand function strength of the nonhemiplegic side assessed within one month of stroke was significantly different in patients with NGT compared to those without NGT, and to assess if hand strength measurements correlated to serum markers and functional status. *Method*: We retrospectively reviewed the medical record of patients who were admitted to our department from September 2010 to April 2012. We recorded patients' serum markers; albumin, protein, prealbumin, transferrin and zinc. We also recorded the modified Barthel index scores (MBI), minimental status examination (MMSE), Berg balance scale (BBS). Hand function assessments included lateral, palmar and tip pinch; and grip strength measurements (lb) of the nonhemiplegic side. Correlations analysis of hand strength to biochemical markers was performed. *Results:* A total of 218 medical records were reviewed. Mean ± SD values MBI, BBS, MMSE albumin, with NGT (n=151)/without NGT (n=67) were 12.5±20.0/51.3±31.3, 6.26±12.2/27.6±20.9, 10.0±10.1/19.1±8.0, 6.7±0.7/7.4±6.7. The mean lateral pinch and grip strength (lb) of these two groups were 6.5±7.0 / 11.7±5.3, 20.1±23.5 / 42.3±20.6; respectively and all these values showed statistically significant differences ($p<0.05$). Both initial grip and lateral pinch strength correlated to patients' initial serum markers, namely transferrin, prealbumin and protein. It also showed significant correlation with patients' functional status. *Conclusion*: NGT patients showed weaker grip and lateral pinch strength of the nonhemiplegic hand and this correlated to patients' functional status and serum markers. Initial assessment of grip and lateral pinch strength of the contralateral hand may be useful to evaluate the functional nutritional status in those with prolonged NGT from an early stage, even before these changes are manifested in serum markers.

MOVEMENT FUNCTIONS – SCI

PP19

INFLUENCE OF PHYSICAL ACTIVITY AND SPASTICITY ON BONE MASS DENSITY IN PATIENTS WITH SPINAL CORD INJURY

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Objectives: Spinal cord injury (SCI) leads to loss of bone mass. This in turn increases the risk of fractures. If and to what extent daily life physical activity may prevent this, has not been established. We have used various tools to measure voluntary and involuntary (spasticity) muscle activity and correlated this with bone mineral density (BMD) in SCI. *Design*: Prospective cohort study. Setting: Outpatient clinic in a rehabilitation hospital. Participants: We studied 12 men with complete tetra- or paraplegia (AIS classification A), and 18 men with incomplete tetra- or paraplegia (AIS classification B to D). Main outcome measures: Questionnaire-obtained measures of muscle activity and DEXA-scan of the skeleton were collected at 1, 3 and 12 months following the SCI. *Results*: Positive correlation between physical activity and bone mineral density after SCI BMD of the proximal femur measured 12 months after the SCI correlated markedly with the level of physical activity (r=0.61, p<0.04). Similarly, whole-body BMD measured 12 months after the SCI was clearly correlated with the level of physical activity (r=0.56, p<0.05). Negative correlation between spasticity and bone mineral density after SCI was found. Subjects who experienced higher frequency and higher severity of their spasticity had more bone loss 12 months after a SCI (r=0.79, p<0.004). Physical activity level was stable before and after injury. Physical activity level, time spent on heavy and light labour and leisure time activities remained stable before injury and one year after injury. Femoral osteopenia develops between 3 and 12 months after the SCI. The proximal femur and whole body BMD declined 12% and 4% (p<0.001) respectively, between 3 and 12 months post-SCI. *Conclusion*: Subjects who exercised heavily before and after the SCI had markedly lower bone loss than subjects who exercised less. In contrast, subjects who experienced more spasticity had higher bone loss. Possibly more spasticity reduces voluntary muscular activity and thereby causes a lowered BMD.

PP20

EVALUATION OF PHYSICAL CAPACITY AND FUNCTIONAL STATE OF PERSONS WITH SPINAL CORD INJURY AFTER TRAINING ON SUMMER CAMP, USING ICF CORE SET

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Introduction: Persons with spinal cord injury (SCI) have reduced physical capacity because of muscle weakness, loss of autonomic control below the level of injury, reduced activity and subsequent changes in metabolic and vascular function, reduced level of functional independence in daily activities - transferring, dressing, using wheelchair, bathing, cooking and shopping. The components of physical capacity and functional state are related and could be improved during training. *Aim*: To evaluate physical capacity and functional state changes of persons with SCI after a course of training on summer camp conditions. *Methods*: Evaluation was performed during 2012 June-September in a summer camp "Landscape therapy and recreation centre". 51 persons with spinal cord injury were examined twice: at the beginning and end of the summer camp. During two weeks all subjects participated in the 6 h per day training programme. The validated ICF Core set for SCI was used for evaluation of the persons' functional state. Persons' physical capacity was examined using the Cooper test (6 or 12 min run by wheelchair), 30 s and 20 m wheelchair driving test, eight driving test and shot put test. 45 (88.2%) persons with SCI were men and 6 (11.8 %) women, average age of the participants was 28 ± 8.8 years. 25 (49.2%) persons had tetraplegia and 26 (51%) paraplegia. *Results*: The results of physical capacity indicated that functional abilities of persons with SCI improved during the training course. At the beginning of the camp, person›s with tetraplegia could go by wheelchair 573 × 45.98 m, in the end - 619 × 68.74 m, respectively and person's with paraplegia could go by wheelchair 1379 × 58.79 m and 1474 × 80.45 m (Cooper test). The results of 30 s and 20 m tests also showed improvement of functional abilities performance (at the beginning of the training persons with paraplegia during 30 s overcome 60 × 16.1 m, after 2 weeks of training – 65 × 11.4 m; 20 m distance they overcome within 8.9 × 3.4 s, after training – 8 × 2.8 s). The analysis of the results of the validated ICF Core set for SCI showed significant positive changes (p < 0.01) in activities and participation (d420, d430, d4450, d5, d630, d640), in body functions domains (d455, d740, b1266); The correlation analysis showed strong significant correlation between ICF domains and physical capacity tests results (between shot put test and d440, r = 0.752, p < 0.01). *Conclusion:* Physical capacity and functional state of persons with spinal cord injury were improved during a two-weeks training programme on summer camp conditions. A strongly significant corelation was found between ICF domains and physical capacity test results before and after training. Improvement of physical capasity increased functional independence of the persons with spinal cord injury.

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SENSORY FUNCTIONS AND PAIN

PP21

THE RELATIONSHIP BETWEEN HAND PAIN AND FUNCTION IN WOMEN WITH RHEUMATOID ARTHRITIS

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Introduction: In patients with rheumatoid arthritis, progressive functional disability and loss of independence are mainly caused by destructive arthritis of the joints of the hands. Aim: To investigate the relationship between hand pain and dysfunction in women with rheumatoid arthritis. *Methods*: The study was conducted in the Outpatient Department of the Rehabilitation, Physical and Sports Medicine Centre at Vilnius University Hospital "Santariškių klinikos". Women with rheumatoid arthritis attending this clinic were invited to participate in the study. Participants were interviewed and data

were collected from medical records. Hand function was examined using the Michigan Hand Outcomes Questionnaire (MHQ) and the modified Keitel Functional Test. Pain was evaluated by the pain Numeric Rating Scale (NRS) and the Functional Pain Scale (FPS). The Functional Independence Measure (FIM) was used to assess daily activities. *Results*: Sixty women with rheumatoid arthritis were included in this study. The mean age of participants was 46 years (SD 8.65; range 26–60 years). Average duration of rheumatoid arthritis was 8 years (SD 3.8 years). Thirty-three women had radiological stage II disease and 27 women had stage III. The mean MHQ was 46.5 (SD 10.6). All women indicated pain in their hands with a mean NRS of 6.3 (SD 1.5). Most participants (56.7%) rated their pain as tolerable but with reduced daily activities, as evaluated by the FPS. Hand function as measured by the modified Keitel functional test was 28.3 (SD 5.7). The greatest functional limitation was transferring into the bath or shower (mean FIM score 108.5; SD 10.5). There were moderate correlations ($p<0.001$) between functional pain and hand functions, evaluated by MHQ ($r=-0.47$), modified Keitel index ($r=-0.43$) and FIM ($r=-0.64$). *Conclusion*: Hand pain was indicated as the most serious problem by the women in this study, and they were dissatisfied with the appearance of their hands. Hand pain was found to be related to the functional impairment amongst women with rheumatoid arthritis.

PP22

ELECTRODIAGNOSTIC STUDIES FOR PREDICTION OF OUTCOME AFTER TRANSFORAMINAL EPIDURAL STEROID INJECTION FOR LUMBAR RADICULOPATHY

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Purpose: We investigated the predictive value of components of electrodiagnostic studies for outcome after lumbar transforaminal epidural steroid injection in patients with clinically diagnosed lumbosacral radiculopathy. *Methods*: In 38 patients with clinical lumbosacral radiculopathy, visual analog scale (VAS) for pain, functional outcome by Roland Morris Disability Questionnaire (RMDQ), and Oswestry Disability Index (ODI) were evaluated after lumbar transforaminal epidural steroid injection in a retrospective study. *Results*: Subjects with clinical lumbar radiculopathy showed significant improvements of VAS. Of 38 patients tested with electrodiagnostic studies before injection, 28 patients were positive for lumbar radiculopathy and 10 patients had negative examination. There were significantly greater improvements of VAS and ODI for patients with a positive lumbar radiculopathy confirmed by the electrodiagnostic study. Each component of electrodiagnostic studies was not significant regarding VAS, RMDQ and ODI. *Conclusions*: Electrodiagnostic study of lumbar radiculopathy is a predictor of improvement in pain and functional outcome after transforaminal epidural steroid injection for lumbar radiculopathy. But component of electrodiagnostic studies, respectively, did not predict the improvement of pain and functional outcome in patients with clinical lumbar radiculopathy.

PP23

NEURO-SPINAL FUNCTIONAL CONDITION AND PAIN INTENSITY IN PATIENTS WITH ACUTE OR SUBACUTE LOW BACK PAIN WITH CONCOMITANT RADICULOPATHY

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Objectives: To evaluate changes of neurospinal functional conditions in accordance with pain intensity in patients undergoing multidisciplinary rehabilitation programme (MRP) due to acute or subacute low back pain with concomitant radiculopathy (LBPcR) *Methods*: 26 patients with acute or subacute LBPcR undergoing MRP participated in the study. Pain intensity was evaluated by a Numerical Pain Scale (NPS). Patients' 'neuro-spinal functional condition' was instrumentally assessed using a computerized multidimensional technology "Insight Subluxation Station" ("ISS"). "ISS" (USA) is a 5-technology unit providing a comprehensive picture of patient's 'neuro-spinal functional condition', measuring: trunk Infrared Termography (IRT) by Rolling Thermal Scanner, spinal Range of Motion (sROM) by wireless Inclinometer, patients' self-reported Pain Threshold (srPT) by pointed Algometer, Heart wave variability (HWV) by Pulse profiler and Surface static Electromyography (sEMG) by 2 channel EMG sensors. These tests' data can be used individually or all together for a comprehensive view of patient's spinal condition by a "ISS" single overall quantitative measure – the Neuro-spinal Function Index (NSFI). The patients were evaluated twice: at the beginning and end of the MRP with a mean interval between measurements of 14 days. The study group consisted of 12 (46.2%) male and 14 (53.8%) female patients. Mean age was 34.58±7.23 years. *Results*: Pain intensity according to the NRS decreased significantly by 3.46 ± 1.4 points ($p<0.05$). Analysis of computerized "ISS" data showed significant changes in all of the measured individual parameters such as IRT, sROM, srPT, HWV and sEMG and in their overall measurement (NSFI): IRT increased by 23.87 ± 12.9 points ($p<0.05$), sROM increased by 7.92 ± 4.5 points ($p<0.05$), srPT increased by 12.66 ± 10.9 points ($p<0.05$), HWV increased by 12.71 ± 10.8 points ($p<0.05$), sEMG index increased by 6.58 ± 4.8 points ($p<0.05$) and NSFI increased by 12.75 ± 4.9 points ($p<0.05$). Moderate negative correlation was seen between NRS score and sROM ($r=-0.506$, $p=0.008$) as well as between NRS score and srPT ($r=-0.386$, $p=0.050$). No other significant correlations were found. *Conclusions*: After a multidisciplinary rehabilitation programme patients with acute or subacute LBPcR had significantly reduced pain intensity and improved 'neuro-spinal condition'. Pain intensity was associated with spinal Range of Motion and paravertebral tissues Pain Threshold, but had no impact on changes in surface static Electromyography, trunk Infrared Thermography, Heart wave variability and overall 'Neuro-spinal Function' Index. A limitation of the study is the lack of comparison group

PP24

LASER-DOPPLER PERFUSION MONITORING, MYOTONOMETRY, AND WORKPLACE RISK EVALUATION AS ASSESSMENT METHODS OF MUSCULOSKELETAL OVERUSE SYNDROMES IN INDUSTRY WORKERS

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Work related musculo-skeletal diseases (MSD) affecting the upper body and limbs are now recognized as one of the leading causes of worker pain and disability. The Fit for Work Europe study (2011) indicated that MSDs reduce the work capacity of at least half of the workers in Estonia. In 2009, the work capacity of 59 % of workers aged 15–64 was limited due to long-term problems with hands, legs, back or neck. In Estonia, MSDs constitute 80 % of all occupational diseases and are therefore one of the frequent causes of permanent

loss of work capacity. There is a Centre of Excellence in Health Promotion and Rehabilitation at Tallinn University Haapsalu College which mission is to promote the research based rehabilitative methods of the working-age population. The paper is aimed at about the methods how to test the need and measure the effect of physical and balneological therapies on the musculoskeletal overuse syndroms in industry workers in Haapsalu in Estonia. There are different methods to map the functional status and the enviromental situation at the workplace: 1. Personal health status - Work Ability Index, Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. 2. Microcirculation of the extremities - the quantitative analysis of post-occlusive reactive hyperaemia (PORH) measured with laser-Doppler perfusion monitoring of extremities (based on three parameters: two time constants and the ratio of the maximum flux, and the resting flux). We used this to measure microcirculation before and after heat and balneological therapies. 3. Muscle functions - myometric method to evaluate muscle conditions. The Myometer is held to allow the determination of the basic indicators of the skeletal muscle condition (stiffness and elasticity). The parameters may be compared with a standard value of a corresponding individual muscle, as well as with statistically determined population standards to evaluate health disturbances possibly caused by work. 4. Workplace risk evaluation (furniture, indoor climate, noise, carbon dioxide concentration etc.). *Comments:* MSD questionnaries, objective methods to test the microcirculation and muscle functions (laser doppler, myometry) and environmental measurements at workplaces may be useful when planning prevention and early rehabilitation - before disability may appear.

PP25

THE IMPACT OF SLEEP DISTURBANCES WITH OR WITHOUT PAIN AND DEPRESSION IN PATIENTS ON LONG-TERM SICK-LEAVE AND DIFFICULTY IN RESUMING WORK

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Introduction: Sleep disturbances, a common problems in patients with longstanding pain, also affects functioning status and often complicate resuming work. Aim: To describe interaction of pain, sleep, depression and functioning status in patients on long-term sick-leave and difficulty in resuming work. *Methods*: 1198 patients on long-term sickleave, referred from the social insurance office to a special unit of the Karolinska Hospital Stockholm, were examined by board certified specialists in psychiatry, orthopedic surgery and rehabilitation medicine. The patients completed validated questionnaires (e.g. Montgomery-Åsberg Depression Rating Scale, Depression Rating Self Report Questionnaire) including status regarding depression, sleep, pain and functioning. Their median age was 46.0 years, 62.8% were women, 41% borne outside Sweden, and 53% unemployed. Chi^2, Fisher's, and Wilcoxon's tests were used for comparisons between and within groups. Sleep disturbance was categorized as no/mild sleep disturbance (S1), moderate sleep disturbance (S2) or severe sleep disturbance (S3). Severity of pain was categorized similarly as P1-P3. *Results:* 993 (83%) suffered from moderate or severe sleep disturbance (S2+S3). Patients with comorbid or primary depression, in the category with severe sleep disturbance (S3), the proportion of patients with moderate pain problems (P2) was 14%, and with severe pain problems (P3) 48%. Activity limitations among these patients with sleep disturbance and difficulties in resuming work were: (*i*) inability in decision-making in pain category P3 increased from 0.34 to 1.27 (on a scale from 0 to 3) with increasing degree of sleep disturbance (S1-S3); (*ii*) likewise, the degree for P3 of difficulty in ability to concentrate increased from 0.83 to 1.76 (S1–S3); (*iii*) difficulty in undertaking a single task or lassitude for category P3 was 0.61 for S1 and 1.45 for S3. Impaired functions: (*iv*) difficulty in terms of fatigability was for pain category P3 1.52 for S1 and 2.16 for sleep category S3 on the 0-3 scale; (*v*) degree of sadness was 1.65 for P3 and S3; (*vi*) severity of pessimistic thoughts for category P3 increased from 0.66 to 1.59 (S3). The degree of disabilities and impaired functions increased with increased sleep disturbance. *Conclusion*: To optimize rehabilitation for patients on long-term sickleave and with difficulties in returning to work the results indicate a need to focus attention on sleep, pain, depression, and functioning status, including impaired functions and limitations of activity/participation.

PP26

A COMPARISON OF THE EFFECT OF AQUA AND LAND EXERCISE ON BETA-ENDORPHIN LEVEL AND PAIN PRESSURE THRESHOLD IN FEMALE ATHLETES

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Objective: The purpose of this study was to compare the effects of aerobic exercise on land and in water on plasma beta endorphin level and pain pressure threshold of female athletes. *Methods*: 34 volleyball players with at least 3 years regular sport activity (mean age 27.52±4.12 years, weight 61.44±5.29 kg & height 170.59±4.86 cm) voluntarily participated in this study. Pain pressure threshold was measured by algometer and plasma beta endorphin was assessed before, immediately after and 30 min after aerobic training on land and in water, separately. Repeated measure test and post-hoc were used for statistical analysis. *Results*: Finding indicated that there was a significant increase in beta endorphin and pain pressure threshold after land and aqua exercise ($p=0.0001$). 30 min after aerobic exercise the result was the same ($p=0.001$). However, after water exercise the level of Beta-Endorphin was significantly lower than after land exercise. *Conclusion*: the results of the current study indicate that both types of aerobic exercise (in water and on land) increase the level of Beta-Endorphin and pain pressure threshold in athletes. However land exercise is more effective than water exercise. Thus, aerobic exercise can be used as a suitable manner for increased endogenous opioids and decreased pain. *Key words:* Beta-Endorphin, pain pressure threshold, aerobic exercise, Athletes female.

PP27

PREVALENCE OF PAIN AND STRUCTURAL DEFORMITIES IN FEET OF COOKS AT SHIRAZ UNIVERSITY OF MEDICAL SCIENCES

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Introduction: The prevalence of work-related musculoskeletal disorders is increasing worldwide. The aim of this study was to consider the prevalence of pain and structural deformities among the cooks of Shiraz University of Medical Sciences and related hospitals. *Material and Method*: This is a cross sectional study of 50 cooks. They were selected by a simple sampling method. Data were collected by a questionnaire regarding age, sex, Body Mass Index, daily work time, postures during work, types of shoes worn

during work hours, and use of foot arch support. A clinical examination was performed to evaluate: existence of pain in feet and legs, extensibility of calf muscles and foot deformities. Statistical analysis was done by descriptive statistics and estimation of prevalence. *Results and Conclusion*: The results showed that: 66% were males, 36% were heavy, 58% had a total work time of more than 8 hours per day, 94% worked in standing position, and 70% wore ordinary sandals. 58% of the cooks reported pain in their feet and legs. In 72% hallux valgus was found as a deformity and 48% of them had flat feet. Incidence of plantar fasciitis was 12% and extensibility of calf muscles was decreased in 44% of the cooks. *Key words:* work-related musculoskeletal disorders, foot pain, foot deformity.

PP28

PREVALENCE OF FOOT PAIN AND STRUCTURAL DEFORMITIES IN FEMALE HAIRDRESSERS IN SHIRAZ

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Introduction: The prevalence of work-related musculoskeletal disorders is increasing worldwide. This survey is about the prevalence of pain and structural deformities in female hairdressers in Shiraz. *Materials and Methods*: This is a cross-sectional study that was done on 239 female hairdressers (range of age 25 to 50 years) (56.1% were married). Data were collected by interview and a questionnaire about age, marital status, body mass index, total work time, posture during work, type of shoes worn during work, and use of foot arch support. Existence of pain in feet and legs, calf muscle extensibility, and foot deformity were evaluated. Collected data were analyzed by descriptive statistics and estimation of prevalence. *Results*: 30.1% of the subjects had a BMI lower than 18, 38.9% had a total work time of more than 8 h per day, and 69.5% of them worked in the standing position. 53.1% of them wore ordinary sandals and 8.4% used arch support. 70.7% of the hairdressers reported pain in their feet and legs, 54.9 % had hallux valgus deformity, and 39.5% had flat foot. Prevalence of plantar fasciitis was 31% and extensibility of calf muscle was decreased in 32.3% of the subjects. *Conclusion*: The results indicate high prevalence of foot and leg problems in female hairdressers.

PP29

INFLUENCE OF FATIGUE IN HIP ABDUCTOR MUSCLE ON KNEE KINEMATICS IN WOMEN WITH AND WITHOUT PATELLOFEMORAL PAIN SYNDROME

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Purpose: Based on the contradictory results of previous studies regarding the relationship between isometric strength of hip abductor muscles and kinematics of lower extremity (LE) joints in the individuals with Patello-Femoral Pain Syndrome (PFPS) and considering the effect of fatigue on reducing the muscular force production capacity, the present study aimed to investigate the effect of isometric fatigue on hip abductor muscles over the rearfoot (RF)-knee joint coupling (JC) pattern while walking in order to more clearly determine the mentioned relationship. *Method*: Twenty-four females with PFPS and 24 healthy females took part in this study. The kinematic data were gathered while walking in both pre-fatigue and post-fatigue conditions. In addition, a vector coding method was used to evaluate the level of coupling. Moreover, the data were analyzed through paired *t*-test and independent *t*-test. *Results*: In the non-fatigued condition, a significant difference was observed between the two groups regarding the RF-knee JC patterns. Moreover, fatigue significantly increased the coupling angle of RF movement in the frontal plane relative to the knee movement in the sagittal plane in both groups. On the other hand, following the fatigue protocol, the coupling angle of the RF movement in the frontal plane relative to the knee movement in the transverse plane significantly decreased in the healthy group, while it significantly increased in the PFPS group. *Conclusion*: Inattention to effects of isotonic strength or other musculoskeletal factors (such as, gastrocnemius) on the kinematics of LE may result in ambiguous findings regarding the relationship between the isometric strength and the kinematics of LE. *Key words:* Vector coding technique; patellofemoral pain syndrome; strength of hip abductor muscles; walking; lower extremity joint coupling.

PP30

NO ASSOCIATION BETWEEN OBESITY AND LOW BACK PAIN

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Background: It is well-established that physical inactivity plays an important role in rising risk of obesity and over weight which nowadays is a pandemic condition in the industrial societies. Obesity may in principle increase joint compression force of some joints and biomechanical changes may influence the structure of joints. For example osteoarthritis of the knee may occur. *Methods*: Three hundred subjects aged between 20–60 years (150 LBP patients and 150 normal subjects) were enrolled in this study to investigate the role of obesity in LBP. They were matched on age and sex. Information regarding the patients' age, sex, BMI, pain intensity, abdominal muscle power, lumbar lordosis and abdominal circumference was collected using a questionnaire. Data analysis was performed by *t*-test, Fisher's test and regression analysis. *Results*: Half of the females and one third of the males participated in the present study were overweight. However, abdominal circumference was increased compared to normal in 82% of the subjects but only 49% of the subjects had BMI more than normal and overweight. There was significant relationship between age, sex and pain intensity with obesity. The rectus abdominis muscle had normal strength in 56.4% of the subjects and the abdominal oblique muscles in 45.9% of the subjects. Women had a higher BMI compared to men ($p=0.0027$). There was a linear regression between age and obesity and the incidence of back pain was higher among women than men ($p=0.0037$). There was a significant relationship between pain and age ($p=0.0136$) but increased abdominal circumference was not related to LBP. *Conclusion*: Prevalence of LBP is not associated with obesity, BMI, abdominal muscle power, lumbar lordosis and abdominal circumference but the intensity of pain is higher in the overweight subjects. *Key words*: LBP, obesity, BMI.

MOVEMENT FUNCTIONS – MUSCULOSKELETAL SYSTEM

PP31

EFFECTS OF 5–DAYS HEAD TILT DOWN (HDT) BED REST ON MYOELECTRICAL ACTIVITY IN VASTUS LATERALIS AND GASTROCNEMIUS MEDIALIS WITH OR WITHOUT COUNTERMEASURES

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Background: Prolonged decrease in physical activity level during bed rest leads to a decrease in muscle mass and force. Besides a decrease in protein synthesis, a decrease in the sarcolemmal excitability may contribute to the muscle weakness. After 21-day head tilt down (HDT) bed rest (BR) we have found that markedly decreased force in postural leg muscles was accompanied by prolongation of the compound muscle action potential (m-wave) in m. vastus lateralis (VL) (+3.5%) and in m. gastrocnemius medialis (GM) (+8.1%). Aim: In this study, we studied effects of the 5-days HDT BR in the same muscles. *Methods*: 10 subjects were tested before, after, and 5 days after the bed rest. During each test, the subjects performed sets of 3 maximum isometric extensions and flexions after a short warm-up procedure. The tests were repeated 3 times in crossover design: without countermeasures (CON), with standing for 25 minutes a day during the BR (STA), and with locomotion replacement training (LRT) for 25 min a day during the BR. Torque and surface EMG were recorded during the contractions. M-waves were excited during the breaks. *Results*: In CON we found a moderate decrease in the knee extension torque of 7.7% ($p < 0.05$) and some prolongation of the m-wave in the VL (3.7%, $p < 0.05$). In the GM both decrease in torque of 5.7% and prolongation of the m-wave (2.6%) were not significant. Changes in the m-wave area were not significant both in VL and GM. There were no significant effects of the BR in the trial STA. In LRT the torque increased in the upper leg by 11.5% ($p<0.05$) and stayed unchanged in the calf. The EMG parameters were not significantly different before and after the BR. Despite the most changes in the EMG were not significant, the changes in CON and LRT were opposite in direction. *Conclusions*: The results show that, even if the effects of the 5-days of the BR are rather moderate, both simple standing and exercise could counteract the decrease in the muscle function due to disuse. *Acknowledgement*: This study is supported with funds of the Bundesministerium für Wirtschaft und Technologie managed by the Space Administration of the German Aerospace Center (grant 50WB0831).

PP32

MORPHEA PROFUNDA - A LOCALISED FORM OF SCLERODERMA- AND PHYSICAL AND REHABILITATION MEDICINE: A CASE REPORT

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Introduction: Morphea profunda (MP) is a rare cutaneous disorder which often has a progressive course with physical and psychological sequence. MP is a localized form of scleroderma characterized by the appearance of circumscribed or diffuse, hard, smooth, ivory-coloured undisplaceable areas. Deep subcutaneous tissue is involved. Hardening of the skin is followed by joint contractures and limited mobility. The aetiology of MP is unknown. Current medication is directed to improve present symptoms as no successful curative systemic therapy has been proven until now. Data relating to MP and Physical and Rehabilitation Medicine (PRM) are rare. We suppose that patient centred rehabilitation setting can help to increase mobility and quality of life of patients suffering from MP. Case: The patient (male, 50 years) was sent to the Department of PMR, Medical University of Vienna, two years after first symptoms because of progression of the disease, including weakness and limited mobility and shortened walking distance. MP (forearm, hand, shank and foot) was treated by systemic medication and PUVA at a department of dermatology so far. The patient occasionally passed physical therapy in various facilities. In general the patient appeared in a good state of health. *Material and Methods*: The patient´s limitations were evaluated by clinical examination of the forearm, hand, shank, and foot, by thermography of extremities and by electronic hand dynamometer. Quality of life and daily restrictions were surveyed by standardised questionnaires (DASH, DLQI, SF-36). Afterwards we started a multidisciplinary therapy including physiotherapy, occupational therapy, therapeutic ultrasound, low-level laser therapy and local carbon dioxide bath in April 2013. *Results*: Therapies were tolerated well, so far. The clinical progress and patient's quality of life at the end of therapies and in a three-month-follow up will be presented. We aim to demonstrate the supportive impact of an accompanying and structured physical medical treatment in a patient suffering from MP.

PP33

EVALUATION OF POSTURAL CONTROL AFTER CALF MUSCLES STRETCHING IN OLDER ADULTS

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Introduction: Postural control impairment is one of the most important causes of injury related disorders worldwide, which can be affected by many factors. It seems that stretching techniques which are widely used by older adults can affect the postural control somewhat. This study, therefore, was designed to evaluate the effects of calf muscles stretching on the postural control in closed and open eye conditions. *Method and materials*: Twenty-two female subjects participated in this study. All the participants experienced three cycles of calf muscles stretching to the point of their discomfort for 45 s with a period of 30 s between stretch cycles. The mean Centre of Pressure (COP) velocity and displacement were measured immediately before and after stretching technique. The measurements were done on a force platform, with the subjects' eyes open and closed. *Results*: The results of this study demonstrated that in eye closed condition, there were significant differences in mean COP displacement and velocity before and after intervention in mediolateral direction (p-value <0.05). *Conclusion*: It was suggested that calf muscles stretching techniques can disturb the postural control in older adults. Therefore, these findings can help the therapists and physicians to make appropriate decisions about management of these people.

PP34

EFFECTS OF DIFFERENT SITTING POSTURES ON LUNG FUNCTION, LUMBAR CURVE, AND SUBJECTIVE EVALUATIONS

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Introduction: This study aims to explore the effects on lung function, lumbar curve, and subjective evaluations in the postures as slump

sitting, lumbar vertebra-supported sitting, sacrum-supported sitting, and slanting sitting. *Methods*: 10 healthy people were recruited to join this study. An experimental chair was innovated so that the regions corresponding to thoracic vertebrae, lumbar vertebrae, and sacrum were adjustable separately. The researchers then employed gas analyzers, goniometer, and subjective evaluation questionnaires to collect data and conduct statistic analyses. Slump sitting posture: the upper part of the subject leaned fully on the back of the chair, with lumbar vertebrae pushing greatly backwards, pelvis pressing firmly against the back supporter, spine curve bulging out. Slanting sitting posture: lowered back of the chair until the angle between seat and back was 135°; the subject then got seated with his/her back resting on the back supporter. Lumbar vertebrae-supported sitting posture: the adjusting mechanism was pushed forward 6 cm on the subject's L3 vertebra, and the back was rested against the back supporter. Sacrum-supported sitting posture: the sacrum adjusting mechanism of the experimental chair was pushed 6 cm forward to the subject's sacrum region, meanwhile the lumbar vertebra-supporting mechanism was adjusted 5 cm forward and its surface pressed on the subject's lumbar curve. The thoracic vertebrae were in a naturally comfortable state. *Results*: The results show that lung function and subjective evaluation in sacrum-supported sitting posture appear to be substantially better than all the others. Regarding spinal angle, lumbar vertebra-supported sitting posture results in a significant lordosis, and is closer to the spinal curve in standing posture.

PP35

A COMPARISON OF THE EFFECTS OF TAPING AND STANDARD ELASTIC BANDAGE ON POSTURAL CONTROL IN ATHLETES WITH PATELLO-FEMORAL PAIN

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Objective: Patello-Femoral Pain Syndrome (PFPS) is the most common overuse syndrome in athletes and affects 40% of the athletic population with anterior knee pain. The aim of this study was to compare the effects of taping and elastic bandage on postural control in athletes with PFPS. *Methods*: 15 males and 19 females with PFPS for more than 1 month participated in this study and were randomly divided into two groups; group 1 was taped based on the McConnell method and in group 2 elastic bandage was used. Postural control capability in both groups was measured before and after the interventions by using a force plate and the star excursion balance test. Paired *t*-test and covariance analysis was used for analysis of the data. *Result*: Results indicated that after taping, reach distances increased significantly ($p<0.05$) in anterior, anterolateral, lateral and posterior directions, but after elastic standard bandage, reach distances increased in posterior, posteromedial and medial directions. However, there was no significant change in force plate variables such as centre of pressure (COP) velocity and displacement, centre of pressure – centre of mass (COP-COM) moment arm in anterior–posterior and mediolateral directions in both groups. Also, there was no significant difference between the two groups in all variables of force plate measures. *Conclusion*: The findings of this investigation showed that in athletes with PFPS, taping and standard elastic bandage improved dynamic postural control. Moreover, dynamic methods could successfully be used to assess the effects of taping and bandage on postural control. Static variables compared with dynamic measures potentially lack the ability to detect subtle differences of postural control in athletes with PFPS. *Key words:* Postural control, Taping, Bandage, Patellofemoral pain syndrome.

PP36

PES PLANUS AND KNEE EXTENSOR MECHANISM AT LATE STANCE PHASE

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Introduction: In a closed kinematic chain, movement of the foot complex interacts with that of the knee joint and its function. Pes planus is one of the most prevalent biomechanical pathologies of the lower limb. The purpose of this study was to compare the force applied to the knee extensor mechanism between normal and pes planus subjects during heel strike and toe off. *Method and materials*: Ten subjects with neutrally aligned feet and 10 with hyperpronated feet aged 23 ± 2.5 years were selected via clinical examination. Kinetic and kinematic data were collected by using a force platform and six camera motion capture system while subjects walked at their preferred speed. Kinematic data of the right lower limb were measured using a 6-degree of freedom model. Kinetic data (mean and peak knee extensor mechanism forces and joint moments) were calculated using the inverse dynamics method for the stance phase of walking in both groups. A 2 by 2 ANOVA (Group × Sub-phase) was used for the statistical analysis. *Results*: No significant differences were found between the group anthropometric characteristics ($p>0.05$). Both groups revealed a similar profile during the initial contact (IC); there was no statistical difference between the knee joint angle and the knee moment. However, there was a statistically significant interaction between the IC and toe-off (TO) in both groups ($p<0.01$). At TO, the pes planus group demonstrated significantly larger knee joint angle and knee moment ($p<0.0001$ and $p=0.002$, respectively). *Conclusion*: This study provided further insight into the mechanism and biomechanical alteration due to pes planus. It is suggested that an alteration may occur in the knee joint mechanism due to pes planus, possibly as a result of stance phase progression and weight bearing increase on the lower limb. Such changes in the knee extensor mechanism at late stance may develop a tendency toward musculoskeletal injuries due to increasing the force applied to the extensor mechanism and, as a consequence, the knee joint.

PP37

THE COMPARISON OF THE FLEXIBILITY OF MUSCLES AROUND THE KNEE BETWEEN PATIENTS WITH KNEE OSTEOARTHRITIS AND HEALTHY SUBJECTS

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Introduction: Osteoarthritis is one of the most common diseases in synovial joints which is often associated with structural changes. Because of high loading during weight bearing activities, knee joint is prone to degenerative process. Muscle weakness and tightness are two important factors in causing knee pain. The aim of this study was to compare flexibility of muscles around the knee between knee osteoarthritis patients and healthy subjects. *Materials*

and Methods: 23 female patients with osteoarthritis and 23 healthy females recruited through convenient sampling participated in the study. The flexibility of quadriceps, hamstring, iliotibial band, adductor and gastrocnemius muscles were measured by goniometer. Also, the intensity of pain was measured by Visual Analogue Scale (VAS). The data were analyzed by independent *t*-test and the Mann-Whitney *U* test to compare two groups. *Results*: The results revealed that there was a significant decrease in the flexibility of quadriceps in the patient group compared with healthy subjects ($p<0.05$). The findings did not show significant differences in the other muscles between two groups. There was a significant correlation between flexibility of quadriceps and pain intensity. *Discussion and Conclusion*: According to the results, the decrease of quadriceps flexibility in patients with osteoarthritis is significant. Therefore, it seems that stretching of these muscles can be an important component of treatment and may influence a decrease in pain in these patients. *Key words* : knee, osteoarthritis, muscle flexibility.

PP38

INVESTIGATION OF THE RELATIONSHIP BETWEEN CORE STABILITY AND ATHLETIC PERFORMANCE IN FOOTBALL, BASKETBALL AND SWIMMING ATHLETES

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Introduction: Core stability is the ability to control movement and position of trunk on pelvic. Improving core stability can also cause improvement in athletic performance, increasing power, improve balance. The purpose of this study was to determine the relationship between core stability and athletic performance in football, basketball and swimming athletes. *Materials and methods*: Participants were men between 20–30 years old, and consisted of 3 groups, 20 persons in each one, with professional athletes in football, basketball and swimming. Participants that met the inclusion criteria were examined during two days. During the first day core stability tests such as anterior, posterior and lateral (right, left) abdominal muscles endurance test were performed, and during the second day functional tests including vertical jump, 40 yard running, medicine ball throw and star excursion balance test were performed. *Results*: It was found that core stability in football, basketball and swimming athletes was not significantly different between each other. The relationship between core stability tests with functional tests (vertical jump, medicine ball throw and star test) showed a low positive relationship, but between core stability and 40 yard running, no significant relationship was found. *Conclusion*: A low relationship between core stability test and functional tests (except running) was found. Further research is needed to understand the relationship between core stability and athletic performance. *Key words:* core stability, athletes, functional test.

PP39

OCCURRENCE OF SHOULDER COMPLICATIONS AMONG POST-CORONARY ARTERY BYPASS SURGERY PATIENTS

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Introduction: The range of motion and function of the shoulder girdle and upper back are believed to be impaired following coronary artery bypass graft surgery (CABG) via median sternotomy. This is due to the effect of sternal retraction on the joints and soft tissues of the thorax. Consequently this makes the patient vulnerable to develop musculoskeletal and neurological complications. Till date, there is no study published in India which determines the occurrence of shoulder complications in CABG patients. Aim: To determine the occurrence of shoulder complications among Post CABG patients and to explore the associated factors. *Methods*: In this cross-sectional survey, 45 post-operative CABG patients were recruited by convenience sampling technique. Approval was taken from Yenepoya University Ethics Committee, India, prior to the commencement of the study. After obtaining Informed consent, details regarding demographic data, operative data, pre and post-operative physiotherapy management and the occurrence of shoulder complications were collected by face to face interview method using a questionnaire specifically designed for this study. *Statistical analysis*: Descriptive statistics was produced for demographic data, operative data, pre and post-operative physiotherapy management and the occurrence of shoulder complications. The occurrence of shoulder complications was calculated by taking the number of subjects with shoulder problems and dividing it by the total number of subjects interviewed. The association between selected factors and the occurrence of shoulder complications was analyzed using chi square test. 5% level of probability was used to evaluate statistical significance. *Results*: The occurrence of shoulder complications among post CABG patients was 36%. Predominance of shoulder complications was found to be more 3–4 months post CABG. No significant association was found between age, gender and performance of upper limb exercises and the occurrence of shoulder complications. *Conclusion*: Given the high occurrence of shoulder disorder, it is crucial that rehabilitation professionals take essential steps to assess and treat these complications in the immediate post-operative period and continue the same following discharge from the hospital. The paper concludes by calling for further research to explore and develop a more directed prophylactic exercise regimen for the musculoskeletal complications following CABG. *Key words*: Coronary artery disease, CABG, shoulder complications, cardiac rehabilitation.

PP40

PHYSIOTHERAPY PROCEDURES IN PATIENT WITH SCOLIOSIS CAUSED BY THE PARTIAL RESECTION OF RIBS: A CASE REPORT

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Introduction: Primary osteosarcoma of rib is a rare tumour seen in children. Surgical resection of ribs is needed which is usually complicated with the development of progressive scoliosis. Aim: To present the changes in the musculoskeletal system during individual physiotherapy treatment in a patient with scoliosis that arose due to a partial removal of the ribs. *Case report*: We report a 17-year-old boy who underwent partial resection of IV, V, VI and VII ribs due

to osteosarcoma of the ribs. This resulted in pronounced posture changes. During individual physical therapy treatment, three-dimensional techniques of breathing, derotation through corrective positioning, exercise of the targeted muscles, movement facilitation, stabilization training and manual mobilization techniques were used to improve postural deformities. The results are based on comparison of photos and measurements of functional ability. By individual physical therapy treatment a significant reduction of the scoliosis, increase of breathing index, and posture corrections were achieved. *Conclusion*: Physical therapy assessment allows the identification of the problem, and setting of realistic goals. Planned and evaluated treatment results in correctly oriented physiotherapy procedures that provide measurable improvement in the current muscular disorders. The role of the physiotherapist, as an important participant of the rehabilitation team, is essential to achieve positive changes in the musculoskeletal system of the spine and trunk deformity caused by partial resection of the ribs. *Key words*: osteosarcoma of rib, rib resection, scoliosis, posture, physiotherapy procedures.

PP41

NEW GENERATION OF VIBRATION TRAINING DEVICES REDUCES UNDESIRABLE ACCELERATIONS – COMPARISON OF TWO VIBRATION SYSTEMS

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Introduction: Vibration has become of increasing interest to health professionals. New vibration devices are coming up and show differences in applying vibrations to the body. The present test tried to compare a common vibration training device, Galileo Advanced ®, with the mechanical impacts dispensed with a new vibration training machine, X-SAM®. The two machines transfer vibrations to the body in two ways. Both devices operate in a side-alternating way. Galileo® is functioning with one vibrating plate and a fixed rotary component. In contrast, X-SAM® operates with two vibrating plates, as well as in a side-alternating way. *Method*: To answer the purpose 20 men and women (32.3±6.2 years, 78.4±7.8 kg, 175.0±12.1 cm) participated in a controlled and randomized test series of the two machines. The series varied in three different body positions: 1) Legs apart (35 cm) and elongated; 2) Legs apart (35 cm) and knee flexion of 110° (goniometer) and 3) Like alternative 2 but with raised heels. The test series lasted one minute for each position and were done with an upstroke up to somewhat of 5 mm and a frequency of 20 Hertz to investigate the accelerations at foot, knee, hip and head. The accelerations were recorded with a 3-d-accelerometer (measuring the accelerations of the x-, y- and z- vectors and calculating a sum-vector). To test whether the accelerations differ depending of the vibration paired *t*-tests were performed. Test values have been the mean absolute values of the acceleration in a time range of 40 seconds within one-minute test intervals. *Results*: Generating about the same acceleration-force (g) at the platforms (3–6g) the accelerations through the bodies were significantly different in between the two devices, here presented as mean ± SD. Especially the accelerations of the lower limbs were much higher ($p < 0{,}05$) in Galileo (Pos. 1: ankle joint sum-vector 4.12 ± 1.09g, head sum-vector 1.01 ± 0.01 g and ankle joint z-vector 1.93 ± 0.67g and y-vector 2.12 ± 0.91g and knee joint z-vector 0.63 ± 0.34g and y-vector 0.69 ± 0.38g) than on the X-SAM® (Pos. 1 ankle joint sum-vector 3.00 ± 0.76g, head sum-vector 1.0 ± 0.001; ankle joint z-vector 1.04 ± 0.64g and y-vector 1.70 ± 0.50; knee joint z-vector 0.44 ± 0.21g and y-vector 0.61 ± 0.28g). *Discussion/Conclusion:* The results give the impression that in comparison to the Galileo® system, the vibration technology of X-SAM® device could reduce accelerations in the regions of lower limbs, hip and head, but further evidence is needed.

PP42

THERAPEUTIC HIPPO-THERAPY AS TREATMENT OF DYSPLASTIC SCOLIOSIS

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Objective: The essence of the treatment by therapeutic riding in children with disorder of stateliness and dysplastic scoliosis is original and unique as the several different actions on organism are integrated in one procedure. Examples are the self-stretching action on mobility; correcting training, muscle training, tonic reactions etc. *Aim*: The purpose of the study was to determine the efficiency of hippo-therapy treatment in patients with dysplastic scoliosis treatment. *Method:* 517 patients of the first and second degrees of dysplastic scoliosis of 7 to 15 years of age participated in the study. From them, 326 patients were treated with hippo-therapy. 178 patients were treated with standard methods of physiotherapy. Hippo-therapy was divided into two periods. The goal of the first, the adaptation period is shifting of anti-gravitation system from standing position to the riding state and the goal of the second period is treatment of the disease by different methods of therapeutic riding, envisaging the form and quality. Hippo-therapy was performed three times a week for 20 min. We have carried out clinical-functional and roentgenological research. We observed the following reduction of the curvature arch for a functional deviation of the spine. Adverse outcome was considered correction of the curvature arch by less than 50 degrees. *Results*: One year after therapy improvement was observed in both groups. Worsening was not observed. In the group hippo-therapy adverse outcome was observed in 148 (45.4%) and in the comparison group in 114 (59.7%) ($p < 0.001$). Relative risk of adverse outcome was RR = 0.76 (95% CI: 0.64–0.90), absolute risk reduction - ARR = 0.143(95% CI: 0.05–0.23), relative risk reduction RRR = 0.24 (95% CI: 0.10–0.36), NNT = 7.00 (95% CI: 4.33–18.26). *Conclusion*: Hippo-therapy may be an efficient method of treating dysplastic scoliosis of the first and second degrees.

PP43

COMPARISON OF THE EFFECT OF TWO TAPING TECHNIQUES ON DECREASE OF THORACIC HYPER-KYPHOSIS

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Introduction: Hyper-kyphosis is an abnormal increase of thoracic arch more than 45 degrees. One of the effective hyper-kyphosis treatment is the vertebral column taping. Aim: The purpose of this study was to compare two taping techniques on decrease of kyphotic curves. *Method & Material*: Thirty two volunteers participated in this study and were divided into two groups (V shape-, and I shape tape). In each group there was 16 persons. Fifty percent tension was used in V and I shape tape methods. In V shape tape group the tape was applied from the anterior aspect of both acromioclavicular joints and continued to the spinous process of T6. In the I shape tape group, tape was applied from T1 to the deepest point of lumbar lordosis. Kyphosis measurement was done before, immediately after tapping, 24 and 48 h after. Friedman, Kolomogrov -Smirnove, Wilcoxon signed rank and Mann Whitney *U* tests were used for statistical analysis. *Results*: The result showed a significant decrease of kyphotic curve in the V shape tape group 48 h after taping, but in the I shape tape group decrease of kyphosis was significant 24 hours ($p = 0.001$) and 48 h after taping ($p < 0.0001$). There was no significant difference of kyphotic reduction between the two groups

in all measured trials, except for 24 hours after tapping ($p = 0.043$). *Discussion*: Taping by providing mechanical support improves proprioceptive feed back and paravertebral muscle function can reduce kyphosis. This study indicated that I shape taping may decrease kyphosis more than V shape taping; this may be due to alignment of taping on the spinal column. *Key words*: spinal column, kyphosis, taping technique, proprioception.

PP44

EXTENSIBILITY OF THE UPPER EXTREMITY NERVOUS SYSTEM DURING UPPER LIMB NEURODYNAMIC TESTING IN DENTAL PROFESSIONALS

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Introduction: Dental Professionals usually experience musculoskeletal pain during the course of their careers. If frequently occurring pain or discomfort is neglected, the cumulative physiological damage can result in Musculoskeletal Disorders (MSDs) or a career ending disability. Researchers presented an anatomical basis for neural involvement in MSDs, suggesting that inflammation, friction or entrapment at sites where the nervous system is relatively fixed can result in lack of extensibility of the connective tissue of the nervous system and may aggravate pain further along the neural tract. Aim: To explore the effect of dental work on the extensibility of the upper limb nervous system. *Methods*: In this cross-sectional study, 50 participants (25 dental professionals and 25 control group) of age ranging from 25 to 45 years were recruited using convenience sampling technique. All the participants were free from MSDs that required treatment or interrupted their daily activities. Inclusion in the dental professional group required at least 1 year of dental experience. After obtaining informed consent, an assessment was done with an Upper Limb Neurodynamic Test (ULNT) meant to test the extensibility of the radial nerve. Each movement of ULNT was taken to the point where tissue resistance restricted further range. Prior to the release of the end position a sensitising manoeuvre is added. The range of glenohumeral abduction was measured using goniometer by a physiotherapist who was blind to group allocation. This procedure was performed on both upper extremities of the subjects in supine position. *Statistical analysis*: Descriptive statistics was produced for personal characteristics. The effect of dental work on the extensibility of the upper limb nervous system was analyzed using independent-sample *t*-tests. 5% level of probability was used to indicate statistical significance. *Results*: The range of glenohumeral abduction in the final test position was significantly less ($p<0.05$) in the dental professionals when compared to the control group. *Conclusion*: The results of this study indicate that lack of extensibility of the nervous system (adverse neural tension) may have an influence in the multi-factorial pathology of MSDs. A thorough examination is recommended to assess the possible cause of adverse neural tension and/or other reasons for decreased range of motion. *Key words*: dental professionals, musculoskeletal disorders, neurodynamic tests.

CARDIOVASCULAR FUNCTIONS

PP45

A COMPARISON OF EFFECTS OF CONTRAST-BATH ON CIRCULATION OF NON-AFFECTED LOWER LIMB IN HEALTHY AND DIABETIC WOMEN

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Background: Circulation is under influence of application of heat and cold. Because of contraindication of these modalities on affected limb in some patients, this study considers the effect of contrast-bath (one type of heat therapy) on circulation of the contra-lateral lower limb in healthy and diabetic women. *Methods*: This study was conducted with 30 healthy and 15 diabetic women with mean age 45 years who were selected by simple sampling. In the first stage, oral temperature, skin temperature of left foot web space and pulse rate of left dorsalis pedis artery were recorded. Then the right foot was immersed in the warm water (3–44°C) for 4 min and then in cold water (10–18°C) for 1 min. This process was repeated 5 times for 24 min. All records were repeated on the left foot immediately and then 10 min after the contrast-bath. Repeated measure, Friedman & Mann-Whitney tests were used for data analysis. *Results*: The results showed that in healthy women, skin temperature increased immediately after the bath, but no significant differences were found between skin temperature before and immediately after bath. Significant difference was found in decrease of skin temperature 10 min after bath. And also, changes of the pulse rate of dorsalis pedis artery were similar to skin temperature. In diabetic women, the skin temperature and pulse rate of dorsalis pedis artery increased after bath and decreased after 10 minutes. The changes of skin temperature were not significant, but for pulse rate of dorsalis pedis artery it was significant. The oral temperature changes in both groups were not significant before and after bath. *Conclusion*: The increase in pulse rate of dorsalis pedis artery in the non-affected limb of the diabetic group after contrast-bath indicates an increase in circulation of that limb. The method may be used to increase circulation in diabetic patients and would perhaps influence healing of diabetic sore in these patients.

BODY STRUCTURES

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ANATOMICAL LOCALIZATION OF MOTOR ENTRY POINT IN THYROARYTENOID MUSCLE FOR LARYNGEAL ELECTROMYOGRAPHY

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Objective: To identify the precise location of the motor entry point of the thyroarytenoid muscle and to determine the needle insertion depth and angle for laryngeal electromyography or electromyography-guided injection. *Method*: Sixteen thyroarytenoid muscles in eight Korean adult cadaver larynges were anatomically dissected. Using a midline approach, the insertion point was set to the centre of the inferior border of the thyroid cartilage. A virtual plane was used to represent the location of the motor entry point in a coordinate system (x/y/z). The lateral and superior angles of electrode deflection and the electrode insertion depth were then calculated from the coordinates. *Results*: The mean coordinates x/y/z (lateral/superior/posterior distance) were 6.2 ± 2.0 mm, 9.1 ± 2.6 mm and 11.0 ± 1.1 mm. The calculated angles of lateral and superior deflection were 29.4 ± 7.6° and 35.8 ± 8.1°, respectively. The calculated insertion depth, the distance from insertion point to motor entry point, was 15.6 ± 2.0 mm. These results suggest that in order to reach the motor entry point of the thyroarytenoid muscle from the

insertion point, the insertion needle must be positioned about 30° laterally, 35° superiorly and at a depth of about 15 mm. *Conclusions*: This is the first cadaver study of the laryngeal muscle motor entry point. The results of this study can help improve the accuracy of needle insertion during diagnostic laryngeal electromyography or electromyography-guided injection.

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LATERAL SPREAD RESPONSES ON FACIAL MOTOR NUCLEUS SUPPRESSION USING INTRAVENOUS DIAZEPAM IN HEMIFACIAL SPASM

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Introduction: There has been a controversy between two hypotheses for the pathophysiology of hemifacial spasm: ectopic excitation-ephaptic transmission at the root entry zone, and increased excitability of the facial nucleus are two candidates. This study sought to investigate the phathophysiologic mechanism of hemifacial spasm. *Materials and methods*: A total of 6 patients with hemifacial spasm were recruited. Before experimental study, the patients performed facial motor nerve conduction study and blink reflex study. In experimental study, supraorbital nerve stimulation with orbicularis oris muscle recording study and lateral spread test were performed, then we applied intravenous diazepam 10 mg to the patients for facial motor neuronal suppression. Two 'drug series' were recorded, 10 min and 20 min after the subject had received a 10 mg diazepam intravenously. *Results*: In all patients, orbicularis oris responses appeared on supraorbital nerve stimulation with orbicularis oris muscle recording study and late responses appeared on lateral spread test. After diazepam injection, on supraorbital nerve stimulation with orbicularis oris muscle recording study, there was no orbicularis oris response in one patient, and latencies of orbicularis oris response were showed slowing tendency as time passed in the other five patients. On lateral spread test, however, in all patients, latencies of direct and late responses were consistent as time passed. *Discussion*: In our present study, we inhibited facial motor nucleus using diazepam that is CNS depressant. If the site of abnormal cross transmission is in the facial nucleus, lateral spread response should be recorded with a wave form of delayed latency as our supraorbital nerve stimulation with orbicularis oris muscle recording study. The results suggest peripheral pathway, ectopic excitation-ephaptic transmission as the pathophysiologic mechanisms in hemifacial spasm. In this study, we did not directly demonstrate that the lateral spread response is a cross transmission response of facial nerve fibres at the site of vascular compression. However, our results suggest that a lateral spread response does not arise from facial motor neurons. In order to clarify the origin of the lateral spread response, further clinical or experimental studies will be needed.

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