NOTE:

Poster Abstracts are listed in no particular order. Please use **CTRL+F** to search and locate the required abstract titles, keywords or author’s names.
"Optimum Care", early inpatient rehabilitation for patients with complex care

**MD David Gobets**, PhD Maaike Eken, PhD Judith van Velzen, PhD Janneke Nachtegaal

**Biography:**

no bio

Background:
An increased number of patients with spinal cord injury (SCI) or other serious injuries survive intensive care unit (ICU) admission. Though, long periods at ICU can lead to negative effects of immobilization. At our Optimum Care Unit (OC) an early start of intensive specialized rehabilitation is currently available for patients who are dependent on complex care such as mechanical ventilation.

Purpose:
Aim of the OC is to combine specialized intensive care with early specialized intensive rehabilitation care in order to prevent negative effects of immobilization, leading to a better and faster functional recovery.

Methods:
Between June 2015 and March 2017, 58 patients were treated at OC, 14 of which were SCI patients. The functional status of SCI patients was measured using Spinal Cord Independence Measure (SCIM) at admission to OC and discharge from the rehabilitation clinic. Duration of stay (DOS) was registered.

Results:
Overall, OC patients have a shorter median DOS compared to a group of 8 patients who needed similar care (106 versus 166 days). For SCI patients, median DOS was 159 days (56-245), with a median stay at the OC of 38 (7-98) days. Median sum score of the SCIM increased significantly from 9 at admission to 27 at discharge.

Conclusions:
An earlier start of specialized rehabilitation is favorable for patients, due to a shorter DOS in patients with SCI and other serious injuries.
However, comparing results with only the SCI population of our control group was not valid due to a small sample size.
Introduction: Japan is rapid aging of society. In Japan, SCI in aged person becomes huge medical issue. In this study, the data between 2005 (population aging rate=19.4%) and 2014 (population aging rate=25.7%) were analyzed to investigate epidemiological changes of SCI due to aging populations.

Methods: An office of registry management of SCI in Fukuoka prefecture (population=5million) was established in the Spinal Injuries Center in 2006. The office sent out the forms of questionnaires by mail to emergency hospitals in Fukuoka prefecture since 2006.

Results: The forms of questionnaires for this study were sent to about 150 hospitals. The response rates were 91.9% in 2005 and 77.0% in 2014.

Incidence and age: A total of 1279 SCI with Frankel A, B, C and D in this 10 years period were registered (154 patients in 2005 and 171 patients in 2014). The incidences of SCI estimated from the number of patients registered and the reply rate, were 35.2 per million per annum (33.7 patients in 2006 and 44.4 patients in 2014). The mean age at injured were 60.8 years old (57.8 years old in 2005 and 63.8 years old in 2014).

Level of injury: There were 1060 patients with cervical SCI (127 patients in 2005 and 152 patients in 2014) and 189 patients with thoracic SCI and caudal region injury (27 patients in 2005 and 19 patients in 2014).

Conclusions: This study might be able to become critical data to understand the epidemiological changes of SCI with rapid aging of society.
2016 Survey on Bowel and Bladder Management for Persons with Spinal Cord Injury in Taiwan

Master of Sociology, Hsin-ping Hung¹, Master of Social Work Cheng-Han Liu¹, Dr. Chao-Yen Hsu¹, Assistant Professor Yuan Ze University Li-Jung Mai¹

¹Spinal Core Injury Foundation

Biography:
Established in 2012, the Spinal Cord Injury Foundation is a non-profit organization. Mission of the foundation is to promote and enhance social participation for SCI sufferers by fostering a friendlier social environment.

Objective: To understand the economics, time, and labor costs in the daily methods of bowel and bladder management for people with spinal cord injury (SCI).

Methods: From May to October 2016, SCI foundation cooperated with associations from Taipei and New Taipei City to conduct convenience sampling based on Taiwan SCI male and female ratio (76% : 24%) to complete 96 effective surveys.

Results: 85% of people with SCI experience serious bowel movements and voiding difficulties and relevant complications, and 50% require assistance from others to complete the excretion process. For bladder management, the top 3 most commonly adapted methods are indwelling catheters, diapers/ pads, and bladder stoma. The time needed for voiding each day, on average, is 65 minutes. There are 52.1% of interviewees adapt a combination of bowel cares. The annual expenditures on excretion each SCI individual spent, on average, is US$644.1 to US$1932.3.

Conclusion: It takes a long time for people with SCI to explore the most comfortable methods for bladder and bowel control. All the changes cause emotional insecurity and unease which discourage their social participation and bring about the problems of care-giving shortage and heavy financial burden in the family. Other than the need for more medical professional attention, it is essential to share good practices among the peer support groups in order to enhance their quality of life and alleviate the economic burden through the supportive network.
Poster Board Number: 45

2016 Survey on Long-Term Care Facilities for Persons with Spinal Cord Injury in Taiwan

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**Li-Jung Mai¹**, Master of Psychology  
**Chun-Jung Yu¹**, Master of Social Work  
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¹Spinal Core Injury Foundation

**Biography:**
Established in 2012, the Spinal Cord Injury Foundation is a non-profit organization. Mission of the foundation is to promote and enhance social participation for SCI sufferers by fostering a friendlier social environment.

Objective: To understand the conditions of persons with spinal cord injury (SCI) who enter long-term care (LTC) facilities and their satisfaction levels to the services provided by the facilities. The survey results will be taken as a reference for government to promote LTC policies.

Methods: From May 2015 to June 2016, SCI foundation took convenience samplings in 23 rehab facilities, scattered in 12 cities throughout Taiwan, and interviewed 54 SCI individuals with quantitative questionnaires.

Results: The average age of interviewees is 51, with 15 years SCI history. Among them, 90.7% are males and 74.1% survivors from cervical SCI. Only 7.9% are in marital relations. 75.9% family financial status are under middle and low income threshold. 98.1% of them receive government subsidiaries and related social welfare. Regarding their feedback to the LTC facilities, listed in the order of satisfactions are medical services, living environment, and daily routine arrangements. The least satisfactory areas listed are dietary, entertainment, and fee charges. 70.4% of SCI survivors are prone to choose to enter LTC facilities with social welfare within 5 years after SCI.

Conclusion: In the past, LTC facilities mainly focused on taking care of severe dementia and the elderly groups, which differs greatly from taking care of people with SCI that are mentally competent, rehabilitable, with only physically disabled. There is still need for government to develop suitable care-giving plans for people with SCI.
A clinical prediction formula for ADL independence outcomes after traumatic spinal cord injury.

Mr Yuto Ariji, Mr Hiroaki Sakai, Mr Ryosuke Ideta, Mr Ryuichiro Koga, Mr Satoshi Murai, Mr Akira Nishimura, Mr Tetsuo Hayashi, Mr Takayoshi Ueta, Mr Keiichiro Shiba

Spinal Injuries Center

Introduction
A spinal cord injury (SCI) database was constructed and functional recovery data after traumatic SCI are accumulated in our center since 2005. We reported that the statistical formula is to predict the long term (6-month) ADL after acute traumatic SCI in this meeting, 2012. For this formula, only 3 factors [age, ASIA motor score of upper limbs on admission (AMS-UL), AMS of lower limbs on admission (AMS-LL)] are used. The purpose of this research is to confirm whether this formula has clinically high prediction accuracy by using subsequent patient's data.

Methods
Inclusion criteria are 1) ASIA impairment scale A to D on admission within the first 30 days after injury 2) 6 months follow-up between January 2012 and January 2017. A clinical prediction formula is as follows: predicted SCIM total score at 6 months (predicted-Y) = 41.301-0.462×age at injury+0.822×AMS-UL+1.034×AMS-LL. First, we calculated predicted-Y and examined whether there is a correlation between this predicted-Y and measured value (Y) by calculating multiple correlation co-efficient (R).

Results
Total numbers of registered patients are 480. 97 patients (79 male, 18 female) had available outcome measure. The subjects were 75 patients with tetraplegia, and 22 patients with paraplegia. The multiple correlation coefficient is R = 0.88 (P <0.0001) and there is an extremely strong correlation between predicted-Y and Y.

Conclusions
These results suggested that only 3 variables could predict SCIM after 6 months and that this formula could be a very useful in terms of patient's evaluation at the start of rehabilitation and setting their goal.
A framework for measuring the progress in achieved exoskeleton-skills in people with complete spinal cord injury

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¹Sint Maartenskliniek Research, ²Sint Maartenskliniek, ³Radboudumc

**Biography:**

NO BIO

Before exoskeleton community use in people with spinal cord injury (SCI) is possible an intensive training in which users learn to perform basic and advanced skills independent and safe is necessary. So far, a framework to test exoskeleton-skills and the consistency of performing exoskeleton-skills is lacking. The aim of this study was to develop a framework for measuring the progress in the ability to perform basic and advanced skills.

Twelve participants with motor complete SCI (Th1-L1) (twenty-five will be included) were given twenty-four training sessions in eight weeks with the Rewalk-exoskeleton. During the 6th, 12th and 18th training the Intermediate-skills-test was performed consisting of twenty-eight skills, measured in an ascending order of difficulty until two skills were not achieved (two out of three failed attempts). When participants could walk independently, the Final-skills-test, consisting of twenty skills, was performed twice in the last (24th) training session. As a reliability measure the consistency in the number of exoskeleton-skills which were performed the same (successful-successful or failure-failure) in the first two attempts relative to the total number was used.

Ten participants completed the training program. Their median achieved Intermediate-skills were 5 (2-8), 6.5 (5-21) and 11.5 (5-27) in training six, twelve and eighteen, respectively. Seven participants performed the Final-skills-test, who achieved 16.5 (14-20) and 17 (14-19) skills. 179 out of 245 Intermediate-skills (73%) and 112 out of 140 Final-skills (80%) were performed the same.

The progress in achieved exoskeleton-skills was measured with the proposed framework. The participants performed exoskeleton-skills with an acceptable consistency.
A novel microsensor system for ambulatory urodynamics in persons with spinal cord injury

Dr Thomas Glott, Mr Lars Geir Tvedt Whist, PhD Ingelin Clausen

Sunnaas Rehabilitation Hospital, Sintef ICT

Biography:
Specialist in physical and rehabilitation medicine and medical director for the spinal cord injury program at Sunnaas Rehabilitation Hospital in Norway

Urodynamic examination with recording of detrusor pressure is essential for diagnostic and treatment purposes in persons with spinal cord injury. The most common procedure is application of a pressure-recording device through the urethra into the bladder, with reference pressure recording in anus. The bladder is filled with an infusion pump using non-physiological filling rates. This method has been shown to cause artifacts due to sensory irritation from the catheter in urethra and also due unphysiological distension of the bladder. Water filled pressure transmission lines connected to external transducers are vulnerable to artifacts due to movements, bending of the catheter, delayed pressure transmission and a limited frequency response. We have developed a novel micro electro mechanical sensor system (MEMS) for direct measurement of detrusor pressure in the human urinary bladder, with placement of the sensor element directly into the urinary bladder through a suprapubic and minimally invasive technique. Reference pressure is recorded with a separate sensor inserted in the prevesical space. Long-term, high-quality recordings in an ambulatory person are feasible. We present the results from the first measurements using the prototype sensor system in a clinical setting in a person with complete paraplegia and neurogenic detrusor overactivity. A 3Ch syringe was used for insertion of sensors suprapubically. The insertion procedure was completed in 15 minutes without any complications. A 24-hour recording was done without any adverse events and did not interfere with sleep or activities. In our initial experience, the system is promising, but clinical implications need to be studied.
A parallel dopaminergic pathway involved in the control of movement

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¹University Of Calgary

Biography:
Dr. Patrick Whelan received his PhD in Neuroscience from the University of Alberta in 1996 and completed his postdoctoral training at the National Institutes of Health in Bethesda, Maryland before joining the University of Calgary in 2000. Dr. Whelan is a co-leader of the Spinal Cord/Nerve Repair and Pain NeuroTeam at the Hotchkiss Brain Institute. His work centres on understanding the descending circuits that control walking in a variety of animal models. His work has led to a new understanding of the role of sensorimotor function that has identified sets of therapeutic targets to improve locomotor function.

Locomotor regions of the mammalian brain have been identified by stimulation either electrically or chemically. While several classes of neurons are implicated in locomotion, monoaminergic nuclei containing DA, serotonin and noradrenaline neurons are of interest. This is important because neuromodulators, such as monoamines, can reorganize motor networks and indeed pharmacological targeting of monoaminergic systems can facilitate walking following SCI. Within these locomotor regions is an area of interest in the diencephalon, termed the SLR, which when stimulated results in goal directed locomotion in intact behaving cats and rats. Most of the DA terminals in the spinal cord are thought to arise from the A11 and A13 nuclei of the SLR. Using optogenetic approaches, we have demonstrated that cells from the A11 and A13 nuclei of the SLR project to the spinal cord and brainstem locomotor regions. These projections are both dopaminergic and non-dopaminergic and show distinct connectomes. When activated, these cells strongly promote locomotor activity in freely behaving mice. We show that DA when applied intrathecally to the spinal cord alters the gait patterns of adult mice. These data provide evidence for parallel dopaminergic projections distinct from the nigrostriatal pathways which form candidate pathways for promoting recovery of function following spinal cord injury.
A patient with spinal chord injury, fever and delirium

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²Haukeland University Hospital

Biography:
Hilde Marie Torgauten is a Junior doctor at the Department of Neurology, Haukeland University Hospital, Bergen, Norway.

Introduction: This is the case of a 70 year old male patient presenting with few and diffuse symptoms during recurrent severe infection episodes after a spinal chord injury (SCI). We suggest a proactive approach despite sparse symptoms and examination findings in these patients. The case highlights the importance of knowledge about sequelae in spinal chord injury among physicians.

Case description: The patient sustained a cervical fracture resulting in an immediate tetraparalysis at C2 level and a respiratory failure, with some sensation sparing below the level of injury (ASIA-B). During the first 3 months after injury he suffered four severe episodes of reduced general condition and a raised temperature, but no pain or organ symptoms. CRP levels were 200-350 mg/L. Clinical examination, chest X-ray and microbiological cultures were normal, and an initial abdominal CT scan showed cholelithiasis. During a final infectious episode, he developed additional delirium and right shoulder pain. Abdominal CT scan revealed cholecystitis. After cholecystectomy, he has had no recurrent severe infections.

Discussion: SCI may result in changed organ function such as urinary and gastrointestinal tract dysfunction, complicating the clinical picture in acute abdominal conditions. We searched PubMed database for gallbladder disease in SCI patients, and found that the literature shows an increased prevalence of gallstones (25-49% versus 10-15% in a general population). Literature on the underlying mechanism is lacking, but one study using cholecintigraphy suggested that impaired autonomic innervation could play a role in the development of gallstone disease in these patients.
Poster Board Number: 221

A point prevalence study observing preventive measures for reducing DVT incidence in immobile patients including SCI in a tertiary hospital.

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\textsuperscript{1}Indian Spinal Injuries Centre, \textsuperscript{2}Indian Spinal Injuries Centre

Biography:  
AN RN with Master Degree in Nursing, Working as a Nursing Educator for 5 years, out of which 3 years dedicated to SCI Nursing.

Introduction-  
The need for systemic thromboprophylaxis is essential, especially in patients with inherited or acquired patient-specific risk factors of venous thrombosis, including deep vein thrombosis (DVT) and pulmonary embolism (PE).  
The objective of the study is  
- to estimate point prevalence of high risk patients for developing DVT.  
- to assess different preventive measures for reducing DVT risk.

Method & Material-  
A cross sectional survey was conducted using a structured questionnaire on 28th March, 2017 over 108 patients from spine, orthopedic, neuromedicine and Neurosurgery units. Wells criteria was used to assess risk and checklist was used to identify preventive measures for reducing DVT risk based on the clinical criteria.

Result  
Thirty six percent of the patient were having risk of developing DVT including 24% from Spine unit, based on Well score and clinical criteria as increased PT, INR value or positive D-Dimer test. Average high risk score was 3.36 with range of 3-4. In 25% cases thigh & calf measurement was not being done. Only in 8% cases measurement was done appropriately (i.e. Measured 10 cm below the tibial tuberosity). The preventive measures used for reducing risk were early identification by thigh and calf measurement everyday (100%) along with using TED Stocking (61%) followed by crape bandage (7%) and DVT pump (7%). Prophylactic measures used for preventing DVT risk were inj enoxaparine (62%), inj fondaparinux 3% and oral anticoagulant in 8%.

Conclusion  
A low score in appropriate measurement of thigh & calf need improvement for better screening of DVT risk.
A Prospective KAP Study On Disaster Management Of Healthcare Staff

Mrs Nidhi Yadav¹, Dr. K Preetham¹, Ms. Priyanka Anchalia¹
¹Indian Spinal Injuries Centre

Biography:
Pursuing Ph.D in Hospital and Health Management since 2014 from Indian Institute of Health Management and Research University, Jaipur also possess Masters of Business Administration (HR & Mkt.) from Punjab Technical University and Post Graduate Diploma in Hospital Management (PGDHM) from Institute of Health Management Research, Jaipur. Graduated in 2007 in Rehabilitation Therapy from Guru Gobind Singh Indraprastha University New Delhi.
Currently working at Indian Spinal Injuries Centre, New Delhi as Manager Quality & Service Excellence

The study is designed and conducted to understand the baseline of knowledge, attitude and practice towards disaster management among health care providers. Sampling is done among nurses, housekeeping and security staff to obtain statistically significant findings, based on which targeted intervention can be planned. The key findings suggest that level of education and year of experience at hospital had an effect on knowledge about disaster management. Major problem area found were knowledge about who is incident commander during disaster, during which phase of disaster management hospitals play most important and where hospital’s disaster management plan can be found. Nurses had positive attitude towards disaster management they agreed to that hospital should have disaster management plan, they should know about disaster plan, effects of disaster can be reduced, mock drills should be conducted regularly and for all classes of staff, they know their responsibility during disaster but majority agreed to that hospital is unlikely to be affected by disaster. 93.89% of correct responses was obtained in practice section in case of nurses. Level of education and year of experience at hospital they are currently working had an effect on knowledge about current practices of disaster management at their hospital. Regular and frequent training should be conducted regarding basic knowledge about what disaster situation is, disaster management, phases of disaster management, disaster preparedness, hospital’s role in different phases of disaster management cycle.
A qualitative exploration of the experiences of siblings of young people with spinal cord injury in Ireland.

Dr Claire Keogh, Dr Sarah O'Doherty, Dr Eimear Smith, Professor Matthew MCauley

1National Rehabilitation Hospital, 2Trinity College Dublin

Biography:
NO BIO

Aim: To explore the experience of living with a sibling with a spinal cord injury (SCI).

Method: Interpretative Phenomenological Analysis was used to analyse semi-structured interviews conducted with 8 participants whose sibling had acquired a SCI.

Results: Interviews explored how participants made sense and adapted to their sibling’s SCI. Three superordinate themes were identified, Intrusion to Life as Normal, Life as Changed and Adjusting to SCI. These themes highlighted the experiences of disruption to their life as they had known it, relating to their sibling’s SCI, changed family dynamics and relationships with others as well as experiencing changes in themselves related to their siblings’ SCI. As well as participants ability to negotiate these changes with a balance of protective influences, escapes and supports.

Discussion: This findings highlight the need for a developmental perspective in terms of siblings’ awareness, understanding and emotional welling being in the context of coping with the injury in the family. It is hoped that the current study will provide the basis for further exploratory research in this area and will assist in providing insight about the needs of siblings in families where there is SCI.
A rare case of Acute traumatic Cervical Spinal Cord injury in 32 weeks pregnant: How we managed it?

Dr Ashok Reddy Padabelle¹, Dr Saransh Gupta¹, Dr Harvinder Singh Chhabra¹

¹Indian Spinal Injuries Center

Biography:

NO BIO

Introduction: Management of acute traumatic cervical Spine Injury in a third trimester pregnancy is challenging with risks involved to both mother and the fetus. We report one such case which was managed successfully with both maternal and fetal good outcomes.

Case: A 30 yrs/ female, Gravida 2, para 1 with 32 weeks of pregnancy, met with RTA and diagnosed with MRI as C4-C5 extension compression injury with AIS B neurology with stable vitals confirmed with viable fetus confirmed by doing Ultra sonography and Fetal Heart sound (FHS) monitoring. Reduced C4-C5 dislocation with cervical traction. We had confusion whether to continue pregnancy/ do elective cesarean section and then go for cervical spine fixation in view of risk of spontaneous delivery during anesthesia, preterm delivery, radiation exposure to the fetus while doing ACDF. Discussed with patient, attendees, Obstetrician and Neonatologist and did C4-C5 ACDF under GA after modifying anesthetic agents, having continuous monitoring of FHS, and having Obstetrician and Neonatologist standby in the theatre. She withstood the surgery well. She was started on rehabilitation on second post op day except for bladder training as per the advice of gynecologist and patient’s preference she was kept on Silicon indwelling catheter. Motor power of lower limbs improved and she continued pregnancy till full term.

Conclusion: Acute surgical management of cervical spine injury and rehabilitation can be successfully managed with proper anesthetic modification, standby gynecologist in the theatre and continuous FHS monitoring.
A reliability study of a real-time clinical biometric ultrasound protocol for persons with SCI at risk for pressure injuries

**Professor Jillian M. Swaine**, Dr. Andrew Moe, Dr. William Breidahl, Professor Daniel Bader, Professor Cees Oomens, Dr. Edmond O'Loughlin, Associate Professor Leanne Lester, Professor Nick Santamaria, Professor Michael C. Stacey

1 University Of Notre Dame Australia, 2 University of Western Australia, 3 Perth Radiology Clinic, 4 University of Southampton, 5 Eindhoven University of Technology, 6 University of Melbourne, 7 McMaster University

**Biography:**

Jillian Swaine is an occupational therapist and PhD candidate at the University of Western Australia and a chief investigator The AusCAN Risk Pressure Ulcer Risk Scale study funded by the NHMRC in Australia and the Ontario Neurotrauma Foundation and Rick Hansen Institute in Canada.

High strains in soft tissues are considered a risk factor for pressure injuries (PIs) following spinal cord injury (SCI) and are computed using finite element method (FEM). The aim of this study was to determine the inter-rater reliability of sonographers measuring the thickness of the soft tissue layers overlying the inferior curvature of the ischial tuberosity (IT) and the diameter of this bone region in real-time, on able-bodied (AB) participants and persons with SCI using ultrasound (US). Material and methods: Two sonographers administered the US biometric protocol and measured soft tissue layers in loaded and unloaded sitting and the diameter of the inferior curvature of the IT in its short and long axis. Fourteen AB and eight SCI participants were measured. Results: Able-bodied inter-rater reliability was excellent (ICC=0.81-0.90) for sonographers measuring all 3 soft tissues layers in unloaded and loaded sitting and very poor reliability for measuring both IT diameters (both ICC=0.00). SCI inter-rater reliability for unloaded sitting was excellent for total, muscle, fat, tendon and muscle (ICC=.80-0.96) and poor for tendon (ICC=0.26), skin (ICC=0.37), skin and fat (ICC=0.75). For loaded sitting, inter-reliability was excellent for total, muscle, fat, tendon and muscle, skin and fat (ICC=0.85-0.97) and poor for tendon only (ICC=0.71) and skin only (ICC=0.10). Conclusion: Good inter-rater reliability exists for sonographers measuring 3 soft tissue layers and not reliable measuring IT diameter, tendon and skin. These biometrics can be used in individualized finite element modelling to estimate the maximum strain in these soft tissue layers.
A retrospective study of supra pubic catheterisation in patients with a spinal cord injury under local anaesthetic

Ms Oonagh Crean¹, Mr Robert Flynn¹, Ms Caroline Ahern¹, Ms Kelley Lennon¹

¹National Rehabilitation Hospital

Biography:
Oonagh Crean is a Clinical Nurse Manager in the Urology Department in the National Rehabilitation Hospital. She completed her Nurse training in the Royal Free Hospital in London and graduated from Middlesex University. She has a Masters Degree in Rehabilitation and Disability studies from University College Dublin. She has worked in the area of neurology since qualifying and has spent the last five years in neurourology. She is interested in Spinal Cord Injury, urodynamics, sexual dysfuction and neurogenic bowel and bladder.

A suprapubic catheter (SPC) is an effective and well-tolerated method of urinary management for patients with neurogenic bladder dysfunction, as complications associated with long-term urethral catheters such as urethral strictures and hypospadias can be avoided. The objective of the study was to retrospectively look at current practice in the NRH of inserting SPCs in an outpatient department under local anaesthetic (LA) and to show that this practice was safe for our client population.

Data was collected retrospectively from 60 cases and included patient demographics, ASIA scores, prophylactic antibiotics and adverse complications. Of the 60 patients sampled there were 4 failed insertions. All cases were carried out under local anaesthetic by a consultant urologist using the Seldinger technique. The use of a flexible cystoscopy for bladder filling allowed the needle to be accurately sited under direct vision.

Careful pre – operative optimization was essential in this high-risk group. Patients with previous lower abdominal surgery, acute pelvic trauma, BMI > 30 or an inability to adequately distend the bladder to 300mls were deemed not suitable to undergo the procedure under LA in the outpatient setting. Few complications were observed post operatively apart from mild haematuria, which is common within the first few hours post insertion.

In the current era of clinical governance where guidelines for best practice are becoming increasingly important, these results suggest that the practice of outpatient SPC insertion under LA is safe in this patient group.
A Sporting Chance – showcasing public and voluntary sector collaboration

Mrs Carmel Lavery¹, Miss Julie Grant¹, Dr Josephine Hillan
¹Musgrave Park Hospital

Biography:
Carmel has worked in the field of Spinal Cord Injury in Northern Ireland for over ten years, and has particular interest in the health and psychological benefits of sports in spinal rehab. She is the lead OT for assistive technology and sports within SCIU.

There is extensive documentation about the benefits of participation in sport for the rehabilitation of patients with a spinal cord injury, and how it can assist with community integration. Historically sport had been offered in the Belfast SCIU. However, in recent years it became unavailable during inpatient rehabilitation for a variety of reasons.

It was recognised by staff that patients undergoing rehabilitation at Belfast SCIU were disadvantaged by not participating in any sport, or being given opportunities to develop links with local sporting clubs to help with community integration. In April 2016, a joint working partnership between OT and PT was set up to re-introduce sport to the weekly therapy timetable. Collaboration and support was sought from Disability Sports NI to help facilitate sports sessions and provide Coaches and equipment.

Inpatients attending the sports sessions were asked to complete a questionnaire to ascertain their attitude to the inclusion of sport to their therapy timetable. It was designed to see if involvement in sport during rehabilitation would encourage patients to continue participating in sports after hospital discharge. The results of the questionnaire proved positive in favour of sports participation during inpatient rehabilitation, with many benefits expressed. The collaboration with Disability Sports NI was recognised as an added benefit, as it increased awareness of sport opportunities in the community.

Our approach and it’s presentation will highlight the benefits of joint collaboration between public and voluntary sectors, produce real benefit for patients as early as possible which will continue into life beyond hospital.
A Survey of the current practice in UK and Ireland in using prophylactic antibiotics with urodynamics in Spinal Cord Injury

Dr Aram Mashoof Fard, Dr Chalil Vinod, Dr Surendra Bandi

Salisbury NHS Foundation Trust

Biography:
Aram Mashoof Fard, MSc, MD, MRCP
Dr Aram Mashoof Fard currently serves as a consultant in spinal Cord Injuries and Rehabilitation Medicine at the Duke of Cornwall Spinal Treatment Centre (DCSTC) in Salisbury, which covers southwest and southeast of England. Her special interest is Respiratory Management of patients with Spinal Cord Injury. She serves as the clinical lead of the centre in this area. She also serves as a recognised Educational Supervisor in Wessex Deanery, in England, and supports the specialty trainees in Rehabilitation Medicine attending the DOCSTC.

Background: The need for antibiotic prophylaxis with urodynamics (UDS) in patients with Spinal Cord Injury (SCI) is not well established and remains unclear in literature.

Aim: The aim is to find out what is the current practice pattern in UK and Ireland in using prophylactic antibiotics with UDS in patients with SCI?

Method: A questionnaire was distributed via email to all 12 spinal centres in UK and Ireland asking about the current practice in using prophylactic antibiotics with UDS.

Results: Nineteen responses were received. One clinician reported not using prophylactic antibiotics routinely. Another clinician reported being guided by the result of a urine culture performed 7-10 days prior to the UDS and the third reported using urine dip and patients symptoms at the time of procedure to make decision whether prophylactic antibiotic is needed. Of the rest of 16 responses, 43.7% reported prescribing prophylactic antibiotics in patients who void with control, 62.5% reported using it in patients who use intermittent catheterisation, 93.7% reported using it in patients with indwelling catheters and 68.7% use it in patients who use reflex voiding.

Most clinicians (81.25%) use Gentamicin (80-160mg intramuscularly or intravenously as the first line for infection prophylaxis.

Conclusion: There is heterogeneity in the use of prophylactic antibiotics with urodynamic in SCI. Currently no evidence-based antibiotic guidelines are available. Well-designed studies are needed to produce clinically useful data, such as estimation of local infection rates and knowledge of community antimicrobial resistance levels, to establish evidence-based antibiotic guidelines in SCI patients.
Achieving Neurological Stability in Complete Traumatic Tetraplegia

Dr Huai Ming Phen¹, Dr Anna Elmers², Ms. Paula Ackerman², Ms. Jana Candia², Ms. Shannon Kalmer², Dr Allan Peljovich³
¹Bart’s and the London School of Medicine and Dentistry, ²The Shepherd Center, ³The Hand and Upper Extremity Center of Georgia

Biography:
Graduate from Bart’s and the London School of Medicine and Dentistry, to join Emory School of Medicine in July 2017 for orthopaedic residency.

In order to take full advantage of neuronal plasticity, surgical reconstruction in traumatic tetraplegia is thought best left until a plateau in function is reached, manifesting as a waiting time of around a year before surgery is considered.

Operative intervention in the hypertonic upper limb yields earlier incorporation of muscle groups, and patients are more likely to engage with rehabilitation if visible progress is made. The authors propose the use of International Classification scoring when planning surgical intervention, as ASIA scoring may be misleading in its functional interpretation. Using both scores, this study aims to identify the time at which neurological stability is reached in the upper limb, in patients with complete traumatic tetraplegia.

Inclusion criteria for this retrospective study were complete traumatic tetraplegia (Frankel A), absent upper extremity co-morbidity and a minimum of one year follow-up. Data was taken from The Shepherd Center’s (Atlanta, GA) electronic records.

42 individuals and 82 arms were evaluated. Using the ASIA scale, patients experienced an average improvement of 1.1 levels and reached neurological stability at an average of 163.21 ± 118.32 days. Using the International Classification scale, patients had an average improvement of 1.4 levels at the point of neurological stability, and reached plateau at 209.4 ± 128.20 days.

Our data supports that neurological stability is usually achieved within a year after injury with both the IC and ASIA scores, thus surgery can be planned for at an earlier time without concern for further recovery in complete traumatic tetraplegia.
Adjustment of physical and sports therapy for the rehabilitation of locomotor function in acute incomplete SCI – The MALT project

Mr Adrian Cathomen, Mrs Martina Franz¹, Mrs Lea Richner¹, Mr Markus Wirz², Mrs Anne von Reumont³, Mrs Tanja Herzog¹, Mrs Kathrin Bach³, Mr Norbert Weidner³, Mr Armin Curt¹

¹University Hospital Balgrist, Spinal Cord Injury Center, ²Zurich University of Applied Sciences, ³University Hospital, Department of Orthopedics, Spinal Cord Injury Center

Biography:
Since 2000 Physical therapist; since 2008 working with patients suffering from spinal cord injury at Spinal Cord Injury Center Balgrist, Zurich, CH; 2012/2013 Internship at Motion Analysis laboratory, Harvard Medical School Boston, US; 2014 Master of Science in physical therapy, Bern, CH; since 2013 Research Assistant at the Research Department of the Spinal Cord Injury Center Balgrist, Zurich, CH.

Fields of interest: Physical therapy for SCI, gait training with a new overground robotic system

Introduction: Neurological training interventions should improve a patients’ functionality beyond compensation and spontaneous recovery. Rehabilitation programs (RP) have variable volumes, intensity and types of training. but currently, the timing, effectiveness and targeted patients of therapies within RP remain unclear. Here, we studied the content, duration and adjustment of physical therapy in relation to changes in locomotor function.

Methods: From informed consent to discharge of inpatient rehabilitation, all physical and sports therapy interventions were recorded in a 5-minute increment using the SCI–Interventions Classification System. Mobility was recorded using SCIM III while patient data was retrieved from the EMSCI database.

Results: Based on mobility scoring, 80 patients were subdivided into outcome-groups G1 (wheelchair users), G2 (moderate walkers) and G3 (good walkers). Strength training was applied most intensively in all outcome-groups (approximately 30% of interventions). During rehabilitation, a decrease in ‘therapist-assisted’ interventions and an increase in ‘against-resistance’ interventions were observed in all outcome-groups. Locomotion was significantly more trained by G3 (18%) and G2 (25%) compared to G1 (10%) with more modalities applied in gait training. Except for activity-training items such as transfer, transition and sitting and for body function/structure inventions on tone, joints and respiration, no differences in interventions on training levels could be observed.

Conclusion: The content of activity-related therapy interventions adapts to progressing ambulation while the content of body function/structure interventions is relatively constant. Our results enable the definition and application of standardized, effective physical therapies in future clinical studies and RPs.
Introduction: Our aim was to determine in which extend the independence in everyday life among SCI individuals is affected by age.

Methods: We studied 164 individuals with SCI of any etiology who live in community. They were residents of urban, suburban and rural areas of Greece. Participants completed demographic questionnaires. Spinal Cord Independence Measure (SCIM) was used for the assessment of participants’ independence in performing activities of daily life. For the statistical analysis of the findings we used the Pearson correlation coefficient.

Results: The participants appeared with no difference in SCIM-mobility subscale regarding age (p=0.408). However we found statistically significant correlation between age and SCIM-self-care subscale (p=0.014 and Pearson’s r=-0.191) and also between age and SCIM-respiration and sphincter management subscale (p=0.028 and Pearson’s r=-0.172), with age increase being related with lower scores in both subscales.

Conclusions: Older individuals with SCI who live in community appear with lower levels of independence regarding self-care and respiration and sphincter management than younger ones. However age does not appear to affect independence in mobility.
An assessment of services quality of hospitals for spinal cord injury: a patient perspective

Miss Manisha Goyal¹, Miss Sonal Khurana², Dr. Chitra Kataria³, Dr. H.S Chhabra⁴
¹Indian Spinal Injuries Centre, ²Indian Spinal Injuries Centre, ³Indian Spinal Injuries Centre, ⁴Indian Spinal Injuries Centre

Biography:
Manisha Goyal working at Indian Spinal Injuries Centre as a Senior Medical Social Worker since last 6 years. She is providing services such as individual, family counseling regarding social and vocational issues.

She help patients for their Community Reintegration and also liaising with Govt and other organization.

Healthcare sector needs special attentions from the government and private as quality provides hope and relief to the patients and their dependents. It also helps to maintain a healthy human capital that contributes in the development of the country. Now quality has become an icon for customers while availing any services or buying a product and it is also a strategic advantage for the organizations to gain success and remain competitive in the market by delivering superior quality of services or products based on customer requirements.

Spinal cord injury needs immediate and long-term comprehensive trauma care, which is crucial for independence and functional recovery. Therefore, the objective of this study was to evaluate the service quality delivered by the hospitals to spinal cord injured patient.

Method and material:
Community level: Spinal Cord injured Individuals recruited in study, who had undergone treatment or rehabilitation sessions at different hospitals.
100 participants to be included
Duration of study: 6 months
Survey questionnaire distributed via email, telephonic interview and direct interaction with candidates. The survey instrument used was SERVPERF (Service Performance) scale, developed by Cronin and Taylor (1994).

Significance:
Unlike the past times, patients are not indifferent to services they receive while in hospitals. Patients seek best available healthcare services. By highlighting the points, each hospital become aware of required needs for better service framework. They should identify what aspects are considered more important to patients and what issues results in their complaints.
An Audit of Sexual Function Discussions in an Out-Patient Setting

Dr Jonathan Mamo¹, Dr Aram Mashoof Fard¹, Dr Chalil P Vinod¹, Mr Surendra Bandi¹, Dr Reshan Jayasinghe¹, Dr Nicholas Mamo²
¹Salisbury Spinal Injury Centre

Biography:
NO BIO

Background:
People with spinal cord injuries (SCI) have an interest in sexuality from both recreational and reproductive viewpoints. Sexual function and its resultant impact on quality of life is a major issue to an overwhelming majority of people living with SCI. Therefore without initially requesting information in an out-patient setting we will not be in a position to identify the individuals requiring further assistance and assessment.

Objective:
To review current practice with regards to discussing sexual function in both men and women in an out-patient setting of our regional spinal injury centre. The results of current practice will be reported back to the spinal injury regional team for possible improvements / amendments to current practice should this be indicated.

Population Sample:
The most recent 100-200 individuals with SCI reviewed clinically as out-patients in the Duke of Cornwall Spinal Injury Centre will be included.

Method:
A list of the most recent 200 clinical reviews will be obtained. Clinic letters for these reviews will be reviewed; AIS scores, basic demographics, as well as documentation on whether sexual function was discussed or not, will be collated for each case in turn. In the event of details not being available on the clinic letters, a review of the clinical notes will be reviewed to ascertain whether the discussion was had in a clinic setting and not transcribed to the final letter.
An Early Evaluation of the United Kingdom National Spinal Cord Injury Programme

Dr Pradeep Thumbikat¹, Dr Jill Aylott²
¹Sheffield Teaching Hospitals, ²Sheffield Hallam University

Biography:
Mr Thumbikat is a Consultant in Spinal Injuries at the Princess Royal Spinal Injuries Centre, Sheffield and an honorary senior lecturer at the University of Sheffield. He is passionate about training in SCI medicine and has worked both nationally and internationally in this regard. His special interests include management of the tetraplegic hand, complex pressure ulcer management and more generally surgical rehabilitation.

Introduction:
This study evaluated the English national programme initiative in spinal cord injury patient (SCI) pathway management, the components of which have been implemented since 2013.

Methodology
The REAIM framework was used to evaluate the programme using a mixed methods approach and a nonexperimental/observational design with an insider-outsider perspective. Quantitative data was obtained from the national database, published documents and hospital data. Qualitative data was obtained through two focus group discussions, one with members of the clinical reference group in spinal cord injury and the other with frontline staff working at Sheffield spinal cord injury centre and referring hospitals. Interviews were transcribed and thematically analysed. The SCI programme was evaluated for reach, efficacy, adoption, implementation and maintenance.

Results
Many aspects have been very effective and can be considered as short term wins such as the introduction of the national registry and linkages with major trauma centres. The pathways are mostly working well for trauma patients, but not for non-trauma patients. Currently, there are no drivers to improve pathway processes outside SCI centres, which has resulted in delayed referrals and discharges. Delays in admission to SCI centres, capacity issues, the need for enhanced outreach and lack of resources were identified. Data quality was poor. There was good stakeholder involvement and a belief that the changes would be maintained.

Conclusions: This study built capacity with the SCI stakeholder group, which is best placed to implement the recommendations from this evaluation study and to advance improvement processes.
An interventional study to ensure timeliness of nutritional assessment among spinal cord injured patients at tertiary care hospital in India

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\textsuperscript{1}Indian Spinal Injuries Centre, \textsuperscript{2}Indian Spinal Injuries Centre, \textsuperscript{3}Indian Spinal Injuries Centre

Biography:
Hii all, I am Priyanka Anchalia.
I am a post graduate in Hospital Management from IIHMR-Delhi and graduate in Pharmacy from GGSIP University. Currently, I am working as Quality Control Officer at Indian Spinal Injuries Centre, New Delhi

In order to ensure compliance to nutritional screening & its documentation as nutritional assessment form within 24 hours of patient’s admission, a study was conducted wherein medical records of patients completing 24 hours of inpatient stay were audited and compliance rate was calculated. It was a prospective, longitudinal study covering 100% target population. The study was conducted in two phases (Pre & post intervention). During the pre intervention phase, existing methodology of conducting nutritional screening was studied i.e. nutritional screening was done by dietitians and documented in patient’s medical records, followed by receiving from the assigned nursing staff for the concerned patient. Intervention was introduced in which, in addition to earlier method of nutritional assessment the documents were kept in the box file available at nursing station by the dietitians, instead of filing them in the patient’s medical record and two way receiving was taken (nursing and dietitian both took receiving from each other). In this method the nursing staff were asked to file the nutritional assessment document in patient’s file instead of dietitian. During the first part of the study the compliance rate of filling the form was only 75%, attributed to loss of records, misplacement and missed nutritional assessment by dietitians. Introduction of new method led to higher compliance amounting to 96%. Paired t-test was done and its value rested at 0.03 at 0.05 level of significance (p=0.05) and suggested that intervention was highly effective in rendering results during post intervention period.
An Update from the PEPSCI Collaboration to Identify Service-User Defined Research Priorities for Paediatric Spinal Cord Injury

Dr Bashak Onal¹,², Dr Allison Graham¹, Dr Marika Augutis³, Dr Erin Kelly⁴, Dr Anke Scheel-Sailer⁵, PEPSCI Collaboration, Dr Julian Taylor¹,²,⁶

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Biography:
NO BIO

Introduction: Although paediatric spinal cord injury (pSCI) is rare, significant physical and psychological life-long complications contribute to a reduced quality of life that requires a multi-disciplinary treatment approach. The majority of pSCI research has been clinician-led with limited input from service-users (i.e. children and their parents/caregivers). Currently the PEPSCI Collaboration is identifying service-user priorities to establish a comprehensive research agenda to address physical and psychological consequences of pSCI.

Methods: A cross-sectional, quantitative, multi-centre survey was designed by the PEPSCI Collaboration to acquire demographic data and information regarding quality of life, health and life domains and neurological impairment. Surveys were created for children, adolescents and young adults with acquired or congenital SCI (aged 0-25 with onset of SCI before the age of 18) and for parents/caregivers.

Results: The PEPSCI Collaboration consists of twenty seven specialist centres from England, Europe and America. Amongst the twenty participant-recruiting centres, five centres in England have recently contacted over 300 potential participants via post. Informed consent/assent has been received from participants with pSCI and their parents/caregivers. Demographic characteristics for the pSCI group so far include participants between the age of 16-25 years with a neurological level between C4-T12 and AIS between A-C. Participant recruitment from Europe and America has already begun with local ethical committee approval and forward survey translations.

Conclusion: The PEPSCI Collaboration has contacted at least 300 potential participants. Preliminary data from England will provide information regarding service-users’ research priorities for pSCI for the first time, to be followed by the international data.
Antibody profiling identifies novel antigenic targets in spinal cord injury patients

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Biography:
NO BIO

Recent evidence implicates antibody responses as pivotal damaging factors in spinal cord injury (SCI)-induced neuroinflammation. To date, only a limited number of antibody targets have been uncovered, and the discovery of novel targets with pathologic and clinical relevance still represents a major challenge. In order to unravel the full antigenic repertoire in SCI patients, we applied Serological Antigen Selection (SAS), an unbiased and high-throughput antibody profiling procedure based on cDNA phage display.

A human spinal cord cDNA phage display library was constructed and used for affinity selection with pooled plasma from traumatic SCI patients (n=10). By performing SAS, we identified a panel of 19 antigenic targets reactive with antibodies in the SCI plasma pool. Sequence analysis to identify the selected antigenic targets uncovered 5 novel protein targets, to which SCI-associated antibody reactivity has not been found before, as well as linear peptides. Immunoreactivity against 9 of the 19 novel identified targets was validated in 41 additional SCI patients and an equal number of age- and gender-matched healthy controls. Elevated antibody levels to at least 1 of the 9 targets were found in more than half of our total SCI patient cohort (n=51) with a specificity of 73%. By combining 6 of the 9 targets into a marker panel, almost half of the SCI patients could be identified while increasing the specificity to 82%. These results significantly contribute to unravelling the antibody signature present in SCI patients and extend our knowledge of the underlying neuroinflammatory processes in SCI pathology.
Are you aware of the possible correlation between botulinum toxin and hearth function?

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1Urology Department General Hospital, 2Cardiology Department General Hospital, 3General Surgery Department General Hospital, 4Neurology Department General Hospital

Biography:
Graduated in Medicine and master’s degree in Urology achieved at Padova University. Hospital doctor since 1994, certificated as highly specialised in neurogenic bladder and bladder dysfunctions since 2008. Author of 101 abstracts and co-author of another 71.

We describe 2 cases in which botulinum toxin injected in the bladder (ITox) caused consequences on heart function.

Case 1 2014: a 38 year old woman was hospitalized for congestive hearth failure due to severe cardiomyopathy secondary to cardiotoxicity to antiblastic (sacral resection for neoplasm in youth, treated with chemotherapy). She undergone periodic ITox for detrusor overactivity (DO). The hearth failure was solved and urge-incontinence worsened because oxybutin was stopped and diuretics were prescribed. Cardiologist informed her of the possibility of arrhythmias/hearth attack due to ITox. Therefore ITox (Botox 200 U) was performed in 2015 with monitoring.(ECG and echocardiogram at 7 and 15 days). Storage low urinary tract symptoms disappeared with good hemodynamic compensation.

Case 2 Woman with incomplete SCIC6, 58 years old, with bladder-sphincter dyssynergia (DESD) had recurrent autonomic dysreflexia (AD) at 300 ml of bladder volume. She voided by triggering more 2 self clean catheterisations (CIC)/die. Over time reflex voidings disappeared with comparison of AD that in 03.2015 evolved in atrial fibrillation. Videourodynamics confirmed DESD with DA. In 2015 she underwent ITox (Botox 200 U). She resumed quickly 5 CIC/die with increase of bladder capacity of 100 cc without AD.

CONCLUSIONS Myocardial infarction and even death have been reported after botulinum toxin injections (1,2,3). As ITox are widely performed clinicians should be aware of the risk of serious side effects in patients with cardiovascular disease. In other conditions, as in SCI, ITox can resolve the sympathetic hypertonus triggered by DO and thus protect from AD and secondary arrhythmia.
Areas of Post-traumatic Growth Following Pediatric-Onset Spinal Cord Injury

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1Shriners Hospitals For Children, 2Northwestern University Feinberg School of Medicine, 3Rush Medical College

Biography:
Kathy Zebracki, Ph.D. is Director of Psychology at Shriners Hospitals for Children, Chicago and Adjunct Associate Professor at Northwestern University Feinberg School of Medicine. She is the current Editor of Topics in Spinal Cord Injury Rehabilitation and an Associate Editor of Developmental Medicine and Child Neurology. She is on the Board of Directors for American Academy for Cerebral Palsy and Developmental Medicine, American Spinal Injury Association and Illinois Spina Bifida Association. Dr. Zebracki is Co-Editor of the textbook, Spinal Cord Injury in the Child and Young Adult, and has authored over 50 peer-reviewed journal articles, 12 book chapters.

Introduction: Post-traumatic growth (PTG) refers to positive psychological change after a challenging life circumstance, e.g. spinal cord injury (SCI). Objective is to describe PTG in individuals who sustained a pediatric SCI, examining association of growth with emotional functioning.

Methods: This is a longitudinal study of adults with pediatric-onset SCI using structured questionnaires and standardized measures of emotional functioning: post-traumatic growth, anxiety, depression, life satisfaction, and happiness. The Post-Traumatic Growth Inventory (PTGI) measures degree (0-‘not at all’ to 5- ‘very great’) to which change has occurred due to the event; there are five factors: ‘Relating to Others,’ ‘New Possibilities,’ ‘Personal Strength,’ ‘Spiritual Change,’ ‘Appreciation for Life’.

Results: 194 adults (64% male, 62% tetraplegia), ages 19-51 (M=35.4, SD=7.8) with mean injury age of 15.1 (7-18, SD=2.4). There were no significant differences in type of growth based on gender, injury type, or severity. All participants reported change in at least one area. Most common were: 1)”I discovered that I am stronger than I thought I was;” 2)”I appreciate value of my life more;” and 3)”I accept more that I need other people.” Most growth (moderate) was endorsed in ‘Appreciation for Life’, ‘New Possibilities’ and ‘Personal Strength.’ Injury duration had a negative correlation with ‘New Possibilities’ (r=-0.17, p=0.013) and a positive association with ‘Spiritual Change’ (r=0.15, p=0.039), suggesting that growth may vary throughout the lifespan. Growth was associated with positive emotional functioning, but not negative symptomatology.

Conclusion: These analyses show that despite challenges individuals with pediatric SCIs face, they experience positive psychological growth throughout adulthood.
Assessment of Sarcopenia in spinal cord injury using definition of European Working Group of Sarcopenia (EWGSOP). Is it possible?

Dr Yannis (Ioannis Eleftherios) Dionyssiotis1, Emeritus Professor Georgios Lyritis3, Dr. Grigoris Skarantavos2, Associated Professor Nikolaos Papaioannou3, Dr Christina-Anastasia Rapidi5, Professor Panayiotis Papagelopoulos2, Dr. Konstantina Petropoulou4

1Physical Medicine and Rehabilitation Department, European Interbalkan Medical Center, 21st Department of Orthopaedics, General University Hospital ATTIKON, 3Laboratory for Research of the Musculoskeletal System, University of Athens, 42nd Physical Medicine and Rehabilitation Department, National Rehabilitation Center, 5Physical Medicine and Rehabilitation Department, General Hospital of Athens "G. Gennimatas"

Biography:
Dr. Yannis Dionyssiotis is specialized in Physical Medicine and Rehabilitation. He holds a PhD in spinal cord injury induced Osteoporosis and Metabolic Bone Diseases; is the Head of Physical Medicine and Rehabilitation Department of European Interbalkan Medical Center in Thessaloniki, Greece. He also holds a senior European Board Certification in PRM (certified 1/2006, recertification 2/2016), Facharztanerkennung in Germany (PRM) and is registered Physician in the UK. http://publicationslist.org/y.dionyssiotis

Introduction
The European Working Group on Sarcopenia in Older People (EWGSOP) developed a definition and consensus diagnostic criteria for age-related sarcopenia using both low muscle mass + low muscle function (strength or performance). Muscle cross sectional area (CSA) has been proposed as a surrogate for muscle effectiveness or loading (force). The present study investigated if a similar approach to define sarcopenia in spinal cord injured subjects would be possible

Methods
The study included 31 paraplegics in chronic phase (> 1.5 years) with complete paraplegia (AIS A) duration of paralysis 5.6 ± 6 years compared with 50 controls. All were examined by whole body DXA (Norland XR 36, USA) regarding muscle mass (relative appendicular skeletal mass (RASM), in Kg) and peripheral quantitative computed tomography (pQCT XCT-3000, Stratec, Germany) in 66% of tibia’s length (muscle CSA, mm²).

Results
Paraplegics had significantly lower values in muscle area and RASM (p <0.001) compared to controls. In the adjusted analysis according to age, height and relative fat mass, paraplegia was associated with lower values of RASM ( beta±se; -2.74±0.28, p<0.001).

Conclusion
In subjects with complete paraplegia muscle CSA, does not depend on motor function of the lower limbs. However, it can be measured and is a surrogate for force (this is already proven in children and healthy population.) Moreover, muscle mass can be measured also. This study suggests that we may categorize paraplegics with the current functional definition of EWGSOP for sarcopenia for research purposes. The sensitivity and specificity of this measurement remains unclear.
Assessment Of The Exigency Of Patients According To Demands Of Hospital Nursing Care In A Spinal Cord Lesions Rehabilitation Department

Miss Nataša Puzić¹, Mrs. Stanka Vrtek¹, Mrs. Neža Majdič¹, Mr. Rajmond Šavrin¹

¹University Rehabilitation Institute Soča

Biography:
NO BIO.

INTRODUCTION. Patients at the country's only spinal cord lesions (SCL) rehabilitation department can be classified in the first three (of four) categories of the Slovenian categorization of the requirements of hospital nursing care (SCRHNC). We are observing a rise in the exigency of health and nursing care of patients with SCL. More patients with SCL are being transferred to our rehabilitation department directly from the intensive care units.

METHODS. Nurses have recorded all nursing activities during the morning period for seven consecutive days, perceived effort for all the activities has been recorded by Borg scale of perceived exertion. Descriptive statistics and graphical displays were performed.

RESULTS. Thirteen patients with spinal cord lesion were classified according to SCRHNC (none in I, five in II, eight in III). Motor FIM and SCIM at admission was assessed (higher in category II and lower in category III). Large variations in complexity of health care were observed in category III, four patients stood out for specific reasons (mechanical ventilation, morbid obesity, colonization with multiple bacteria, pressure ulcers, tracheal aspiration).

CONCLUSIONS. A rehabilitation department should have the possibility to classify exigent SCL patients also in the fourth SCRHNC category which would allow a much better assessment and planning of the complex nursing care.
Introduction: The aim of this study was to define the relationship of low testosterone level in persons with spinal cord injury (SCI) and to identify factors associated with this deficiency.

Methods: Outcome was measured the prevalence of low testosterone level (total serum testosterone < 3.40 ng/mL) and the relationship of testosterone level with participant’s age, Height, Weight, body mass index (BMI), bone mineral density (BMD), time since injury, American Spinal Injury Association Impairment Scale (AIS) grade. The Pearson product-moment correlation was used to assess the relationship between testosterone level and age, Height, Weight, BMI, BMD, time since injury.

Results: A low serum testosterone level (<3.40 ng/mL) was detected by 4 of 16 patients (25.0%). The testosterone level was associated with severity of injury as defined by BMD (t=-5.72, P=.026). The rate of low testosterone level was slightly greater in participants with motor complete injuries compared with those with motor incomplete injuries. Testosterone levels were higher in the motor incomplete injury group (23.0%) compared with the motor complete injury group (33.3%). Possibly related to the small sample size, the SCI levels, age, Height, Weight, BMI, time since injury did not reach statistical significance in predicting testosterone level.

Conclusions: These findings confirm correlation of testosterone level in men with spinal cord injury, and a significant association between testosterone level and BMD, severity of SCI. Measuring serum total testosterone levels is relevant to clinical practice, as all these routinely assessed in rehabilitation settings for patients with SCI, particularly those with osteoporosis and motor complete injuries.
Associations between self-efficacy and secondary health conditions in people living with spinal cord injury: a systematic review and meta-analysis

Mr Tijn van Diemen¹,²,³, Mr Tim Crul¹, MD Ilse van Nes², MD PhD Jan Geertzen³, PhD Marcel Post¹,³
¹Center of Excellence in Rehabilitation Medicine, Brain Center Rudolf Magnus, University Medical Center Utrecht, and De Hoogstraat Rehabilitation, ²Sint Maartenskliniek, Department of Rehabilitation, ³University of Groningen, University Medical Center Groningen, Department of Rehabilitation Medicine

Biography:
Tim Crul is a master student at the Medical Department of the University of Utrecht, with a special interest in rehabilitation medicine. Mr Crul worked on this project with Mr van Diemen from September to December 2016. The submitted article corresponding to this abstract was accepted by the Archives of Physical Medicine and Rehabilitation on the 30th of March 2017. This project is Mr Crul's first scientific experience and his first publication.

Introduction: The aim of this study is to describe possible associations between self-efficacy and secondary health conditions (SHCs) in people living with spinal cord injury.

Methods: PubMed, Embase, the Cochrane library and CINAHL were systematically searched from database inception to September 2016. Studies were included if they described patients living with spinal cord injury, self-efficacy was measured by a standardized questionnaire and an association was made with somatic or psychological SHCs. A meta-analysis concerning the association between self-efficacy and SHCs in people with spinal cord injury was performed if a minimum of 4 comparable studies were available.

Results: 22 out of 670 articles met the inclusion criteria. Seven investigated associations between self-efficacy and somatic SHCs. Only a trend towards an association between higher self-efficacy with pain, fatigue, number of SHCs and limitations caused by SHCs was found. Twenty-one studies described the association between self-efficacy and psychological SHCs. All correlations of higher self-efficacy with fewer depressive (18) and anxiety symptoms (7) were significant and meta-analysis showed a strong negative correlation in both cases. A small number of studies (2) showed a trend towards a correlation between self-efficacy and quality of life.

Conclusion: Self-efficacy is negatively associated with depressive and anxiety symptoms in spinal cord injury. Therefore self-efficacy seems an important target in the rehabilitation of patients living with spinal cord injury. More research is necessary to clarify the link between self-efficacy and somatic SHCs. Future research should focus on different types of self-efficacy and their association with SHCs.
Bang for Your Injury Prevention Buck

Dr. Herndon Murray, Mrs Emma Harrington
Shepherd Center

Biography:
H. Herndon Murray, M.D., a board certified orthopedic surgeon, played an integral part of the 1975 founding of Shepherd Center. Dr. Murray, now medical director of Shepherd Center's spinal cord injury program, is board certified by the American Board of Orthopaedic Surgery. He attended the School of the South (Sewanee) and the University of Georgia, and received his M.D. from Tulane University School of Medicine. Dr. Murray completed his orthopedic training at Georgia Baptist Hospital, Scottish Rite Children’s Hospital, and Rancho Los Amigos Hospital in California.

Introduction and Aims:
In 2012 Shepherd Center formalized the injury prevention program and have since used multiple formats, trying to reach the maximum number of people, for the lowest costs, with a message that people will look at and remember.

Even though unintentional injuries are the fourth leading cause of death in the United States, and $36 billion dollars were spent on trauma care in 2005, funding for injury prevention has traditionally been scarce.

Methods
To ensure that we are being good stewards of our injury prevention funds, Shepherd Center conducted a cost benefit analysis of our prevention campaigns.

Results
Social media posts based on peer-to-peer theory, such as the diving prevention posts, are the most cost effective way to reach a broad audience. Local public service announcements are effective when produced in partnership with like-minded organizations.

Main Points:
• To start a program, you need enthusiasm, commitment and funding
• Clearly define your message and your target audience
• Include a spokesperson whom your target audience can relate to. For example, an injured teenager or football coach
• Traditional injury prevention methods, e.g. classroom curriculum and school visits, require large amounts of time and money to reach a limited number of students, but peer-to-peer interactions are considered a best practice and potentially more impactful
• Partnerships are important when designing prevention campaigns
• Social media channels, such as Facebook, Twitter and Instagram, allow you to reach a large audience in an inexpensive way
Bariatric surgery for morbid obesity in patient with spinal cord injury – a longitudinal follow up

Dr Samford Wong¹, Dr Simone Tiberti¹, Mr Maurizio Belci¹
¹National Spinal Injury Centre, ²City, University of London

Biography:
NO BIO

Introductions: We previously reported that bariatric surgery could help morbid obese patients with spinal cord injury¹ (SCI) but long-term follow up data is lacking.

Methods: This study reports a two year outcome of a patient who underwent bariatric surgery. A 46 year old female sustained an incomplete paraplegia (T10, AIS B) reported a weight gain from 126.5kg to 134.3kg after SCI. A laparoscopic Roux-en-Y gastric bypass (RYGB) was successfully performed in May 2013. Patient was discharged with a prescription of a general multivitamin / mineral preparation, vitamin D supplements and thiamine supplements.

Results: Patient has lost 42.3kg since she had her RYGB. There were important clinical improvements in body mass index (kg/m²) (49.2 to 33.2); mid-upper arm circumference (cm) (32.9 to 36.4); triceps-skinfold thickness (mm) (41.6 to 37.6); mid-arm muscle circumference (cm) (32.9 to 24.6); total cholesterol (mmol/L) (4.4 to 4.2); HDL-cholesterol (mmol/L) (1.4 to 1.5); LDL-cholesterol (mmol/L) (1.7 to 2.2); triglycerides (mmol/L) (1.7 to 1.2); 25 hydroxy-vitamin D (nmol/L) (30.8 to 55.4); folate (ng/mL) (6.4 to 14.6); ferritin (ng/mL) (229 to 62); vitamin B12 (pg/mL) (701 to 343).

Conclusion: Although RYGB could help morbid obese SCI patients to lose weight. It may not be sufficient to stimulate / maintain muscle mass in long term. Despite regular oral multivitamin and mineral supplementation, ferritin and B12 seems to deplete overtime, indicating long-term monitoring is essential. Further studies are warranted to examine the efficacy of nutrition-pharmacotherapy and / or physical activity intervention could preserve muscle mass in this vulnerable group of patients.
Barriers To Tourism For Spinal Cord Injured Individuals: State Of Tourist Spots In Metropolitan Cities Of India - Preliminary Report

**Miss Nishu Tyagi**, Miss Ruby Aikat, Mr Jitendra Pratap Singh, Miss Nitu Sinha, Dr. Ganesh Shankar, Miss Mamata Kemkar, Mr. Kapil Bawa, Miss Somya Prasad

1 Indian Spinal Injuries Centre, 2 ISIC Institute of Rehabilitation Sciences, 3 All India Institute of Medical Sciences, 4 Clinical Researcher, 5 Professor, 6 Senior Occupational Therapist, 7 Engineer, VIPRO, 8 Occupational Therapist, Vimhans Hospital

**Biography:**
First Indian to won ‘Inga-Britt Lindstrom Grant Award’ in 2013. Introduced Telerehabilitation concept in India through common technologies at ISIC in 2014. Awarded gold medal, fellowship and two silver medals continuously. Published four papers and two chapters in the book titled ‘Research Publication and Ethics. Presented more than 12 papers in National & International Conferences. Awarded ‘Smart City-Jan Award’ for ‘Excellence in Medical Field’. Presently supervising TeleHealth Unit at ISIC and rehabilitated more than 2000 patients. Her dream is to expand the R&D of Rehabilitation in India by creating new ideas, collaboration with good team work for the benefit of community.

Tourism is one of most popular leisure activities which enhance community integration and quality of life for individuals with disabilities. Many barriers to travel still exist, requiring skill and patience on the part of the traveler.

Objective: To explore major accessibility and attitudinal barriers that people with Spinal Cord Injury (SCI) encountered along with the recent status of tourist spots in famous metropolitan cities of India.

Methodology: Phase 1: List of 1531 post discharged SCI individuals from ISIC (August 2013 to July 2014) was obtained. 200 were randomly selected. Telephonic interview on ‘Tourism Survey Questionnaire’ addressing six accessibility domains were administered. Responses were obtained from 86 (urban, rural India). Phase2: Access Audit Checklist was administered to review the current status of top five tourist spots of Delhi, Mumbai, Bangalore, Hyderabad, Calcutta and Chennai. Phase3: Booklet on Tourism Facilities for SCIs was developed. Phase4: Pilot testing done in three metropolitan cities via Booklet provided.

Results: 83.72% stated that their frequency of tourist visits had been reduced after injury, and only 12.79% were aware about disability tourism. Common barriers were unavailability of active wheelchairs at tourist spots, negative connotations (74.4%). 76 stated unavailability of medical facilities at tourist places as main reason. Intrapersonal constraints were viewed as a major factor that reduced an individual's frequency, rate, or satisfaction as a participant in an activity.

Conclusion: This Preliminary report is an initiative to have a view on disability tourism which has an impact on an individual’s motivation, independence and overall quality of life.
Bladder management in SCI: what’s new? The impact of changing epidemiology

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Introduction:

Increase of age and a growing percentage of incomplete lesions between patients with new onset of Spinal Cord Injury (SCI) are common trends in all developed countries.

Methods:

We thus decided to perform a survey to investigate the impact of changing SCI epidemiology on bladder management at discharge from Spinal Unit. We involved three Spinal Units located in three different regional areas of our country.

Results:

We obtained data from a total of 157 patients, 96 males and 61 females. We observed a high percentage of cervical lesions (mostly incomplete, 31,9% of our population) with a paraplegic/tetraplegic ratio of 1,34. Our data also showed a very low percentage of lumbosacral complete lesions (only 5,7%). Mean age was 57,7 years in the overall population, 56,5 years for males and 60.2 years for females. Our data showed a high percentage of catheter-free micturition both in males and females (37,5% and 39,3% respectively). Intermittent catheterization, alone or in combination with another method, was used by 38,5% of males and 37,7% of females. Condom catheter was used by 7,3% of males. Indwelling urethral catheter was adopted by 15,6% of males and 23% of females. Suprapubic cystostomy was the bladder emptying method of a single male patient.

Conclusions:

Intermittent catheterization is the most common bladder emptying method in our population, but we also observed a high percentage of both catheter-free micturition and indwelling catheterization: in our opinion these findings may be explained by the high percentage of incomplete lesions and elevated mean age, respectively.
Body composition in people with a spinal cord injury: associations among outcome measures and effect of handcycle training

Dr Sonja De Groot, MSc Ingrid Kouwijzer, Bac Suzanne de Groot, Bac Marjolein Baauw, PT Rogier Broeksteeg, OT, PhD Linda Valent

1 Amsterdam Rehabilitation Research Center | Reade, 2 University of Groningen, University Medical Center Groningen, Center for Human Movement Sciences, 3 Research and Development, Heliomare rehabilitation center, 4 Nutrition and dietetics, The Hague University of Applied Sciences, 5 Rijndam rehabilitation center

Biography:
Sonja de Groot is a human movement scientist and works as a senior researcher in the field of SCI. She is coordinator of the Dutch SCI Research Network and Section Editor of Spinal Cord. For more information see: http://www.rug.nl/staff/sonja.de.groot/cv

Introduction: To study 1) the association among clinical feasible body composition measures; and 2) the change in body composition due to training for a handcycling mountain time trial (HandbikeBattle).

Methods: Body composition (body mass, body mass index (BMI), waist circumference (WC), %fat determined with skinfolds and fat and fat free mass (% and kg) assessed by bio-impedance analysis (BIA)) of 19 persons with SCI was evaluated before (T1) and after 4 months of training for the HandbikeBattle. Associations among body composition measures were calculated among 31 participants at T1.

Results: When correlated with %fat measured by BIA, the %fat determined with the skinfolds showed a very large correlation (r=0.81), in contrast to body mass (r=0.24), WC (r=0.45) and BMI (r=0.58). However, the skinfolds overestimated the %fat (mean difference: 4.0±4.6%, p<0.001)). Training led to significant improvements in WC (91.5±14.7 cm to 90.2±13.6 cm, p=0.05), BMI (25.2±5.1 kg/m2 to 24.8±4.9 kg/m2, p=0.035), fat mass measured by BIA (21.2±10.0 kg to 20.1±9.1 kg, p=0.03), %fat measured by the skinfolds (29.2±7.6% to 27.9±7.0%, p=0.02), but no changes were found in %fat and fat free mass (% or kg) measured by BIA.

Conclusions: Body mass, WC and BMI do not give much information on body composition of people with SCI. The skinfolds showed a strong relationship, but overestimation, with %fat measured by BIA. Participating in the HandbikeBattle seems to lead to small but positive changes in body composition. Future analyses will focus on the association with training hours and changes in fitness.
Bowel and bladder functions after robotic exoskeleton assisted walking overground training in SCI persons

**Dr Giulia Stampacchia**, Dr Carla D’Avino, Dr Samuele Bigazzi, Dr Adriana Gerini, Dr Roberta Benedetti, Dr Alessandro Rustici, Dr Donatella Pistolesi

1 Spinal Cord Injury Unit, Pisa University Hospital, 2 Urological Unit, Pisa University Hospital

**Biography:**

**NO BIO**

**Introduction** – Recently motorized wearable exoskeletons are available for gait rehabilitation also in patients with complete Spinal Cord Injury (SCI). In our center is ongoing a research funded by the Italian Ministry of Health (grant RF-2011-02346770) on the health benefits (such as pain and spasticity) in SCI patients trained with motorized wearable exoskeletons (Stampacchia et al., 2016). On the basis of self-reported improvements in visceral functions, we started to evaluate bowel and bladder functioning before and after gait training with robotic exoskeleton.

**Methods** – Four SCI patients (3 men): ASIA A (1), ASIA B (1) and ASIA C (2) were enrolled in our study. Bowel and bladder functions have been evaluated by: Neurogenic Bowel Dysfunction score (NBDs), Bristol stool scale and ISCOS-Lower urinary tract function basic data set. These scales were administered before, after a 20 sessions of exoskeleton gait training and in the follow-up (3 months later).

**Results** – All patients showed an improvement in NBD scores, switching from severe-moderate bowel dysfunction (average score 14.75) to moderate-low (10). Also bladder function improved, with a reduction of involuntary urine leakage due to the dramatic reduction of urinary tract infections.

**Conclusions** – The improvement of quality of life, in terms of a better management of visceral functions can be obtained with the robotic exoskeleton gait training.

**References**

Building Capacity for Spinal Cord Injury Primary Care and Community Support: Recommendations from a Key Stakeholder Summit

Dr Joseph Lee1,2, Dr James Milligan1,2, Dr Matt Smith1, Mr. Peter Athanasopoulos3, Ms Tara Jeji4, Ms Jennifer Howcroft5, Mr Jeremy Howcroft5, Dr Linda Lee1,2
1Centre For Family Medicine Family Health Team, 2Department of Family Medicine, McMaster University, 3Spinal Cord Injury Ontario, 4Ontario Neurotrauma Foundation, 5Consumer Representative

Biography:
Dr. Lee is a family physician and Chair and Lead Physician for the Centre for Family Medicine Family Health Team, Kitchener, Ontario, Canada, Associate Clinical Professor, Department of Family Medicine, McMaster University, Hamilton, Ontario, Canada, Adjunct Professor Department of Family Medicine, Western University, London, Ontario, Canada and, Assistant Professor (Adjunct), School of Pharmacy, the University of Waterloo, Waterloo, Ontario, Canada.

Background: Persons with spinal cord injury (SCI) experience significant challenges when they access primary care and community services. To develop a provincial strategy to improve SCI care, multiple stakeholders came together to direct research, education, and innovation in primary and community care for SCI. This poster presentation presents Summit proceedings and recommendations based on the perspectives of consumers, primary care providers, specialists, funders, researchers and program leaders.

Methods: Over 100 individuals representing people with SCI, care partners, primary care and rehabilitation clinicians, community services, researchers, and policy makers. Perspectives on SCI management and access to care were shared by primary care, neurosurgery, rehabilitation, and members of the SCI community. Panel discussions were delivered by members of the SCI community and primary care clinicians, sharing their lived experiences of primary care and their experiences managing and providing SCI primary care, respectively. Workshop discussions provided an opportunity to identify key barriers and gaps in SCI primary and community care and potential solutions.

Results: This summit identified barriers, gaps, and potential solutions in five target areas: Application of best practices (knowledge empowerment, online repository of SCI resources), knowledge translation (SCI network for information management), accessibility of services (environmental/technological) and systemic issues (regional equity), research (aligning funding to support care, non-traumatic SCI identification, SCI primary care data access), and communication (improved access to patient information).

Conclusions: This summit identified priorities for improving SCI primary care, brought together key stakeholders capable of advancing SCI primary care, and will help shape policy direction and SCI care.
Poster Board Number: 11

Cardiorespiratory Effects Of Combining Transcutaneous Spinal Stimulation And Robot Assisted Walking: A Case Study.

Dr Neil Fleming¹, Mr. Bernard Donne¹, Dr. Nick Mahony¹, Prof. Richard Reilly¹, Mr. John Lynch²

¹Trinity College Dublin, ²National Rehabilitation Hospital

Biography:
NO BIO

This case study examined the effect of combining transcutaneous spinal stimulation (TSS) with robot assisted walking (RAW) on cardiorespiratory measures of exercise performance in a spinal cord injured individual. The participant with spinal cord lesions at T9 and L1 vertebral levels, had been assessed clinically as motor and sensory complete (ASIA A).

Test sessions of 60-min RAW were performed on three consecutive days using a robotic exoskeleton (EKSO bionics). Each session included 4 by 15-min of walking with 5-min of seated recovery between exercise bouts. Electrical current was delivered non-invasively to the spinal cord at the level of T11 (30Hz) and C01 (5Hz) during 2 of the 15 min exercise bouts in each session. Cardiorespiratory data were collected via a portable metabolic analyser (Cosmed K4b²⁺); hip and knee motor torque data were collected throughout all sessions. Data averaged over 3-min increments within each exercise bout were compared using a 2-factor repeated measures ANOVA.

RAW resulted in a mean VO₂ of 12.3±1.5 mL/kg/min. The addition of TSS to RAW resulted in an increase in VO₂ (14.7±1.5 mL/kg/min, F=35.6, P<0.01). Heart rate was also significantly greater with combined TSS and RAW (128±10 vs. 107±8 beats/min, F=32.2, P<0.01). No significant differences in hip or knee joint torque data were observed. The addition of TSS significantly increased cardiorespiratory cost of RAW in a paraplegic individual. Further research is required in order to establish what is causing the increased energy cost and whether this effect is consistent across a larger cohort of SCI individuals.
Centrum Paraple services - from case-management and coordinated multidisciplinary approach to the deepest existential level

Mr David Lukes¹, Mr Jan Formanek¹, Mrs Lenka Honzatkova¹, Dr. Jiri Pokuta¹

Centrum Paraple

Biography:
NO BIO

Since its founding in 1994 by the Czech Paraplegic association, Centrum Paraple has helped more than 1400 people each year. Our NGO specifically aids those who are recovering from spinal cord injuries (SCI) and their families. Our services are offered to people from Czech Republic aged 16 and older with a focus on the improvement of the physical, social and psychological health of our clients. We encourage them to be as self-sufficient as possible and to live out their lives fully. This is carried out mostly by 2-4 week long in-house over-night stays and counselling tailored to our clients' needs.

We support our clients shortly after their injuries as well as later in life. Active participation of the clients in the whole process is essential. We believe change can be reached only through dialogue. We stress the importance of individual needs, human dignity and taking responsibility for one's life. Our methods are grounded in case-management and coordinated multidisciplinary approach. The situations our clients face are often very challenging on the deepest existential level, so we recognize that and consciously incorporate it into our services.

Centrum Paraple's complex network of support is guaranteed by our multidisciplinary team consisting of social workers, psychologists, physiotherapists, and occupational therapists that cooperate with wheelchair peers, sport therapists, personal assistants, nurses, nutritional therapists. The facultative services (2-7 days long) of social rehabilitation are mostly focused on movement and sports, which usually take place out of our center and include skiing, water sports, cycling, all-terrain vehicles.
Cerebroprotein Hydrolysate in the management of Acute Spinal Cord Injury: Our Experience

Dr Ishwar dayal Chaurasia1, Dr. Mahim Koshariya2, Dr. Surbhi Garg3, Dr. M.C Songra4

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Biography:
Assistant Professor, MS MCh Neurosurgery.
Having special interest Neurotrauma and Spine.
Working in the field of Head Injury Management for last 17 years. Graduate and Post graduate teacher having various International Publications and presentations.

Introduction
Spinal cord injury an extremely serious type of physical trauma, that can have a lasting and significant impact on most aspects of daily life leading to a grievous clinical situation. It can result in quadriplegia, paraplegia and other lifetime disabilities. Cerebroprotein hydrolysate, a neuropeptide having neurotropic and neuroprotective role, being successfully used in the treatment of Alzheimers disease, acute cerebrovascular strokes, traumatic brain injury with proven benefits. Few studies support its beneficial role in spinal cord injury.

Methodology
120 patients of traumatic spinal cord injuries were studied with acute traumatic spinal cord injury who reported in casualty ward within 8 hours of injury with complete neurological evaluations and with CT and/or magnetic resonance imaging. The control group received usual conventional treatment: methylprednisolone + methylcobalamin and the study group received intravenous cerebroprotein hydrolysate 60 mg BD for 2 weeks and a protocol of intravenous fluids to ensure the spinal cord perfusion pressure augmentation.

Results
Cerebroprotein hydrolysate treated group was compared to the conventional therapy (controlled) group. There was a statistically significant (p value=0.001) seen in improvement in terms of functional outcome in patients treated with cerebroprotein hydrolysate. These patients have significant motor and partial sensory recovery including the sensations of touch, pressure, vibration and pain.

Conclusion
Our results suggest that patients with traumatic acute spinal cord injuries when treated with cerebroprotein hydrolysate are benefited significantly in regards to functional outcome and it can be safely used. Though a large randomized control trials are required to prove its potential benefit.
Poster Board Number: 73

Challenges in learning International standards to document remaining autonomic function after spinal cord injury (ISAFSCI): Suggestions for clarification and improvement

Dr Nan Liu¹, Dr Huayi Xing¹, Professor Mouwang Zhou¹, Professor Andrei Krassioukov², Professor Finn Biering-Sørensen³

¹Peking University Third Hospital, ²International Collaboration on Repair Discoveries (ICORD), Department of Medicine, University of British Columbia, ³Clinic for Spinal Cord Injuries, Rigshospitalet, University of Copenhagen

Biography:
Dr. Nan Liu is deputy director and associate professor of the Department of Rehabilitation Medicine, Peking University Third Hospital, Beijing, China. He worked as visiting assistant professor in ICORD, University of British Columbia, Canada in 2012 to 2013. His research interest is related to autonomic function following spinal cord injury and medical training in the field of spinal cord injury. He is a member of ISCoS and ASIA.

Introduction:
To present the challenges in learning of the International standards to document remaining autonomic function after spinal cord injury (ISAFSCI), and to illustrate confusions in option selection of several items within the ISAFSCI

Methods:
A total of 37 medical students attended a training session regarding the ISAFSCI. Following the training, interactive group discussion on the difficulties during the learning process was performed with the tutor. After one-hour’s discussion, difficulties raised by the students were collected, summarized and categorized into three main topics as: definition, expression, and confusion for the option selection of items in the ISAFSCI.

Results:
Students encountered difficulties in the definitions of three items within the ISAFSCI: supine hypotension, orthostatic hypotension and autonomic dysreflexia (AD). Misunderstanding occurred with the inconsistent expressions in five items: supine hypertension, supine/resting hypotension, neurogenic shock, temperature dysregulation and ejaculation. Confusions arose for the documentation of items within ISAFSCI which are related to heart, blood pressure and broncho-pulmonary system, AD episode with reflex bradycardia or sweating, as well as choosing scores for urinary and fecal incontinence, and voluntary anal sphincter contraction.

Conclusion:
Difficulties during learning of the ISAFSCI summarized according to the discussion and feedback from the medical students may provide information to improve the ISAFSCI, including further clarification, which would eventually contribute to facilitate the use of ISAFSCI across the world.
Challenges persons with a spinal cord injury face in regaining their role in life and society in Sub-Saharan Africa.

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¹Ryhovs County Hospital, ²Functional area Occupational therapy and physiotherapy, Karolinska University Hospital, ³Functional area Neurology, Karolinska University Hospital

Biography:
Joséfin David is a care unit manager and an occupational therapist with a master’s degree in public health. She found her interest in SCI early on during her Bachelor’s degree. While she was on an exchange period in Uganda she worked with patients who had suffered a SCI. That further inspired her to pursue a master in Public Health. She has a passion for SCI and the challenges these patients face in the African societies. She has devoted her clinical work to patient with neurological injuries and SCI at Karolinska Hospital in Stockholm.

Introduction: Spinal cord injury is a devastating injury that can lead to death and lifelong disability. Spinal cord injury strikes beyond the individual to caregivers, family, community and nation; this is a major social and economical task. Chances of dying after a spinal cord injury are higher in sub-Saharan Africa than in many other regions of the world. Still the knowledge about the patient group in this specific region is limited. The aim of this study was to find out which challenges persons with a spinal cord injury face in regaining their role in society in Sub-Saharan Africa.

Method: A literature review was conducted in order to investigate the challenges SCI patients face when living in Sub-Sahara Africa. Qualitative, quantitative and other literature has been reviewed in order to identify themes related to different aspects of the post-SCI experience.

Results: 10 themes were identified showing that social support, financial resources, education about spinal cord injuries, physical, sexual and mental health, inaccessibility and technical aids, are areas of challenges to regain a life with activities and sense of quality of life after a spinal cord injury. Many of the themes are interlinked and have an impact one another.

Conclusions: Support by family, friends, social network and caregivers is essential for Spinal cord injured patients to overcome health issues, financial issues and gain self-sufficiency and happiness. Education about the condition for patients and their families prior to discharge, as well as on-going psychosocial and medical support, should be prioritized for SCI patients.
Characterizing gait deficits of patients with chronic incomplete spinal cord injury

Mr. Christian Meyer¹, Dr. Christopher S. Easthope¹, Dr. Tim Killeen¹, Dr. Linard Filli², Prof. Dr. med. Armin Curt¹, Dr. med. Dr. sc. nat. Björn Zörner¹,², Dr. Marc Bolliger¹
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**Biography:**

NO BIO

Gait dysfunction is a common consequence after incomplete spinal cord injury (iSCI) and frequently persists even following rehabilitation. The purpose of this study was to characterize gait impairments in subjects with iSCI using state-of-the-art 3D kinematic gait analysis. Nine subjects with chronic iSCI walked without assistance at 50% of their maximum walking speed on a treadmill. Kinematic outcome measures of each patient were compared to reference values of 20 age- and speed-matched healthy controls.

Subjects with iSCI exhibited higher gait variability and were less stable according to key gait stability markers than the healthy control population. Furthermore, subjects with iSCI showed reduced range of motion (ROM) in the leg joints with a proximal-distal gradient, i.e. hip angles were only slightly diminished, whereas knee and ankle joints showed more pronounced reductions in ROM. Mean step length of the subjects with iSCI was close to normal, but minimal toe clearance was increased.

Gait impairments in subjects with iSCI seem to be characterized by higher distal than proximal constraints suggesting higher importance of supraspinal input in the control of distal joints. Comprehensive analysis of iSCI gait pathology will enable the development of tailored locomotor therapies and help to identify sensitive endpoint measures for future trials aimed at restoring locomotion in subjects with iSCI.
Clinical and kinematic improvements with a powered exoskeleton in SCI patients: first results in Portugal

Dr Jorge Pimenta¹, Dr. André Ladeira², Dra. Maria da Paz Carvalho¹, Dra. Glória Batista¹, Dra. Maria Martín¹, Dr. Jorge Jacinto¹, Dra. Filipa Faria¹

¹Centro De Medicina De Reabilitação De Alcoitão, ²Hospital Prof. Dr. Fernando da Fonseca

Introduction: Robotic-assisted locomotor training with a powered exoskeleton allows spinal cord injured (SCI) patients to stand and walk independently over-ground, in a natural, weight-bearing, reciprocal pattern, as a training tool to improve stepping and weight-shifting. The improvement in those patients is related to the activity-dependent plasticity in SCI.

Objective: Evaluate the clinical and kinematic results of SCI patients subjected to powered exoskeleton training as part of an inpatient rehabilitation program.

Methods: Six subjects were enrolled, with neurological levels ranging from C6 to L3, all motor incomplete lesions. Outcome measures included walking time, up time and degree of assistance feedback provided by the Ekso® orthosis; the ambulatory status and the mobility aid was also evaluated and in one patient a motion capture gait analysis was performed before and after the program.

Results: Three patients were non-ambulant when they started the program, and one of those became ambulant at the end of it. The other three patients were ambulant before the program, and two of those changed the mobility aid at the end of the program. The motion capture gait analysis showed a significant improvement in gait speed, cadence and most of the dynamic base parameters.

Conclusions: The heterogeneity of the devices and populations studied in the literature makes it hard to compare outcomes. In spite of that, our results after an average of 16 sessions suggest promising effects regarding the utilization of the exoskeleton as a device to allow full walking potential exploration in SCI patients with incomplete lesions.
Clinical Characteristics and Functional Outcomes in Non-Traumatic Spinal Cord Injury in Elderly

Dr Boni Il Koo¹, Dr Hyun Yoon Ko¹
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Biography:
NO BIO

Objective: To investigate clinical features, medical co-morbidities, secondary complications, and functional outcomes in non-traumatic spinal cord injury (NTSCI) in elderly

Methods: A retrospective study for 71 patients, aged over 60, admitted with acute spinal cord injury between 2009 and 2014 was performed. All patients were divided into 2 groups: NTSCI and traumatic spinal cord injury (TSCI) group. Data on demographics, clinical features, medical co-morbidities, secondary complications, functional outcomes, and destination at discharge in both groups were analyzed. Functional outcomes contained rehabilitation length of stay (LOS) and spinal cord independence measure-III (SCIM-III) score at admission and discharge; SCIM-III score gain (change in SCIM-III score from admission to discharge), and the SCIM-III efficiency (SCIM-III score gain / LOS).

Results: NTSCI group was 40.8% (n=29) and showed higher proportion of female population (p=0.03), paraplegia (p=0.002) and incomplete lesion (p=0.04). Medical co-morbidities of cardiovascular disease (p=0.006) and connective tissue disease (p<0.001) were more common in NTSCI group. There was low incidence of secondary complications in NTSCI group. The comparison of functional improvement showed no significant difference. However, LOS was shorter (p=0.012) and functional efficiency was higher in NTSCI group (p=0.01). Proportion of discharge to home was also higher in NTSCI group (p=0.021).

Conclusions: Elderly patients with NTSCI achieved better efficiency of functional improvement probably because of less severe and less frequent secondary complication compared to patients with TSCI. Therefore, it is important to consider this information while setting the goal and planning of the rehabilitation program.
Clinical Practice Guideline for Management of Patients with Acute SCI: Recommendations on the Type and Timing of Anticoagulation Prophylaxis

Dr. James Harrop, Dr. Bizhan Aarabi, Dr. Paul Anderson, Dr. Paul Arnold, Dr. Darrel Brodke, Dr. Anthony Burns, Dr. Kazuhiro Chiba, Dr. Joseph Dettori, Dr. Julio Furlan, Dr. Langston Holly, Susan Howley, Tara Jeji, Dr. Sukhvinder Kalsi-Ryan, Dr. Mark Kotter, Dr. Shekar Kurpad, Dr. Brian Kwon, Dr. Ralph Marino, Dr. Allan Martin, Dr. Eric Massicotte, Dr. Geno Merli, Dr. James Middleton, Dr. Hiroaki Nakashima, Dr. Narihito Nagoshi, Katherine Palmieri, Dr. Mohammed Shamji, Dr. Anoushka Singh, Andrea Skelly, Dr. Lindsay Tetreault, Dr. Jefferson Wilson, Dr. Albert Yee, Dr Michael Fehlings

1 University Of Toronto, 2 Thomas Jefferson University, 3 University of Maryland Medical Center, 4 University of Wisconsin, 5 University of Kansas Medical Center, 6 University of Salt Lake City, 7 Toronto Rehabilitation Institute, 8 National Defense Medical College, 9 Spectrum Inc., 10 Toronto General Hospital, 11 University of California Los Angeles, 12 Christopher and Dana Reeve Foundation, 13 Ontario Neurotrauma Foundation, 14 Toronto Western Hospital, 15 Cambridge University, 16 Medical College of Wisconsin, 17 University of British Columbia, 18 University of Sydney, 19 University of Nagoya, 20 Keio University, 21 University College of Cork, Ireland, 22 Sunnybrook Hospital

Biography:
“Lindsay Tetreault is a first year medical student at University College Cork. She completed her undergraduate and doctorate degrees at the University of Toronto and completed a postdoctoral fellowship at the Toronto Western Hospital. Her research focused on developing prediction models to determine outcomes and complications in patients undergoing surgery for degenerative cervical myelopathy. More recently, Lindsay has assisted in the development of guidelines to outline how to best manage patients with degenerative myelopathy as well as spinal cord injury.”

Introduction: Patients with spinal cord injury (SCI) are at an increased risk of venous thromboembolism (VTE) due to hypercoagulability, stasis and intimal injury. The objective of this study is to develop guidelines that outline optimal prophylactic anticoagulation strategies in patients with SCI.

Methods: A systematic review of the literature was conducted to address the following key questions: (1) what is the comparative effectiveness and safety of pharmacological, mechanical and/or invasive anticoagulation strategies for preventing DVT and PE; and (2) what is the optimal timing to initiate and/or discontinue anticoagulation prophylaxis following injury. A multidisciplinary guideline development group used this evidence, in combination with their clinical expertise, to develop recommendations for the optimal prophylaxis strategies.

Results: Our recommendations included: (1) “We suggest that prophylactic antithrombotic pharmacological therapy be offered to minimize the risk of thromboembolic events in the acute period after SCI”; (2) “We suggest that prophylactic antithrombotic pharmacological therapy, consisting of either subcutaneous LMWH or fixed-dose UFH be offered to minimize the risk of thromboembolic events in the acute period after SCI. Given the potential for increased bleeding events with the use of adjusted-dose UFH, we suggest against this treatment option”; and (3) “We suggest commencing prophylactic antithrombotic pharmacological therapy within the first 72 hours after injury in order to minimize the risk of venous thromboembolic complications during the period of acute hospitalization.”

Conclusions: These guidelines should be implemented into clinical practice to improve outcomes in patients with SCI by encouraging clinicians to make evidence-informed decisions.
Clinical Practice Guideline for Management of Patients with Acute SCI: The Role of Baseline MRI in Clinical Decision Making

Dr. Allan Martin\(^1,2\), Dr. Bizhan Aarabi\(^3\), Dr. Paul Anderson\(^4\), Dr. Paul Arnold, Dr. Darrel Brodke\(^6\), Dr. Anthony Burns\(^7\), Dr. Kazuhiro Chiba\(^8\), Dr. Joseph Dettori\(^9\), Dr. Julio Furlan\(^10\), Dr. James Harrop\(^11\), Dr. Langston Holly\(^12\), Susan Howley\(^13\), Tara Jeji\(^14\), Dr. Sukhvinder Kalsi-Ryan\(^2\), Dr. Mark Kotter\(^15\), Dr. Shekar Kurpad\(^16\), Dr. Brian Kwon\(^17\), Dr. Ralph Marino\(^11\), Dr. Eric Massicotte\(^2\), Dr. Geno Merli\(^11\), Dr. James Middleton\(^18\), Dr. Hiroaki Nakashima\(^19\), Dr. Narihito Nagoshi\(^20\), Katherine Palmieri\(^5\), Dr. Mohammed Shamji\(^2\), Dr. Anoushka Singh\(^2\), Andrea Skelly\(^9\), **Dr. Lindsay Tetreault**\(^21\), Dr. Jefferson Wilson\(^1\), Dr. Albert Yee\(^22\), Dr. Michael Fehlings\(^1\)

\(^1\)University Of Toronto, \(^2\)Toronto Western Hospital, \(^3\)University of Maryland Medical Center, \(^4\)University of Wisconsin, \(^5\)University of Kansas Medical Center, \(^6\)University of Salt Lake City, \(^7\)Toronto Rehabilitation Institute, \(^8\)National Defense Medical College, \(^9\)Spectrum Inc., \(^10\)Toronto General Hospital, \(^11\)Thomas Jefferson University, \(^12\)University of California Los Angeles, \(^13\)Christopher and Dana Reeve Foundation, \(^14\)Ontario Neurotrauma Foundation, \(^15\)Cambridge University, \(^16\)Medical College of Wisconsin, \(^17\)University of British Columbia, \(^18\)University of Sydney, \(^19\)University of Nagoya, \(^20\)Keio University, \(^21\)University College of Cork, Ireland, \(^22\)Sunnybrook Hospital

**Biography:**

“Lindsay Tetreault is a first year medical student at University College Cork. She completed her undergraduate and doctorate degrees at the University of Toronto and completed a postdoctoral fellowship at the Toronto Western Hospital. Her research focused on developing prediction models to determine outcomes and complications in patients undergoing surgery for degenerative cervical myelopathy. More recently, Lindsay has assisted in the development of guidelines to outline how to best manage patients with degenerative myelopathy as well as spinal cord injury.”

Introduction: MRI is the gold standard for imaging the spinal cord and related soft tissues; however, there remains debate about the appropriate use of MRI in patients with SCI as it requires considerable resources and may be risky in patients with respiratory difficulties or hemodynamic instability. This guideline aims to outline the role of MRI in clinical decision making and outcome prediction in patients with SCI.

Methods: A systematic review addressed the following key questions: (1) how does the acquisition of a baseline MRI influence management strategies and, consequently, neurologic, functional, patient-reported and safety outcomes?; (2) do spinal cord lesion characteristics, pattern and length identified on baseline MRI predict neurologic, functional, patient-reported, and safety outcomes?; (3) do spinal cord characteristics identified on diffusion tensor imaging (DTI) predict neurologic, functional, patient-reported and safety outcomes?; (4) is baseline MRI cost-effective in patients with SCI? A multidisciplinary guideline development group used this information, in combination with clinical expertise, to develop recommendations on the use of MRI in the evaluation and treatment of patients with SCI.

Results: Our recommendations were: (1) “We suggest that MRI be performed in adult patients with acute spinal cord injury prior to surgical intervention, when feasible, to facilitate improved clinical decision-making” and (2) “We suggest that MRI should be performed in adult patients in the acute period following SCI, before or after surgical intervention, to improve prediction of neurologic outcome.”

Conclusions: These guidelines should be implemented into clinical practice to improve outcomes and prognostication for SCI patients.

Dr. Jefferson Wilson, Dr. Bizhan Aarabi, Dr. Paul Anderson, Dr. Paul Arnold, Dr. Darell Brodke, Dr. Anthony Burns, Dr. Kazuhiro Chiba, Dr. Joseph Dettori, Dr. Julio Furlan, Dr. James Harrop, Dr. Langston Holly, Ms. Susan Howley, Ms. Tara Jeji, Dr. Sukhvinder Kalsi-Ryan, Dr. Mark Kotter, Dr. Shekar Kurpad, Dr. Brian Kwon, Dr. Ralph Marino, Dr. Allan Martin, Dr. Eric Massicotte, Dr. Geno Merli, Dr. James Middleton, Dr. Hiroaki Nakashima, Dr. Narihito Nagoshi, Dr. Katherine Palmieri, Dr. Mohammed Shamji, Dr. Anoushka Singh, Andrea Skelly, Dr. Lindsay Tetreault, Dr. Albert Yee, Dr. Michael Fehlings

Introduction: Preclinical evidence suggests that persistent compression of the spinal cord after a primary injury represents a reversible form of secondary injury which, if ameliorated in an expeditious fashion, may lead to reduced neural tissue injury and improved outcomes. This guideline aims to discuss the timing of surgical decompression in patients with SCI and central cord syndrome.

Methods: A systematic review addressed the following key questions: (1) what is the efficacy and effectiveness of early decompression (≤ 24 hours) compared with late decompression (>24 hours) based on clinically important change in neurological status?; (2) does timing of decompression influence functional or administrative outcomes?; (3) what is the safety profile of early decompression compared with late decompression or conservative therapy?; (4) what is the evidence that early decompression has differential efficacy or safety in subpopulations?; and (5) what is the comparative cost-effectiveness of early versus late decompression? A multidisciplinary guideline development group used this information, in combination with clinical expertise, to develop recommendations for the timing of surgical decompression in patients with SCI and central cord syndrome.

Results: Our recommendations were: “We suggest that early surgery be considered as a treatment option in adult patients with traumatic central cord syndrome” and “We suggest that early surgery be offered as an option for adult acute SCI patients regardless of level.”

Conclusions: These guidelines should be implemented into clinical practice to improve outcomes in patients with SCI and central cord syndrome by encouraging clinicians to make evidence-informed decisions.
Poster Board Number: 278

Clinical Practice Guideline for Management of Patients with Acute Spinal Cord Injury: Recommendations on the Type and Timing of Rehabilitation

Dr. Anthony Burns², Dr. Bizhan Aarabi³, Dr. Paul Anderson⁴, Dr. Paul Arnold⁵, Dr. Darrel Brodke⁶, Dr. Kazuhiro Chiba⁷, Dr. Joseph Dettori⁸, Dr. Julio Furlan⁹, Dr. James Harrop¹⁰, Dr. Langston Holly¹¹, Susan Howley¹², Tara Jeji¹³, Dr. Sukhvinder Kalsi-Ryan¹⁴, Dr. Mark Kotter¹⁵, Dr. Shekar Kurpad¹⁶, Dr. Brian Kwon¹⁷, Dr. Ralph Marino¹⁰, Dr. Allan Martin¹,¹⁴, Dr. Eric Massicotte¹⁴, Dr. Geno Merli¹⁰, Dr. James Middleton¹⁸, Dr. Hiroaki Nakashima¹⁹, Dr. Narihito Nagoshi²⁰, Katherine Palmieri⁵, Dr. Mohammed Shamji¹⁴, Dr. Anoushka Singh¹⁴, Andrea Skelly⁸, Dr. Lindsay Tetreault¹¹, Dr. Jefferson Wilson¹, Dr. Albert Yee²², Dr Michael Fehlings¹

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Biography:

“Lindsay Tetreault is a first year medical student at University College Cork. She completed her undergraduate and doctorate degrees at the University of Toronto and completed a postdoctoral fellowship at the Toronto Western Hospital. Her research focused on developing prediction models to determine outcomes and complications in patients undergoing surgery for degenerative cervical myelopathy. More recently, Lindsay has assisted in the development of guidelines to outline how to best manage patients with degenerative myelopathy as well as spinal cord injury.”

Introduction: Rehabilitation plays a central role in maximizing function and facilitating community reintegration following a SCI. Despite this, many fundamental questions remain regarding the timing and efficacy of various strategies. The study aims to develop guidelines that outline the appropriate type and timing of rehabilitation in patients with SCI.

Methods: A systematic review addressed the following questions: (1) Does the time interval between injury and commencing rehabilitation affect outcome? (2) What is the comparative effectiveness of different rehabilitation strategies? (3) Are there patient or injury characteristics that impact the efficacy of rehabilitation? (4) What is the cost-effectiveness of various rehabilitation strategies? A multidisciplinary guideline development group used this information, in combination with their clinical expertise, to develop recommendations for the type and timing of rehabilitation.

Results: Our recommendations were: (1) We suggest rehabilitation be offered to patients with acute SCI when they are medically stable and can tolerate required rehabilitation intensity; (2) We suggest BWSTT as an option for ambulation training in addition to conventional overground walking, dependent on resource availability, context, and local expertise; (3) We suggest that individuals with acute and subacute cervical SCI be offered FES as an option to improve hand and upper extremity function; and (4) Based on the absence of any clear benefit, we suggest not offering additional training in unsupported sitting beyond what is currently incorporated in standard rehabilitation.

Conclusions: These guidelines should be implemented into clinical practice to improve outcomes in patients with SCI by encouraging clinicians to make evidence-informed decisions.
Clinical Practice Guideline for Management of Patients with Acute Spinal Cord Injury: Recommendations on the Use of Methylprednisolone Sodium Succinate

Dr Michael Fehlings¹, Dr. Bizhan Aarabi², Dr. Paul Anderson³, Dr. Paul Arnold, Dr. Darrel Brodke⁵, Dr. Anthony Burns⁶, Dr. Kazuhiro Chiba, Dr. Joseph Dettoni⁸, Dr. Julio Furlan⁹, Dr. James Harrop¹⁰, Dr. Langston Holly¹¹, Susan Howley¹², Tara Jeji¹³, Dr. Sukhvinder Kalsi-Ryan¹⁴, Dr. Mark Kotter¹⁵, Dr. Shekar Kurpad¹⁶, Dr. Brian Kwon¹⁷, Dr. Ralph Marino¹⁰, Dr. Allan Martin¹¹, Dr. Eric Massicotte¹⁴, Dr. Geno Merli¹⁰, Dr. James Middleton¹⁸, Dr. Hiroaki Nakashima¹⁹, Dr. Narihito Nagoshi²⁰, Katherine Palmieri⁴, Dr. Mohammed Shamji¹⁴, Dr. Anoushka Singh¹⁴, Andrea Skelly⁸, Dr. Lindsay Tetreault¹⁹, Dr. Jefferson Wilson¹, Dr. Albert Yee²²

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Biography:
Lindsay Tetreault is a first year medical student at University College Cork. She completed her undergraduate and doctorate degrees at the University of Toronto and completed a postdoctoral fellowship at the Toronto Western Hospital. Her research focused on developing prediction models to determine outcomes and complications in patients undergoing surgery for degenerative cervical myelopathy. More recently, Lindsay has assisted in the development of guidelines to outline how to best manage patients with degenerative myelopathy as well as spinal cord injury.

Introduction: Given its potent anti-inflammatory actions, methylprednisolone sodium succinate (MPSS) may have potential neuroprotective effects in patients with spinal cord injury (SCI) when administered at high doses. The objective of this guideline is to outline the appropriate use of MPSS in patients with SCI.

Methods: A systematic review addressed the following key questions: (1) what is the efficacy, effectiveness and safety of MPSS compared with no pharmacologic treatment?; and (2) what is the evidence that MPSS has differential efficacy or safety in subpopulations? A multidisciplinary guideline development group used this information, in combination with their clinical expertise, to develop recommendations for the use of MPSS. The benefits and harms, financial impact, acceptability, feasibility and patient preferences of each recommendation were carefully considered.

Results: Our recommendations were: (1) “We suggest not offering a 24 hour infusion of high dose MPSS to adult patients who present after 8 hours of acute SCI” (moderate evidence); (2) “When started within 8 hours of injury, we suggest that a 24 hour infusion of high dose MPSS be offered to adult patients with acute SCI as a treatment option” (moderate evidence); and (3) “We suggest not offering a 48 hour infusion of high dose MPSS for adult patients with acute SCI” (no included studies, expert opinion).

Conclusions: These guidelines should be implemented into clinical practice to improve outcomes and reduce morbidity in patients with SCI by promoting standardization of care, decreasing the heterogeneity of management strategies and encouraging clinicians to make evidence-informed decisions.
Cognitive profiles in Spinal Cord Injury Persons

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Biography:
NO BIO

Introduction
In the last few years cognitive impairment in SCI people has been observed some. The aim of our study was to investigate the executive/frontal functiones using, for the first time, standardized and validated neuropsychological test.

Materials and methods
19 SCI in-patients (13 males and 6 females) 52 years old (± 14) were recruited. Patient with impaired manual dexterity were excluded. The SCI were traumatic in 9 cases and non-traumatic in 10 cases. ASIA classification: A (N = 5), B (N = 1), C (N = 2), and D (N = 11).

Neuropsychological functions were assessed using: Mini Mental State Examination (MMSE), Modified Wisconsin Card Sorting Test (MWCST), Frontal Assessment Battery (FAB), Raven Colored Progressive Matrices (CPM47), Sub Test 5 of the Wescherl intelligent Scale.

Results
All the 19 subjects reported normal score in MMSE, in MWCST Categories, in CPM47 and in the Sub Test 5 of the Wescherl Intelligent Scale.

Abnormal results were found in MWCST Perseverative Errors (5 cases/19 cases) and in the FAB (6 cases/19 cases).

Conclusions
An impairment of the frontal functions in patients with SCI can be demonstrated utilizing some neuropsychological test, in particular the FAB and the MWCST.

This experience confirms the utility to investigate the cognitive aspects of frontal functions in SCI persons.
Colon Transit Delay, Hypomotility And Increased Motility Index In Spinal Cord Injury Using Wireless Motility Capsules

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¹University Of Michigan Hospital

Biography:
NO BIO

Background/Objectives: Patients with spinal cord injury (SCI) present with abdominal bloating, pain, distention and constipation. Studies are limited in the SCI due to cumbersome GI testing. The Wireless Motility Capsule (WMC) can be used to assess colon transit time (CTT), pressures, contractility, and dysmotility in SCI.

Methods: Data of 10 SCI patients evaluated with the WMC (SmartPill Corp.) (females =6 and males =4, cervical =3, thoracic=4, lumbar =2, unk=1) was compared to a 52 healthy controls (HC) and 15 slow transit constipation (STC) patients. Opiates were stopped >3 d before WMC testing. CTT (normal <59 h), and contractions, areas under curves (AUC) >25 mmHg/hr were calculated. Motility index (MI) calculated = Ln(sum of amplitude × number of contractions +1). AUC & MI facilitate chronotropic and ionotropic assessments of GI motility.

Results: Prolonged CTT was shown in 6/10 (60%) SCI. CTT was slower in SCI compared HC, less delay compared to STC. Compared to HC and STC, colon pressure parameters in SCI were reduced. MI depicted WMC in SCI collected greater amount of amplitude pressure per contraction compared to HC. WMC in SCI remains static in a retrograde motion during CT compared to a continuous peristaltic pattern illustrated by HC.

Conclusions: Prolonged CTT in SCI patients is comparable to individuals with STC, although SCI shows decreased colon contractility vs normal in STC. Further investigation is warranted to evaluate increased MI in SCI, colon motor impairment in relation to gastric and small bowel dysfunction, symptoms, SCI level and completeness, GI complications.
Poster Board Number: 287

Combination Therapy with Zoledronic Acid and FES-row Training Reduces Bone Loss in the Paralyzed Legs: A Randomized Comparative Clinical Trial

Dr Leslie Morse1, Dr. Karen Troy3, Ying Fang3, Nguyen Nguyen1, Dr. Ricardo Battaglino2, Dr. Richard Goldstein1, Dr. Ross Zafonte4, Dr. J. Andrew Taylor4

1Craig Hospital, 2UC Denver, 3WPI, 4Spaulding Rehabilitation Hospital

Biography:
Dr. Leslie Morse, DO, is the Endowed Medical Director of Research, Craig Hospital and Associate Professor, Department of PMR, University of Colorado.

Her research, as well as her clinical focus, is the care of individuals with SCI, with a long-term goal of developing mechanism-based therapies to prevent and treat SCI-induced osteoporosis. She is studying the effect of robotic-assisted gait-training on bone health. She is also the Co-Project Director of the Rocky Mountain Regional Spinal Injury System. Author of more than 50 publications, she has received several national best-paper awards and presented her work nationally and internationally.

Background: SCI results in rapid, severe osteoporosis and an increased risk of lower extremity fractures. Functional Electrical Stimulation (FES) assisted-rowing is a promising intervention to improve bone health in SCI due to its ability to generate a muscular contraction in conjunction with mechanical loading of the lower extremity long bones. Combination therapy consisting of FES-rowing plus zoledronic acid may prevent bone loss to a greater degree than row-training alone.

Methods: Participants were eligible if they were 18 years of age or older, had motor complete SCI, were not actively using bisphosphonates, and had no current lower extremity fracture. 20 participants were enrolled between August 2011 and February 2014 and completed baseline and end of study testing. Volumetric CT scans at the tibial metaphysis were performed for finite element analysis. Strength and mineral indices were determined.

Results: In male only models adjusting for baseline values, compressive strength index (p=0.004), cortical thickness index (p=0.001), bending strength index (p=0.001), buckling ratio (p=0.001), and cortical bone volume (p=0.001) were greater in the zoledronic acid plus rowing group compared to the rowing only group. There was a significant positive association between total rowing work completed and compressive strength index (p=0.005) and buckling ration (p=0.053). A subgroup analysis of the rowing only arm showed that gains in compressive strength index at the tibial metaphysis varied in a dose-dependent fashion based on the total amount of rowing performed (p=0.009).

Conclusion: Combination therapy with zoledronic acid and FES-row training improves bone quality and bone strength following SCI.
Combined treatment of solifenacin and mirabegron represents an effective treatment for neurogenic detrusor overactivity in patients with multiple sclerosis

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**Biography:**

NO BIO

Objective: Patients suffering from multiple sclerosis (MS) develop up to 60% neurogenic detrusor overactivity (NDO). Aim of the study was to evaluate the effectiveness of solifenacin and mirabegron administration in the treatment of NDO in patients with MS.

Materials /Methods: 36 patients (14 men and 22 women) with MS and NDO, were evaluated. All had received treatment with solifenacin 10 mg daily for three months. Patients were divided in two groups, group A (18 patients), continued receiving solifenacin 10 mg daily for three months and group B (18 patients) receiving solifenacin 10 mg and mirabegron 50 mg. Primary endpoint was the change from baseline to end-of-treatment in mean number of micturition episodes/24h. Secondary endpoints were the changes in mean volume per micturition, urgency episodes, mean number of urinary incontinence and the presence of urinary infection.

Results: Patients in group A did not demonstrate statistically significant changes in 3-day bladder diary. Due to minor adverse effects and low efficacy of treatment four patients were excluded from the study. Treatment in patients of group B resulted in statistically significant improvement in mean change from baseline to end-of-treatment in mean number of micturition episodes (3.7±0.5 micturition/24 h), in urgency episodes (2.0±0.3), mean number of urinary incontinence (1.2±0.4) and a statistically significant increase in mean volume voided per micturition (70±14 ml). In group B both drugs demonstrated good safety and tolerability and only two patients were excluded from the study.

Conclusion: Treatment with solifenacin and mirabegron revealed both effectiveness and safety in patients with NDO and MS.
Comparison of urodynamic parameters following intra-detrusor botulinum toxin injection of two preparations for treatment of neurogenic detrusor over-activity in SCI

Introduction and Objective
Neurogenic detrusor over-activity is a common development following SCI and can lead to high detrusor pressures, reduced capacity and incontinence. Intra-detrusor botulinum toxin injections (BTX) are an effective treatment option. Between 2013 and 2014 we changed preparation of BTX from abobotulinum A (aboBTX) to onabotulinum toxin A (onaBTX). We have reviewed the notes of patients who received consecutive doses of each preparation and analysed the urodynamic parameters. In addition, satisfaction data was collected where available. The data was analysed to determine whether there was a difference between the preparations with respect to urodynamic outcomes or satisfaction.

Methods
The notes of 171 patients receiving aboBTX and onaBTX during 2013-2014 were reviewed. The inclusion criteria included NDO following SCI and a urodynamic report within 9 months of injection of both aboBTX and onaBTX. 36 patients fulfilled these criteria. The maximum cystometric capacity (MCC), maximum detrusor pressure (MDP) and leakage were recorded. Patient satisfaction was also recorded where available. Paired Student’s t-tests were performed to determine whether there was a statistically significant difference in urodynamic parameters between the two BTX preparations. Additional statistical analysis was performed on satisfaction and leakage data.

Results
There were no statistically significant differences in the MCC and MDP measured following aboBTX and onaBTX injections. In addition, there was no significant difference in the subjective satisfaction or leakage data between the two preparations.

Conclusion
There was no significant difference between the urodynamic and subject reported outcome measures for the two intra-detrusor botulinum toxin preparations for NDO.
Poster Board Number: 76

Construct validity of the trunk scale.

Professor Daniel Graves

Professor Daniel Graves

Professor Daniel Graves

Professor Daniel Graves

Professor Daniel Graves

Biography:

Daniel E. Graves, Ph.D. Was the Director of Spinal Cord Injury Research for The Institute for Rehabilitation and Research (TIRR) from 1996 - 2011. He was also the Director of the NeuroRecovery Center at TIRR. Dr. Graves was Principal Investigator of the Texas Model Spinal Cord Injury System (TMSCIS)1996-2011 and PI of the Kentucky Model SCI system from 2011-2016. He has held academic appointment as Associate Professor of Physical Medicine and Rehabilitation, Baylor College of Medicine and Clinical Associate Professor of Neurosurgery at the University of Louisville.

The trunk scale was designed to measure the voluntary control of the thoracic and lumbar musculature following a spinal cord injury. This 13 item scale has high marginal reliability .93. The trunk scale also has very favorable construct validity characteristics. The score on this short test are not influenced by patient factors like gender, ethnicity or by body mass index. The trunk scale also demonstrates a pattern of interrelations with upper and lower extremity motor scores, and sensory scores from the International Standards for Neurological Classification of Spinal Cord Injury that support validity hypotheses. Trunk scores are significantly related to the Lower extremity motor score ( 0.667 p > .05), but not strongly related to the upper extremity motor score ( -0.011, p < .05). Likewise the trunk scores are significantly related to both light touch ( 0.301, p > .05) and pin prick ( p = .300, p > .05) sensory scores. Two items, siting balance and standing balance the trunk scale were too difficult for the calibration sample to perform and the items could not be calibrated properly. These items will remain on the test as they will provide room on the scale for person’s higher functional ability. The trunk scale is ready to be tested in a sample of persons with SCI. The implications for future development and the utility of the trunk scale will be discussed.
Contextualizing Quality of Life: Do Community Features Contribute to Emotional Well-Being after Spinal Cord Injury?

Dr Amanda Botticello  
*Kessler Foundation

**Biography:**
Amanda Botticello, PhD, MPH is a Senior Research Scientist in the Spinal Cord Injury Research and Outcomes and Assessment Research Departments at Kessler Foundation and an Associate Research Professor in the Department of Physical Medicine and Rehabilitation at Rutgers New Jersey Medical School (NJMS). She has over 15 years of experience in conducting survey research, designing quantitative and qualitative research studies, and applying advanced biostatics to the analysis of large datasets. The substantive focus of her research is advancing the science of the social determinants of health, health disparities research, and understanding geographic variation in disability.

**Introduction:**
Research shows that persons with SCI living in places that are socioeconomically disadvantaged report more restricted activity and poorer health whereas those living in communities with more resources and natural features report better participation and health. The objective of this study was to understand the specific relationship between communities and emotional QOL after SCI.

**Methods:**
This investigation used cross-sectional data collected in 2009-2010 for the Spinal Cord Injury-Quality of Life (SCI-QOL) measurement system. Of the 494 adults with traumatic SCI living in the community during the SCI-QOL study, 440 (89%) were successfully matched to geographic data. Emotional QOL domains included negative (depression, anxiety, trauma, and loss) and positive (resilience, self-esteem, and well-being) affect. Communities were operationalized using Census tracts and 5-mile buffer areas around residential areas. Community predictors included socioeconomic advantage (SES), the proportion of natural and park space, and counts of local destinations. Linear regression models were stratified by community type (rural versus urban) and adjusted for sociodemographic and injury-related characteristics.

**Results:**
Living in higher SES communities with more natural and recreational space was associated with significantly decreased levels of positive affect whereas living in areas with a large number of destinations was related to increased resilience, self-esteem, and well-being only among persons living in urban areas. No associations were observed between characteristics and negative affect among persons living in either urban or rural areas.

**Conclusions:**
These findings suggest that positive emotional QOL of persons with SCI living in urban areas is sensitive to the opportunity for involvement.
Objective: To observe continuous cardiovascular responses during video urodynamic studies (VUD) and to identify correlations between events of autonomic dysreflexia (AD) and video urodynamic study findings in patients with spinal cord injury (SCI) above T6.

Methods and methods: Thirty-four with SCI above T6 were enrolled, and parameters of continuous cardiovascular monitoring were recorded ‘beat to beat’ using Finometer ProTM during VUD. Associations between cardiovascular responses and variables of VUD were analyzed.

Results: Incidence of overactive detrusor during UD and trabeculation on voiding cystourethrogram were significantly higher in the AD group than in the no AD group (p<0.05). Changes of systolic blood pressure showed moderate negative correlation (\( r = -0.402, p = 0.020 \)) with bladder compliance and high positive correlation (\( r = 0.810, p = 0.000 \)) with maximum detrusor pressure. However, there was no significant difference between clinical findings: neurological level of injury, completeness of injury, symptoms of AD, and voiding type. There was an initial rise in systolic blood pressure over 20 mmHg at 241 ± 126 ml in the overactive detrusors and 442 ± 123 ml in the underactive detrusors. Significant bradycardia or tachycardia correlating with AD during UD was not observed.

Conclusion: Continuous cardiovascular monitoring detected bladder type-specific cardiovascular responses during VUD in patients with SCI above T6. There was no correlation between presenting clinical symptoms related with AD and the rise in systolic blood pressure. Continuous monitoring of cardiovascular responses during UD is recommended to prevent unpredictable or undetectable cardiovascular reactions in patients with SCI above T6.
Correlation of renal function test methods to skeletal muscle mass in spinal cord injury patients

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Objective
To study the correlation of skeletal muscle mass with eGFR acquired from serum creatinine, creatinine clearance from 24-hr urine collection, and Serum Cystatin C(CysC) which is not influenced by skeletal muscle mass.

Method
112 spinal cord injury(SCI) patients were grouped into Complete SCI group(N=39) and Incomplete SCI group(N=73) and both groups conducted body composition analysis to obtain skeletal muscle mass(SMM). The groups were further divided into group within normal range (90-110%) of standard body weight, group within 80-90% of normal range, and group less than 80% of normal range. Each group was studied of correlation of eGFRCysC uninfluenced by muscle mass to 24hrs creatinine clearance and eGFR.

Result
eGFRCysC and 24hrs creatinine clearance showed significant correlation in all groups, showing the highest Pearson correlation level in SMM group of normal range (90-110%) with p-value<0.01 which was the most significant. When comparing Complete SCI and Incomplete SCI group, Incomplete SCI group showed higher Pearson correlation than Complete SCI group.
When studying deviation 24hrs creatinine clearance of each group with eGFRCysC, the group with within normal range (90-110%) of SMM (N=56) included 43% of patients within range of ±30% and group less than 80% of normal SMM range (N=22) included 32% of patients with range of ±30%.

Conclusion
In study measuring renal function in patients with SCI, eGFR deduced from serum creatinine has low precision and eGFRCysC attained from serum Cystatin C and 24-hr creatinine clearance can be very advantageous.
Defining Traumatic Spinal Cord Injury: The Stability of ASIA Impairment Scale vs The Frankel Scale

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\textsuperscript{1}Kessler Institute For Rehabilitation, \textsuperscript{2}Rutgers-NJ Medical School

Introduction:
Before 1992 traumatic Spinal Cord Injury (SCI) was clinically classified using the Frankel Scale. Our objective is to investigate if the sacral sparing definition is a more stable definition when classifying traumatic SCI than the previously used Frankel Classification.

Study Subjects: Neurological data from the national Spinal Cord Injury Model Systems (SCIMS) database, age $\geq$16 years, with AIS grades A-D traumatic SCI with admission to inpatient rehabilitation.

Methods:
Design: Retrospective analysis of data from the US-SCIMS database from 01/2011 to 2/2015. Participants: Individuals (N=388) with traumatic SCI with admission to inpatient rehabilitation within 30 days of injury with follow-up at 1 year post-injury.

Results:
Patients classified as Frankel A at admission, 64.81% remained Frankel A versus AIS A, 74.23% remained AIS A at 1 year. Patients classified as Frankel B at admission, 13.19% regressed to Frankel A, 35.64% of Frankel C regressed, and 75.01% of Frankel D regressed at 1 year. Patients classified as AIS B at admission, 13.33% regressed to AIS A and 8.64% of AIS C regressed at 1 year.

Conclusions:
To our knowledge this is the first study to replicate the work by Waters in 1991 to validate the stability of the sacral sparing definition for complete and incomplete traumatic SCI. Our data demonstrates not only less change but less regression in neurologic status comparing admission to 1 year in the AIS group to the Frankel group. Further study is needed.
Design of a double-blind controlled trial on the effect of probiotics on diarrhea in spinal cord injury patients with antibiotics

Drs Willemijn Faber¹, dr Maaike Eken¹, drs Wendy Achterberg², dr Karen Koning³, dr Janneke Nachtegaal¹

¹Rehabilitation Centre Heliomare, ²Rehabilitation Centre Reade, ³Winclove

Biography:
Willemijn Faber works as a physiatrist at the Spinal Cord Injury ward at Rehabilitation Centre Heliomare in the Netherlands. Furthermore she is vice president of the Dutch Flemisch Spinal Cord Society and council member of ISCoS.

Introduction: Neurogenic bowel dysfunction is one of the secondary consequences of spinal cord injury (SCI) that patients experience as most troublesome. Additionally, patients after SCI frequently receive antibiotic treatment for infections of the pulmonary tract, urinary tract or others. These patients are at high risk of developing antibiotic related bowel problems, such as diarrhea. Probiotics have clearly shown to reduce antibiotic-associated diarrhea (AAD). Though, studies investigating the effect in SCI patients are lacking.

Purpose: To investigate whether the use of probiotics can decrease AAD and positively influence bowel management of patients with SCI treated with antibiotics.

Design: Double-blind randomized placebo-controlled trial at 2 rehabilitation centers.

Intervention: Ecologic® AAD (1x10¹⁰ cfu)

Patients: 56 patients with SCI, aged between 18-75 years old, who are admitted for an inpatient rehabilitation period will be invited to participate in the study.

Methods: In case an infection occurs, and antibiotic treatment is necessary, as usual care, it will be accompanied by probiotics or placebo, randomly assigned (T0). After cessation of the antibiotic treatment of 5-10 days (T1), the patients use probiotics/placebo for three more weeks (T2). Defecation patterns, by using de Bristol Stool Scale (BBS) and bowel management are monitored daily until two weeks after stopping probiotics/placebo (T3). Quality of life, nausea and walking ability are collected at T0, T1, T2 and T3.

Main outcome measures: incidence of AAD, measured by the Bristol Stool Scale.
Poster Board Number: 172

Determinants for health-related seating problems in persons with spinal cord injury

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Biography:
Dr. Linda Valent finished her PhD (HMS) on The effects of hand cycling in persons with SCI in 2009. Current topics of research in Heliomare: HandbikeBattle/hand cycling and Sitting/wheelchair. She is also working as an O.T. on the SCI-ward and on the Seating Advisory Team. She is member of the Dutch SCI-seating expert group (ZZZ) and of the Dutch SCI Research Group (Nederlands-Vlaams Dwarslaesie Genootschap).

Introduction: Pain, fatigue, pressure ulcers (PU) and instability are frequently reported seating problems in persons with spinal cord injury (SCI). Objective: To study the association between personal, lesion and wheelchair characteristics with experienced seating-related problems: pain, fatigue, recent PU and instability during sitting and reaching.

Method: Cross-sectional study in 264 wheelchair users ≥10 years after SCI. Multiple logistic regression analyses between seating-related problems and personal (age, gender, waist circumference (WC)), lesion (time since injury, lesion level (tetraplegia (TP=1) vs paraplegia (PP=0)), completeness (AIS: AB=1 vs CD=0)) and wheelchair determinants (reported Lack Of Support in the wheelchair (LOS: yes=1 vs no=0) and Less Attention Paid to Seating (fitting) (LAPS: yes=1 vs no=0)). First, univariate logistic regression analyses were conducted to find significant determinants for the multivariate analyses (p ≤0.10).

Results: Significant determinants for pain were LOS (OR=3.5, 95%-CI=1.6–7.8) and LAPS (OR=2.6, 95%-CI=1.3–5.2). Age, WC and LOS were significantly associated with fatigue with ORs of 1.04 (95%-CI=1.00–1.07), 0.97 (95%-CI=0.94–0.99) and 3.8 (95%-CI=1.8–8.1), respectively. Completeness (OR=6.9, 95%-CI=20–23.6) and LOS (OR=2.3, 95%-CI=1.1–4.6) were significantly related to PU. People with LOS reported significantly more instability in sitting (OR=3.0, 95%-CI=1.4–6.2) and with AIS AB reported less instability compared to AIS CD (OR=0.35, 95%-C.I.: 0.17–0.72). Finally, lesion level and LOS were significant determinants for instability in reaching (OR=3.0, 95%-CI=1.6–5.5; OR=2.7, 95%-CI=1.4–5.6).

Conclusions: Reported lack of support in the wheelchair has a clear association with pain, fatigue, PU and instability. This suggests that an adequate wheelchair-user-fitting may contribute to prevention of aforementioned problems.
Developing an Online Pressure Injury Toolkit to Support Best-practice in the Community

**Professor James Middleton**¹²³, Ms Elizabeth Dallaway¹², Ms Lyndall Katte⁴, Ms Frances Monypenny⁵

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**Biography:**

Professor Middleton is a Consultant Physician in Rehabilitation Medicine with 25 years of clinical and research experience in the field of spinal cord injury (SCI) medicine and rehabilitation. James is Director of the ‘NSW State Spinal Cord Injury Service and also holds an academic appointment at the John Walsh Centre for Rehabilitation Research, The University of Sydney. Blending continuing clinical and management roles with his academic position affords James a unique opportunity to translate research evidence into improved rehabilitation practice, service planning, delivery and innovation, as well as enhanced health, functioning and quality of life outcomes for people with SCI.

**Introduction**

Providing timely and appropriate care and support for people with spinal cord injury (SCI) and pressure injury (PI) in the community is challenging due to fragmented care, complexity, lack of SCI-specific knowledge and expertise, limited resources and training. An online toolkit and clinical pathway were developed to bring international best-practice guidelines to the 'bed side' suitable for the Australian context.

**Methods**

The first online toolkit version was co-designed and then evaluated by a state-wide multidisciplinary group of ‘clinical champions’, including community and general hospital-based nurses, wound consultants, occupational therapists (OTs) and rehabilitation physician, and spinal plastics team clinical nurse consultants, OTs, dietitians, social worker and seating therapist. Survey questions were based on the Technology Acceptance Model to determine the perceived usefulness (PU) and ease-of-use (PEU) of online resource.

**Results**

Responses (n=16) rated PU high (i.e. >50% of respondents scored 5/5) for toolkit sections: PI risk screening; comprehensive assessment; red and yellow flags; validated wound assessment tool; bed support surfaces; psychosocial assessment; (consumer) self-management. Respondents reported that the toolkit supported multidisciplinary assessment, facilitated clinical decision-making and was most useful to share with colleagues, new staff and students. PEU was rated low by one user (non-SCI rehabilitation physician), and in general, rated low for ease of navigation and flow of content.

**Conclusions**

Based on feedback, toolkit design improvements included: (i) a ‘quick guide to first assessment and initial management’ (ii) consistent navigation titles and better organisation of content with a clear hierarchy of information categories and (iii) a clinician’s checklist.
Introduction: People with SCI need to perform self-care to maintain the stability of their condition and avoid complications. Self-care was defined as the process of maintaining the stability of one’s own condition (self-care maintenance), monitoring signs and symptoms that can precede the complications (self-care monitoring) and managing the complications at their origin (self-care management). Self-care is influenced by self-efficacy in the task-specific self-care maintenance, monitoring and management behaviors (self-care confidence). Although its key role in their lives, no instrument exists in the literature to measure the self-care behaviors in SCI. Aim of this study was to develop a psychometrically sound instrument to measure self-care in people with SCI.

Methods: A methodological study. The process of the instrument development started with a systematic integrative review and a qualitative descriptive study conducted in 2016. After that, a preliminary item pool was developed, discussed and refined through a consensus conference realized in January 2017. Participants of the consensus conference were 10 expert patients and healthcare professionals with a several years’ experience in SCI.

Results: A preliminary version of Self-Care in Spinal Cord Injuries Index (SCSCII) was developed. The SCSCII consists of 75 items divided in the four dimensions of self-care maintenance, monitoring, management, and confidence

Conclusion: The process of validity and reliability testing of the SCSCII is still in progress and data collection will start soon. The SCSCII has the potential to become a psychometrically sound instrument that can be used in clinical practice and research to measure self-care in people with SCI.
Development and implementation of clinical care pathways for patients with spinal cord injury in inpatient rehabilitation in the Netherlands

PT, PhD Sacha AHB Van Langeveld¹, Professor Marcel Post¹,²,³, MD, PhD Janneke M Stolwijk-Swuste¹
¹De Hoogstraat Rehabilitation, Spinal Cord Injury department, ²Center of excellence in Rehabilitation Medicine, De Hoogstraat rehabilitation, ³University of Groningen

Biography:
Sacha AHB van Langeveld is physical therapist and has been working as a PT for 27 years in De Hoogstraat rehabilitation at the spinal cord injury department. Sacha received her PhD in 2010. In her PhD she developed the SCI-ICS: the spinal cord injury-interventions classification system, an international tool to document interventions of PT, OT and sports therapists. Currently Sacha is involved in the development and implementation of clinical care pathways with the goal to monitor and improve content of care for spinal cord injury, traumatic and non-traumatic brain injury and for amputation.

Introduction:
In 2015 we developed four clinical pathways with the goal to improve the process of care for inpatients with SCI in rehabilitation centre De Hoogstraat. Each pathway consists of a basic therapy program with the right amount and timing of therapy to enable patients to achieve their rehabilitation goals within a certain timeframe.

Objectives:
To describe the clinical pathways for patients with SCI and patient’s and therapist’s experiences with these pathways.

Methods:
We followed the 7-phase development and implementation model of the Network Clinical Pathways (NKP.be). Contents of individual and group treatments of all disciplines were described and allocated to distinct phases of inpatient rehabilitation. The duration of admission and treatment costs per pathway were calculated. Questionnaires on satisfaction with the rehabilitation program were administered to patients and therapists.

Results:
In 2016 all patients at the SCI unit (n=142) were allocated to one of the four clinical pathways on admission. The pathways “hands not affected”, “hands affected”, “no hand function” and “post-surgery pressure ulcer” accounted for 46.5%, 30.3%, 6.3% and 16.9% of the patients, respectively. Patients (n=41) and therapists (n=30) expressed overall very positive experiences regarding the pathways.

Conclusions:
First results show the developed clinical pathways are a good basis for a rehabilitation program for patients with SCI. Ongoing analysis of data and findings from questionnaires for patients and therapists on the contents and organization of the pathways will allow further structured improvement.
Development of the clinical decision support tool: “Monitoring Efficacy of Neurogenic bowel Treatment On Response (MENTOR)”

**Dr Anton Emmanuel**¹, Dr Klaus Krogh², Mr Peter Christensen³, Dr Stephen Kirshblum⁴, Mr Dietrich Leder⁵, Dr Hans van Kuppevelt⁶, Mr Michele Spinelli⁷, Mr Paul Skaife⁸

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**Biography:**
Neurogastroenterologist at UCLH, London SCI Centre (Stanmore) and National Hospital for Neurology & Neurosurgery (Queen Square); academic at UCL.

**Introduction:**
Management of neurogenic bowel dysfunction (NBD) is not systematically undertaken even though there is a proposed care pathway. This may relate to a lack of a simple monitoring and guidance protocol for determining when treatment is inadequate. A clinical decision support tool MENTOR (Monitoring Efficacy of Neurogenic bowel Treatment On Response) has been developed based on objective bowel score measures and patients’ subjective perception.

**Methods:**
An initial international expert survey was conducted to identify current practice. A modified Delphi methodology, facilitated by a certified process-facilitator, was used to develop the tool. An expert panel (the authors) participated in a 3-month online forum, discussing the responses of the initial survey, culminating in a virtual meeting where a framework was developed. Three iterative surveys were conducted among the expert panel to simplify the consensus agreements. The results were presented and discussed in a face-to-face meeting, recognising the primacy of symptoms to patients, and medical complications to clinicians. The group also reached unanimous consensus on a recommended decision cycle to optimise when to apply the support tool.

**Results:**
Of 76 experts invited, 35 (46%) participated. The final instrument is shown, comprising a composite between patient self-reported satisfaction and objective Neurogenic Bowel Dysfunction Score. Consensus was for monitoring every 3-6 months until a stable state was achieved, and annually thereafter unless a new treatment was needed.

**Conclusion:**
A modified Delphi process allied to expert consensus was an effective way of developing a tool to support clinical decision in this specialist patient group.
Poster Board Number: 130

Diaphragm Pacing in Spinal Cord Injury Patients: Long-term follow up from the Initial FDA Trial Proves Durability

Dr Raymond Onders, MaryJo Elmo, Cindy Kaplan

University Hospitals Case Medical Center

Biography:
Raymond P. Onders MD is Professor of Surgery at Case Western Reserve University School of Medicine and Chief of Surgery at University Hospitals Cleveland Medical Center. Over the last 20 years, he has focused his research efforts on ways to help people with spinal cord injuries and other patients breathe naturally using their own diaphragm. One of his first research subjects was the late Christopher Reeve (Superman). He has authored over 100 publications and book chapters on these subjects. He focuses now on using diaphragm pacing to shorten mechanical ventilation on all intensive care unit patients.

Objective: Long term analysis of ventilator dependent spinal cord injured (SCI) patients who were implanted with diaphragm pacing (DP).

Design/Method: Prospective analysis of clinical trial patients implanted with DP system under the FDA approved protocol. All patients underwent laparoscopic diaphragm motor point mapping with electrode implantation and subsequent diaphragm conditioning and ventilator weaning.

Results: Between March 2000 and March 2008, 41(32 males) SCI patients were implanted. All patients were dependent on tracheostomy mechanical ventilation. Injuries were a result of MVA(17), sports(16) and other(8). The average age at time of injury was 22 years (2-70) and average age at implant was 30.9 (18-74). Time from injury to implant averaged 4.9 years (0.3 – 25 years). All patients achieved 4 hours of continuous pacing without the ventilator, the primary end point of the trial. 63% (26) used DP 24 hours a day continuously. 32% (13) use DP at least 10 consecutive hours daily. There have been 17 deaths but none from pneumonia. 21 patients continue to use DP as primary mode of ventilation. Two patients had electrodes removed after recovery of volitional breathing. There is total of 323 years of DP use with an average use of 8 years (up to 14 years). Five patients required system replacement all done as out-patient procedures: infected wires(1), non-functional single internal electrode(2), replacement of obsolete internal connector system (2).

Conclusion: The DP system has proven to be durable and, in this patient population, eliminated pneumonia as the leading impact on the reduction in life expectancy.
Diaphragm Rehabilitation through Diaphragm Pacing—Not just for Ventilator Dependent Traumatic Tetraplegics

Dr Raymond Onders¹, MaryJo Elmo¹, Cindy Kaplan¹
¹University Hospitals Case Medical Center

Biography:
Raymond P. Onders MD is Professor of Surgery at Case Western Reserve University School of Medicine and Chief of Surgery at University Hospitals Cleveland Medical Center. Over the last 20 years, he has focused his research efforts on ways to help people with spinal cord injuries and other patients breathe naturally using their own diaphragm. One of his first research subjects was the late Christopher Reeve (Superman). He has authored over 100 publications and book chapters on these subjects. He focuses now on using diaphragm pacing to shorten mechanical ventilation on all intensive care unit patients.

Background: Diaphragm pacing (DP) has been shown to replace mechanical ventilation in spinal cord injury (SCI). Instability of respiratory drive and apneas leads to disuse diaphragm atrophy in many non-ventilator dependent SCI patients. DP, which is functional electrical stimulation, can be therapeutic.

Design/Methods: A retrospective review of prospective databases under 13 separate IRB and/or FDA trials at a single site to identify patients with non-traumatic spinal cord or brain stem problems with chronic hypoventilation. Patients had diaphragm neurophysiologic testing with the final direct intra-operative diaphragm stimulation.

Results: 21 of 470 implanted patients met inclusion criteria. The average age was 45.7 years. Ten were dependent on invasive ventilation, 3 used non-invasive ventilation, 4 were hypercarbic, 3 used oxygen and 1 was intolerant to NIV. Time with respiratory dysfunction ranged from 1 to 134 months with an average of 26.3 months. All patients at surgery had stimulable diaphragms and no peri-operative problems. Positive diaphragm improvement and ventilation was seen in 86% (18/21). Two spinal cord abscess patients had infection recurrence with new infarction and no benefit. Six patients became ventilator free. Long term analysis of diaphragm electromyography (dEMG) on 8 patients confirmed positive respiratory neuroplasticity with both automatic and volitional improved burst activity.

Conclusions: Various insults to the spinal column causing diaphragm weakness can have delayed symptom onset. This review shows DP can be used to rehabilitate the diaphragm. DP through respiratory neuroplasticity can improve respiratory control. Patients with acute spinal cord abscess should be infection free prior to DP.
Does additional urine cytology improve detection of bladder tumors in patients with neurogenic lower urinary tract dysfunction?

Professor Jürgen Pannek¹, Mrs Franziska Rademacher¹, Dr. Jens Wöllner¹

¹Schweizer Paraplegiker Zentrum

Biography:
NO BIO

Objectives: To investigate the clinical usefulness of a combination of cystoscopy and urine cytology for bladder cancer screening in patients with chronic neurogenic lower urinary tract dysfunction (NLUTD).

Materials and methods: By a systematic chart review, we identified all patients that underwent combined cystoscopy and urine cytology testing. In patients with no suspicious cells in cytology and inconspicuous cystoscopy, no further diagnostic procedures were performed. In patients with suspicious findings either by cytology or by cystoscopy, a transurethral resection was performed.

Results: 79 patients (age 54.8±14.3 years, 38 female, 41 male) were identified, using indwelling catheters in 44 patients (55.7%), intermittent catheterization in 18 patients (22.8%), and reflex voiding in 17 patients (21.5%). In 25 cases, cystoscopy revealed suspicious findings. In 17 patients, suspicious cells were detected by urine cytology. At histologic examination, no tumor was found in 15 patients, bladder cancer (superficial (n=2), or muscle invasive (n=3) urothelial cancer, muscle-invasive squamous cell carcinoma (n=1)) was found in six patients. Sensitivity of cytology and cystoscopy was both 83.3%, specificity was 43.7% for cytology, and 31.2% for cystoscopy, respectively. One patient with a bladder tumor was missed by cytology, three tumors were missed by cystoscopy. If a biopsy was taken only if both the cytologic and cystoscopic findings were suspicious, four patients would have spared the procedure, and one tumor would not have been diagnosed.

Conclusion: A combination of cystoscopy and urine cytology can improve bladder tumor detection rates and lower the number of unnecessary biopsies
Dutch guidelines for Rehabilitation of Spinal Cord Injury.

Professor Marcel Post, **CF van Koppenhagen**, I van Nes

Objective
The purpose of the guideline was to provide recommendations for the experienced bottlenecks in daily rehabilitation practice of persons with spinal cord injury. Furthermore, to achieve more uniform and better coordinated care in the Netherlands. The recommendations are based on a careful weighing of the latest scientific findings, expert opinion and patient preferences. The guidelines support healthcare professionals in their clinical decision-making and provides transparency for patients and others.

Method
The guidelines were composed according to the Appraisal of Guidelines for Research & Evaluation II. The Dutch Flemish Spinal cord injury started an inquiry among their members at all bottlenecks in daily practice of spinal cord injury rehabilitation. This inquiry was followed by an inventational conference with participants from all stakeholders (rehabilitation physicians, insurance companies, patients, neurologists, intensivists, physiotherapists, occupational therapists etc). A working group was formed and the most mentioned bottlenecks were clustered and elaborated into hypotheses. These hypotheses were studied, analysed, comprehended and recommendations were formulated.

Results
We will present 8 subtopics of the guidelines at a glance: pressure sores, deep venous thrombosis, neuropathic pain, life time care, fertility, sexuality, pneumonia, energy expenditure, mood and care of the elderly.

Conclusions
Guidelines in Rehabilitation of Spinal cord in injury will improve quality of daily care in patients.
Early Access to Vocational Rehabilitation: Development, implementation and evaluation of a Novel In-patient Service (the “In-Voc” program)

Professor James Middleton1,2,3, Ms Deborah Johnston2,3, Professor Gregory Murphy4, Dr Kumaran Ramakrishnan2,3, Professor Ian Cameron2,3

1State SCI Service, NSW Agency for Clinical Innovation, 2John Walsh Centre for Rehabilitation Research, Kolling Institute, Northern Sydney Local Health District, 3Sydney Medical School Northern, The University of Sydney, 4School of Public Health, Latrobe University

Biography:
Professor Middleton is a Consultant Physician in Rehabilitation Medicine with 25 years of clinical and research experience in the field of spinal cord injury (SCI) medicine and rehabilitation. James is Director of the NSW State Spinal Cord Injury Service and also holds an academic appointment at the John Walsh Centre for Rehabilitation Research, The University of Sydney. Blending continuing clinical and management roles with his academic position affords James a unique opportunity to translate research evidence into improved rehabilitation practice, service planning, delivery and innovation, as well as enhanced health, functioning and quality of life outcomes for people with SCI.

Introduction:
Following spinal cord injury (SCI), individuals rate work participation and economic self-sufficiency as a high priority for improved health and well-being. However, return to work (RTW) rates after SCI are generally poor (35%). Inpatient SCI care focuses predominantly on physical rehabilitation, offering little opportunity for hospital clinicians to consider vocational issues. This study investigates outcomes of the “InVoc” program, provided by trained vocational coordinators (VCs) to fill this gap.

Methods:
InVoc was offered to all eligible patients admitted to three SCI units in Sydney, Australia over a two-year period. Following informed consent, demographic, injury-related, psychosocial and RTW data were collected at baseline (program inception), 12 and 24 months post-injury. In addition, semi-structured interviews and focus group discussions were conducted with participants with SCI, 4 VCs and health professionals, exploring perceptions about InVoc.

Results:
One-hundred inpatients (mean age 36 ±15 years, 82% male, 87% previously employed) were evaluated. Time to In-Voc inception was 61 days (median), with almost one-third commencing InVoc within the first month post-injury. The program lasted 11 weeks (median, range 3–39 weeks), delivering 9.1 hours (median, range 1–75.2hrs) of services per participant. At 12 and 24 months, RTW rates were 41% and 58%, respectively. Most technician/trade, sales, machine operator and labourer type jobs were lost at 24 months post-injury, in contrast to professional and managerial occupations, with more people working in clerical/administrative jobs.

Conclusion:
The integration of early, patient-centred and paced vocational rehabilitation by VCs working within the in-hospital multidisciplinary rehabilitation team contributed to positive RTW outcomes.
Early results of nerve transfers on a tetraplegic patient in Pretoria South Africa

Mrs Melanie Skeen, Dr Francois De Villiers Theron, Erich Mennen, Mrs Arlene Damons, Mrs Katherine Labuschagne

1Rita Henn & Ass, Summit Rehab, 2University of Pretoria, 3Muelmed rehabilitation centre, 4Tshwane Rehabilitation Centre

Biography:
No Bio

A review of the tetraplegic patient where nerve transfers were performed in our Spinal unit in 2015. The surgical technique involved transferring branches from the Auxillary nerve to the medial branch of the tricep nerve as well as transferring the Supinator nerve to the posterior interosseos nerve. The main aim of surgery was to reestablish elbow extension and finger extension. Procedures to reestablish finger flexion was considered but not performed due to rehabilitation goals that will be discussed. The functional outcomes at 13 month show excellent returns in both elbow and finger extension. Pre-operative and current muscle charts show significant improvement (more than a grade 3) Functional implications of this outcome as well as future plans to improve upper limb function in tetraplegics will be discussed.
Poster Board Number: 122

Effect of classical homeopathy on recurrent urinary tract infections in individuals with chronic neurogenic lower urinary tract dysfunction

Professor Jürgen Pannek¹, Mrs Susanne Pannek-Rademacher², Dr. Mohinder Jus², Dr Jens Wöllner¹, Dr. Jörg Krebs¹

¹Schweizer Paraplegiker Zentrum, ²SHi Homeopathic College

Biography:
NO BIO

Objective: To investigate the usefulness of classical homeopathy for the prevention of recurrent symptomatic urinary tract infections (UTI) in patients chronic neurogenic lower urinary tract dysfunction (NLUTD) due to spinal cord injury (SCI).

Materials and methods: patients with NLUTD due to chronic (> 1 year) SCI and at least three UTI/year were included in a prospective, controlled study. Participants were treated either with a standardized prophylaxis alone or in combination with homeopathy. Bladder management remained unaltered. The number of UTI, specific quality of life (QoL) (Kings Health questionnaire; KHQ), general QoL (EQ-5D), and satisfaction with the treatment were assessed prospectively for one year and compared to baseline data as well as between the two groups.

Results: Ten patients were in the control group; 25 patients received adjuncive homeopathic treatment. The median number of self-reported UTI in the homeopathy group decreased significantly, whereas it remained unchanged in the control group. The domain incontinence impact of the KHQ improved significantly (p=0.035), whereas the general QoL did not change. The satisfaction with homeopathic care was high.

Conclusion: Adjunctive homeopathic treatment lead to a significant decrease of UTI in SCI patients. Satisfaction with treatment was high. Therefore, classical homeopathy could be considered for UTI prophylaxis in SCI patients with recurrent UTI
Effect of Diaphragmatic Breathing Techniques on Perceived Exertion and Cardiovascular Variables During Resistance Exercises Performed by Tetraplegic Rugby Athletes

Miss Sonal Khurana¹, Mr. Piyush Singh², Ms. Shaily Razdan³

¹Indian Spinal Injuries Centre, ²Indian Spinal Injuries Centre, ³Amity Physiotherapy College

Biography:
Sonal Khurana is working as senior physiotherapist and assistive technology analyst at Indian Spinal Injuries. She has awarded gold medal for academic excellence.

She is also performing role of medical record auditor, manual handling trainer and fly-care project trainer for indigo airlines officials. Additionally, she has been appointed as faculty for special education foundation course with rehabilitation council of India and paramati care.

She has been continuously involved in various researches and contributed in International journals.

Also certified as alternative medicine therapist and WHO Wheelchair Service Trainer. She is also member of international Societies such as ISWP, IAP and DCPTOT.

People with tetraplegia tend to have sedentary lifestyle which prevents optimal participation in work and recreational activities. Thus, the aim of the present study is to determine the effect of the use of diaphragmatic breathing techniques on perceived exertion and cardiovascular variables during resistance exercises performed by tetraplegic rugby athletes who use wheelchairs as their primary mode of mobility.

Forty tetraplegic rugby athletes with incomplete C5-C8 spinal cord injury were selected randomly to participate in the present study, and were assigned to one of two equal groups: 1) experimental group that was taught to perform resistance exercises without any breathing instruction followed by sessions including different breathing techniques, and 2) control group. Perceived exertion, blood pressure and heart rate were measured prior to and following each resistance exercises session.

The data indicates that performing resistance exercises without any breathing instruction induced highest cardiovascular and perceived exertion responses in both groups. Exhalation during the concentric phase of exercise was associated with elevations in all responses as compared to inhalation during the concentric phase of exercise which resulted in significant reduction of all responses.

These results suggest that coupling inhalation or exhalation with the concentric phase of lift of resistance exercises produces similar blood pressure responses, while the inhalation technique specifically reduces heart rate and perceived exertion. Thus, inhalation technique is recommended for its sustained effects on all studied variables.
Effect of FES cycling adjunctive to conventional physiotherapy on mobility outcomes in motor incomplete tetraplegia: A twelve month retrospective analysis

Mr Tom Meredith¹, Mr John Lynch¹
¹National Rehabilitation Hospital

Biography:
NO BIO

Introduction
Functional Electrical Stimulation (FES) cycling has been postulated to optimise lower limb muscle torques, mass, strength, and composition, in patients with motor incomplete SCI. The aim of the present study is to explore its effect on mobility outcomes in patients within this population.

Method
Data were analysed from a sample of patients with SCI related motor incomplete tetraplegia, who were discharged from a specialist rehabilitation facility in the calendar year 2016. Patients were included if they were diagnosed AIS C/D, and were mobile for a minimum of 10 metres at discharge. Primary outcomes were walking speed, balance, and functional walking ability (WISCI). Mixed between-within ANOVAs were performed comparing patients receiving FES cycling therapy alongside conventional physiotherapy (FES), and those receiving conventional physiotherapy only (PT) to determine the effect of additional FES cycling on these outcomes.

Results
Data from 29 patients (23m/6f) were analysed (Mean Age = 51.87±14.97). Of these, 12 were included in the FES group. All patients’ mobility outcomes improved significantly pre- and post-intervention. No significant differences were found between groups for effect of additional FES cycling on mobility outcomes, though trendlines suggest a greater increases in balance and walking speed measurements in the FES group.

Discussion and conclusions
No significant differences were found between groups for effect of additional FES cycling on mobility outcomes, though non-significant increases in balance and walking speed measurements were noted for patients in the FES group. Analysis over a longer period, with greater sample sizes, may display greater significance in these improvements.
Poster Board Number: 242

Effect of low dose Tamsulosin on Autonomic dysreflexia (AD) in spinal cord injury patients (above T6)

Mrs Rebecca Phillip¹, Dr Harvinder Singh Chhabra¹, Ms Neetu Maitra¹, Mrs Rajesh Sharawat¹, Mr Jitender Kumar¹

¹Indian Spinal Injuries Centre

Biography:
no bio

Introduction: Autonomic dysreflexia (AD) is a common and potentially life threatening complication to spinal cord injury (SCI) at or above the sixth spinal cord thoracic segment (T6) which comprises of headache, feeling of anxiety, bradycardia, cardiac arrhythmias, profuse sweating above the level of injury, etc. Common causes relate to bowel, bladder, bed sores, ingrown nails, spasticity.

Aim: The aim of the present study was to describe and compare autonomic responses with use of Tamsulosin in SCI patients.

Method: Patients diagnosed with AD were divided among 2 groups (10 each, control and interventional). Both the groups were given standard of care, additionally, the interventional group was given 0.2mg of Tamsulosin once daily for 50 days.

Results: All patients were C5-C6 level complete (AIS-A), adult males post 12 weeks of injury. In control group 8 patients had 5 episodes of AD where delayed urinary catheterization and bowel manipulation were noted to be leading cause predisposing to AD. In the second group none of the patient developed an episode of AD.

Conclusion: Tamsulosin was found to be effective in Autonomic dysreflexia. Of special relevance to the present study, it’s administration may be attempted in patients with AD. Knowledge about AD and treatment thereof is important to doctors and staff introducing patients to treatment of neurogenic bowel/bladder disorders are needed and patient education and awareness is helpful.
Effect of short duration exoskeleton training programme on blood pressure and arterial stiffness in patients with spinal cord injury

Miss Kirsty Luard\textsuperscript{1}, Mr Louis Martinelli\textsuperscript{1}, Mrs Helen Hobbs\textsuperscript{1}, Ms Helen Ryan-Stewart\textsuperscript{2}, Mr Lee Stoner\textsuperscript{3}, Ms Danielle Lambrick\textsuperscript{4}, Mr James Faulkner\textsuperscript{2}

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\textbf{Biography:}
No Bio

Introduction: Individuals with spinal cord injury (SCI) have an elevated cardiovascular disease risk compared to ambulatory counterparts due to physical inactivity and blood pressure irregularities. The purpose of this study was to assess the effect of a short duration Ekso Bionic exoskeleton rehabilitation programme on cardiovascular markers in patients with SCI. Methods: Six individuals with SCI (30± 13y; ASIA classifications of C6A, C8A, T9A, T11A, C6B, T1C) completed a 5-day training programme, on consecutive days. The programme consisted of daily 60 minute physiotherapy session, followed by 90 minutes of gait training in the exoskeleton. Prior to and following the training programme, Pulse Wave Analysis was used to assess resting, supine central and peripheral blood pressure (BP), mean arterial pressure, arterial stiffness (Augmentation index [Aix]) and heart rate. Results: A significant reduction in Aix (30± 18 to 21± 15%) and central diastolic BP (72± 8 to 68 ± 8mmHg) was observed following completion of the training programme (P< 0.05). There were no significant changes in all other central and peripheral BP measures, mean arterial pressure or resting heart rate (P> 0.05). Conclusion: This study demonstrates that a short duration robotic exoskeleton training programme can reduce arterial stiffness in patients with SCI. Although this may have important implications for SCI patients due to their elevated cardiovascular risk profile, larger randomized controlled trials are needed to determine the efficacy of exoskeleton training programmes for this population group.
Effectiveness of exoskeleton training in SCI: preliminary study on metabolic and cardiac responses.

Dr Silvia Corbianco¹, Dr Marco Dini¹, Dr Roberta Benedetti¹, Dr Samuele Bigazzi¹, Dr Alessandro Rustici¹, Dr Carla D’Avino¹, Dr Adriana Gerini¹, Eng Stefano Mazzoleni², Dr Giulia Stampacchia¹

¹Spinal Cord Injury Unit, Pisa University Hospital, ²The BioRobotics Institute, Scuola Superiore Sant’Anna

Biography:
NO BIO

Objectives: New devices, as robotic overground exoskeletons are available for gait training in Spinal Cord Injured (SCI) persons. Evaluation of cardiorespiratory and metabolic effects of training with exoskeleton is the objective of this study. Study funded by Italian Ministry of Health.

Methods: Four voluntary subjects (3 men), were admitted to a walking training program with esoskeleton, three times per week for 20-sessions. The gait speed was increasing from the beginning (T0) to the end (T1) of the protocol 0,097 (SD 0,022; T0) vs 0,145 (SD 0,017;T1) m/sec respectively (p < 0.01), promoting a gradual workload increase. Measurements of VO2Rest ,VO2Ex and heart rate (HR) were collected at rest and during walking exercise at T0 and at T1. The VO2 data (ml/min) were normalized to body mass, VO2BM (ml/kg/min), and were also expressed relative to resting metabolic equivalents of tasks (METs).

Results: VO2Rest BM were 2,77 (SD 0,3) ml/kg/min. The VO2Ex BM average was 5,43 (SD 0,46) at T0 and 4,94 (SD 0,72) mL/kg/min at T1 ; METs was 2,37 (SD 1,48) at T0 and 1,56 (SD 1,08) at T1. HR values was 97,5 (SD 21) at T0 and 96,75 (SD 18) beats/min at T1. As the workload increased from 59,73 (SD 25,39) at T0 to 86,10 (SD 25,26) Watt at T1 (paired t-test: p < 0.01), a cardiovascular adaptation should be occurred although HR didn't change.

Conclusions: These results suggest that robotic overground exoskeleton training improves cardiovascular performance and this may have implications to reduce the prevalence of secondary comorbidity.
Effectiveness of 200 U versus 300 U of intradetrusor onabotulinumtoxinA injections to treat neurogenic detrusor overactivity.

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¹Neurological Physical and Rehabilitation Medicine Department, University Hospital of Nantes, ²Urology Department, University Hospital of Nantes

Introduction: The primary objective of this study was to compare the duration of effectiveness of 200 U (granted Marketing Authorisation (MA) in 2011) and 300 U (dose used prior to MA) of intradetrusor onabotulinumtoxinA (BoNT-A) injections, to treat neurogenic detrusor overactivity.

Methods: Retrospective review of all patients who received intradetrusor BoNT-A injections between 24 August 2011 (date of MA) and 1st March 2014 in Nantes. Patients were divided into 2 groups. Group 1 had previously received intradetrusor BoNT-A injections at a dose of 300 U before the MA, and subsequently received injections of 200 U. Group 2 began treatment at a dose of 200 U. We compared the duration of effectiveness in each group.

Results: 134 patients (63.5% traumatic spinal cord injury (SCI); 26.1% other SCI; 10.4% multiple sclerosis) were followed for a mean 4.7 years. In group 1 (n=83), the duration of effectiveness decreased in 49.7% of patients with the 200 U dose and thus subsequent doses were re-increased to 300 U. In group 2 (n=51), 37.3% of patients failed to respond to a dose of 200 U. The mean duration of effectiveness of 200 U of intradetrusor BoNT-A injections was significantly lower (7.7 months) than 300 U (10.0 months) (p=0.002). In group 1, a shorter previous duration of effectiveness at 300 U was a prognostic factor for failure of the 200 U dose (p=0.0004). Both doses were found to be safe.

Conclusion: The duration of effectiveness of intradetrusor BoNT-A injections was significantly longer with a dose of 300 U than a dose of 200 U.
Effectiveness Of Bowel Training Program On The Patient With Spinal Cord Injury In A Tertiary Care Hospital

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Indian Spinal Injuries Centre

Biography:
"NO BIO"

OBJECTIVE
To find effectiveness of bowel training program (BTP) on quality of life (QOL) of spinal cord injury (SCI) patients.

METHOD
26 chronic SCI in-patients enrolled in the study. A questionnaire (International SCI data were set: Bowel function extended data set) and Neurogenic bowel dysfunction score (NBDS) filled before and after BTP.

RESULTS
Patients (89%) were unaware of bowel care facilitators before training. All patients started using bowel care facilitators and toilet chair for evacuation instead of bed after training. Patients (92.3%) were totally dependent after injury, however with training they required only partial assistance. Approximately half of patients had either incontinence of flatus or liquid stool which reduced to 30%. Quality of life was affected by bowel dysfunction in all patients post injury but after training 88.5% reported little or no impact of bowel dysfunction on QOL. All patients complained of altered lifestyle due to incontinence or constipation but only half had such complaints after training. The NBDS statistically improved after training (15±3.5 to 4.1±3.1, p<0.05) with patients reporting moderate to severe dysfunction reducing from 23 to 2. There were no changes in anal tone and voluntary anal contraction post training.

CONCLUSION
Bowel training program is extremely effective in SCI patients. There are less complaints of incontinence and bowel dysfunction. Patients are more confident and require partial assistance. Training leads to improved sense of independence and better quality of life.
Effectiveness of intravesical electrostimulation (IVES) on neurogenic non-obstructive urinary retention: results from a monocentric retrospective study.

Dr Oreste Risi¹, Dr Michele Manica², Dr Antonio Manfredi¹, Dr Giuseppe Romeo Tecci¹, Dr Rocca Carmela Lisanti³

¹Department of Urodynamics and Andrology - ASST Bergamo Ovest, ²Department of Urology - ASST Papa Giovanni XXIII, ³Department of Urology - Cliniche Humanitas Gavazzeni

Biography:
NO BIO

Intro - Intravesical electrostimulation (IVES) represents a conservative approach to neurogenic non-obstructive urinary retention (N-NOR). In literature there are mixed results about IVES. The aim of this study is to describe our experience with IVES.

Methods - We evaluated 43 patients with N-NOR who underwent IVES from 2002 to 2016. All the patients were assessed with a voiding diary with the number of daily catheterizations (DC), the post-voidal residual (PVR) and a urodynamic study at baseline and after 15 consecutive daily IVES. We considered improved the patients who reduced the number of DC and had a reduction of at least 50% in PVR. We considered cured the patients who did not require any DC. We compared through video-urodynamic study the precence of first sensation of bladder filling at baseline and after IVES.

Results - 24/43 patients (55,8%) were not improved after IVES. Of these 15/24 (62,5%) had complete retention and 9/24 (37,5%) had incomplete retention with spontaneous micturition but high PVR. Before of the treatment only 3 (12,5%) patients of this group reported a sensation of bladder filling, while after the treatment 11/24 (45,8%) reported this sensation. 19/43 patients (44,2%) were improved after IVES. 7/19 (36,8%) had complete retention and 12/19 (63%) had incomplete urinary retention. 11/19 (57,89%) reported a sensation of bladder filling at baseline urodynamic investigation. After the treatment all the 19 patients reported bladder sensitivity. No patient was cured.

Conclusions - The improvement of contractility is limited. The improvement of bladder sensitivity seems to be more consistent.
Effectiveness of Pressure Ulcer Educational Programme Based On Health Belief Model for Person with SCI: A Pre and Post Trial

Dr Natiara Mohamad Hashim	extsuperscript{2}, Associate Professor Julia Patrick Engkasan	extsuperscript{1}, Associate Professor Nazirah Hasnan	extsuperscript{1}

	extsuperscript{1}Universiti Malaya, 	extsuperscript{2}Universiti Teknologi MARA

Biography:
Dr Natiara is currently in her 3rd year of training in Master of Rehabilitation Medicine in University of Malaya into becoming a future rehabilitation physician. She has a special interest towards peer support movement among SCI community.

Introduction
Education plays an important role in preventing the occurrence of pressure ulcers among persons with spinal cord injury (SCI). Many methods of preventive education have been described, however, they are lacking a theoretical framework of human behaviour. We have integrated the theory of Health Belief Model (HBM) in our education programme. HBM describes adherence to self-care regimens in chronic conditions is motivated by beliefs about susceptibility and severity of the condition, the benefit of the behaviour to achieve the desired outcome and barriers to perform the behaviour.

Methods
We created a multidisciplinary structured pressure ulcer prevention education programme based on the HBM. The education programme was held in a group of 10 participants, consisted of didactic lectures, open discussion and a practical session; these were conducted by doctor, physiotherapist, occupational therapist and a nurse. The skin care belief scales were administered pre, post and 8-week post intervention, which measures the 8 domains of HBM. The data of this study was analysed using repeated measures ANOVA to assess the effectiveness of our programme.

Results
30 SCI participants from the department of rehabilitation medicine UMMC who fulfilled the inclusion and exclusion criteria completed this study. Our education programme had a statistically significant effect on Susceptibility, $F(2,58) = 12.53, p = 0.002$, Barriers to Skin Check Belief, $F(2,58) = 5.74, p = 0.008$, Benefits to Wheelchair Pressure Relief Belief, $F(1.65,47.8) = 3.97, p = 0.033$, Barriers to Turning and Positioning Belief, $F(2,58) = 3.92, p = 0.025$ and Self-Efficacy, $F(1.7,49.11) = 4.7, p = 0.033$.

Conclusion
Our education programme has shown to be effective in improving the beliefs in 5 domains of SCBS.
Poster Board Number: 6

Effects of Functional Electrical Stimulation (FES) on walking in individuals with incomplete Spinal Cord Injury

Dr Siddeshwar Patil¹, Mr Wajid Ali Raza¹, Mr Firas Jamil¹
¹Yorkshire Regional Spinal Injuries Centre

Biography:
Specialty Trainee (Year 6 - Final year) - Academic interest in Spinal Cord Injury and Functional Electrical Stimulation.

Objective:
To assess efficacy of Functional Electrical Stimulation (FES) aided mobility in individuals with Incomplete Thoracic/Lumbar Spinal Cord Injury at a Regional Spinal Injuries Centre.

Participants:
4 individuals with Spinal Cord Injury

Main Outcome Measures:
10 Meter Timed walk, BORG Rating of Perceived Exertion, Falls Efficacy Scale for measuring confidence and fear of fall.

Intervention:
L300/Plus system for 12 weeks at home

Results:
Three females and one male SCI included; Average duration of SCI 8 months; 3 traumatic spinal cord injury and one non-traumatic spinal cord injury; prior to commencing FES, one each used walking stick and 2 crutches while 2 used wheeled Zimmer frame; pre-FES walking ability in majority limited to <3 metres. Pre-FES: The mean BORG scale was 9/10, majority could not complete the 10M walk test; only 1 completed and required 210 seconds; The average Falls Efficacy Scale was 84 at baseline indicating increased risk of falling as well as fear of falling.
Post-FES: The mean BORG scale was 4/10, 10MWT average of 46 seconds and Falls Efficacy Scale averaged 62 while using the FES. Assessing without FES assistance also they demonstrated a BORG scale of 7/10, 10MWT (n=3 only) 72 seconds and Falls Efficacy scale was 67.

Conclusion:
We can conclude that FES has significantly improved the walking ability (gait speed and effort; confidence) and reduced fear/risk of falling in this small group of individuals with SCI. We can speculate similar findings in the rest of our study population and improved quality of life.
Poster Board Number: 21

Effects of moderate and high intensity aerobic training in ambulant subjects with incomplete SCI – a randomized controlled trail

Msc Matthijs Ferdinand Wouda¹, Msc Eivind Lundgaard¹, MD, PhD Frank Becker¹,², Msc, PhD Vegard Strøm¹
¹Sunnaas Rehabilitation, ²University of Oslo, Faculty of Medicine

Biography:
NO BIO

Introduction
The low levels of physical capacity and a high prevalence of cardiovascular diseases in the SCI population underlines the need for effective exercise programs to improve physical fitness. We investigated the effects of aerobic exercise programs on physical capacity and physical activity levels in ambulant subjects with incomplete SCI, after being discharged from inpatient rehabilitation.

Methods
Twenty five men and five women, 18-69 years, with an incomplete SCI, AIS-D, injury level C3-S2, were recruited at Sunnaas Rehabilitation Hospital, and randomized to either high intensity interval training (HIIT; n=10), moderate intensity training (MIT; n=10) or a control group (n=10). The intervention groups performed at home a 12-week individual training program by walking/running, wearing a heart rate monitor to verify the intensity. Pre- and post-tests consisted of maximal exercise testing on a treadmill (peak oxygen uptake; peakVO2) and 7-days continuously activity monitoring (total daily energy expenditure (TDEE) and daily amount of steps).

Results
The mean pre-test peakVO2 for all subjects was 2.76 (SD 0.71) liter/min, with no differences between the groups. After intervention, all groups exhibited increased peakVO2 (HIIT+13%, MIT +9% and CG +10%), without any significant differences between the groups. The physical activity level increased significantly only in the HIIT group (daily amount of steps 699, 95% CI: 84–1589, p=0.03 and TDEE 173 Kcal, 95% CI: -37–384, p=0.09).

Conclusions
After the 12-week intervention period, physical capacity had increased in all groups. But, only the HIIT led to higher levels of physical activity.
Efficacy of mini-invasive surgery in a selected cohort of patients with pressure ulcer

Dr Davide Casavola¹, Dr Giacomo Lucchesi², Dr Gabriele Righi³, Dr Erez James Cohen⁴, Dr Giulio Del Popolo⁵

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Biography:
NO BIO

Introduction: Pressure ulcers (PUs) still remain the second most common life-threatening complication associated with spinal cord injury (SCI). Our aim was to assess if fat grafting (lipofilling) combined with platelet-rich plasma (PRP) as a treatment for PUs in I and II stage can reduce complications, need of major surgery and health costs.

Methods: The surgery procedure consists in liposuction of autologous subcutaneous tissue from patient abdomen, centrifugation of the sample and addition of PRP previously obtained from autologous blood. This preparation is then reinjected at ulcer level. During a period of 2 years 12 male SCI patients, with I-II stage PUs, were managed with lipofilling combined with PRP. Mean age was 49 years, 16 % were tetraplegics and 74% were paraplegics. Three patients presented with bilateral ischiatic PUs, three with bilateral trochanteric PUs, two with unilateral trochanteric PU, two with unilateral ischiatic PU, one with unilateral ischiatic and perianal PUs and one with bilateral ischiatic and unilateral trochanteric PUs.

Results: At a mean follow-up time of 12 months, only one severe complication occurred (fistula) that needed a major surgery treatment. The remaining ulcers healed completely within a mean time of 1 months. Moreover, no other patient at follow-up needed further surgical treatment.

Conclusion: All patients had insufficient adipose tissue and high risk for PUs recurrence. Our findings showed that lipofilling combined with PRP is a safe and cost-effective treatment. Considering lower costs and shorter healing times than dressing management, this treatment can become a valid alternative for PUs (stage I-II)
Electroventilation, exiting toy or useful tool?

**Dr Gerhard Baer**, Pasi Talonen

1 Medical School, University Of Tampere

**Biography:**
GAB finished Medical School in Göttingen, Germany in 1965. Dr.med. (psychopharmacology), German medical diploma in 1967. Specialised in Tampere, Finland, in anaesthesiology; diploma in 1971. From 1971 to 2002 (retirement) staff anaesthesiologist at Tampere University Hospital. 1978 started development of "Tampere phrenic nerve stimulator" (PNS) together with Pasi P.Talonen. In 1985 PhD thesis (jet ventilation). Since 1988 ass.prof. at Medical Faculty, University of Tampere; medical adviser for Atrotech Ltd. Talonen defended his PhD thesis at Tampere University of technology in 1990 (PNS); lead Atrotech until retirement (2016). Together they published 22 papers and participated in organising two meetings on PNS.

Electroventilation (EV) (Duchenne1872) means to use an apnoeic patient’s diaphragm for artificial ventilation by rhythmically electrically stimulating his phrenic nerves. Interest in Duchenne’s resuscitator faded when tracheal intubation appeared. EV was later used in patients who could not complain, newborns, and in difficult times, the polio epidemics. – As spin-off from cardiac pacing, Glenn’s group developed EV to an acceptable method, diaphragm pacing (DP), eliminating pain, burns, and skin-penetrating wires. However, “nerve fatigue” prevented full-time use. Of 37 patients with SCI only 13 achieved full-time long-term ventilator aid by DP (Glenn1976). - Muscle fibre types change by changing their stimulation frequency (Salmons1976). To create fatigue-resistant muscle fibres in human diaphragms Glenn used appropriate frequencies <8Hz (Glenn1984). From now on full-time long-term EV was possible. However, with DP transforming muscle fibres into fatigue resistant ones takes months (conditioning period). Using a four-pole non-cuff electrode and sequential nerve stimulation for phrenic nerve stimulation (PNS) (Talonen1990) the conditioning period shrunk to weeks. - Authors having experience with other methods found PNS safe and reliable. Using PNS instead of mechanical ventilation upper airway infections are significantly (p=0.001) reduced (Hirschfeld2008), airway nursing decreases, quality of speech is improved as is QOL. In patients with spinal cord injury-caused respiratory device dependency the initial higher investment with PNS is payed off during average live-time by lower running costs.
EMOTIONAL STATUS OF COMMUNITY LIVING SPINAL CORD INJURY (SCI) INDIVIDUALS: THE IMPACT OF EDUCATIONAL LEVEL

Dr Ioannis - Alexandros Tzanos1, Dr Konstantina Gioti2, Dr Elias Panagiotopoylos1
1Patras University Hospital, 2National Rehabilitation Centre

Introduction: Our aim was to determine in which extend the emotional status of SCI individuals is affected by educational level.

Methods: We studied 164 individuals with SCI of any etiology who live in community. They were residents of urban, suburban and rural areas of Greece. Participants completed demographic questionnaires. The sample was divided in three subcategories regarding their educational level (primary, secondary and tertiary or higher education). The PHQ-9 Questionnaire was used for the assessment of participants' level of depressive symptoms. For the statistical analysis of the findings we used the Analysis of Variance (ANOVA) method.

Results: We identified a statistically significant difference in PHQ-9 levels between tertiary education graduates and the rest participants. Specifically those who have not enter college or university appear with higher level of depressive disorders

Conclusions: High educational level exerts a protective role for depression development among community living SCI individuals.
Enterovirus-d68 acute encephalomyelitis in Spanish pediatric population: neurological follow up and functional prognosis.

Dr Elisa López-Dolado, Dr María Guadalupe Iglesias Barrero, Dr DANIEL LEON GONZALEZ, Mrs María del Mar Atienza Pérez, Silvia Ceruelo, Dr Angel Manuel Gil Agudo

INTRODUCTION: The Enterovirus D-68, a member of Picornaviridae group D family, usually produces mild to moderate respiratory disease. Outbreaks of critical respiratory illness caused by this virus were reported recently in some European countries and United States. Neurological complications such as aseptic meningitis or acute flaccid encephalomyelitis are very uncommon but have been reported. AIM: This study seeks to describe the onset, follow up and prognosis of a pediatric acute Enterovirus-D68 encephalomyelitis case series, focusing on the recovery pattern and functional prognosis. PATIENTS AND RESULTS: We describe five cases of acute flaccid palsy in three males and two females between two to six years old. The date of onset was October in three of the cases and in the other two in March. The onset consisted in fever and headache that evolved in two to four days towards dysphagia, flaccid acute asymmetric flaccid paralysis and finally severe respiratory failure, ventilatory support and tracheotomy. In all cases, cefotaxima and aziclovir were initially prescribed, followed by corticosteroids and immunoglobulin. Only one of the patients received plasmapheresis. A PEG for severe dysphagia was always needed. Enterovirus-D68 was always detected in nasopharyngeal samples. Motor recovery begun after two to six months, mostly in lower limbs. After a year of follow up, PEG could be removed in three of five cases, ventilatory support could be totally eliminated in two patients and tracheotomy closed in only one case. Four of the five patients were able to stand and walk for few steps.
Epidemiology of traumatic spinal cord injury in Ireland

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Biography:
Consultant in Rehabilitation Medicine & Medical Director Spinal Cord System of Care - National Rehabilitation & Mater Misericordiae University Hospitals, Dublin.

Background: Epidemiology of spinal cord injury, traumatic and non-traumatic (TSCI, NTSCI), in Ireland requires updating, to inform health service development and contribute to global mapping projects. The last study was carried out in 2000 on TSCI only. A 6 year retrospective TSCI study (2010-2015) has been helpful in guiding service development but a prospective update is considered gold standard. The objective of this study was to collect population-based epidemiological data on TSCI throughout 2016.

Methods: New incident cases of TSCI were identified at the point of hospital admission. Information was collected as per the ISCoS core data sets. National census results 2016 were the population denominator.

Results: Overall incidence of TSCI in 2016 was 12.8 per million (61 cases), incidence in survivors 12 per million (57 cases). Males accounted for 45 cases (78.9%). Mean (SD) age of onset was 50.3 (18.8) years. Falls were the leading aetiology accounting for 34 cases (59.6%) of injuries. Most common level/AIS sub-group was tetraplegia incomplete, 26 cases (45.6%). Mean (SD) length of stay in those who have completed rehabilitation was 89 (39) days. Among those discharged (n=41), 28 (68.3%) have returned home, 6 (14.6%) went to another hospital and 7 (17.1%) to a nursing home.

Conclusions: Overall incidence of TSCI has changed very little since 2000. However, injury patterns (age, aetiology and level/AIS) have changed considerably. This altered aetiology may necessitate a change in how acute and rehabilitation services are delivered. A population-based epidemiological study of NTSCI is being carried out during 2017.
Poster Board Number: 16

Epidemiology, outcomes and experiences of living with traumatic spinal cord injuries in Botswana (Thesis)

Dr Inka Löfvenmark1,2
1Spinalis SCI-outpatient Clinic, 2Karolinska Institutet

Biography:
My name is Inka Löfvenmark. I have been working as a physiotherapist in the SCI field since 1994 when I started to work in Chicago. I continued at Spinalis in Stockholm when I moved back in 2000. During the last years, I have worked as physiotherapist and coordinator in a project aiming at establishing SCI-rehabilitation in Botswana. In parallel with the project I conducted the data collection for my thesis, which I defended in 2016. I am still engaged in the follow-up in Botswana and with starting up a similar unit in Zambia.

Background: Traumatic spinal cord injuries (TSCI) lead to substantial changes and challenges in a person’s life. Many resource-constrained settings lack systems-of-care, leading to lower functional outcomes and higher morbidity and mortality rates.

Purpose: To deepen the understanding of living with TSCI in Botswana and explore epidemiology and outcomes.

Method: One interview-study and three mainly prospective studies following one sample were conducted; namely persons admitted with acute TSCI during a 2-year period; from admission, throughout hospitalization to discharge, and to 2-years follow-up.

Result: Personal resources and positive attitudes were crucial to experience integration into society. Family support and sources of income were strong facilitators; as was spirituality, while inaccessibility hindered social inclusion. Incidence was 13/million/year. Road traffic crashes were the primary cause; mainly single. Internal fixation was performed after 12 days (median) and acute phase mortality was 20%. Hospitalization was 5 months (median); prolonged by complete injuries and pressure ulcers. Follow-up rate was 71%, revealing increased rates of pressure ulcers and urinary tract infections. Mortality was zero during the follow-up period and 44% had resumed work or studies.

Conclusion: The outcomes for people with TSCI in Botswana were partly closer to resource-constrained settings; acute management, delays to surgery, high rates of complications and in-hospital mortality. In other ways, the situation was approaching high-income countries; provision of technical aids, return-to-work, follow-up and survival rates 2-years post-injury. Botswana has financial power to continue developing TSCI-management to decrease complications and acute mortality - likely contributing to continuous improvements of rehabilitation and outcomes after TSCI.
Epidural anaesthesia leading to complete flaccid paraplegia. A case report

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1 North West England Spinal Injuries Centre, Southport UK

Introduction: An epidural anaesthetic was given for pain control during labour to a woman which led to complete paraplegia. Case details and probable cause are discussed here.
Case Report: A young 18 years old pregnant woman of Central Asian origin was admitted at full term of her pregnancy with labour pains and had an epidural anaesthetic of Levobupivacaine + Fentanyl to facilitate painless vaginal delivery. Post-delivery however she developed complete paraplegia of T10 level. She had investigations to find the cause. MRI scan of the spine which showed findings suggestive of arachnoditis. The EMG study showed active denervation of the muscles of the lower limb. She later underwent spinal rehabilitation for her disability. The neurology deficit did not change or improve with time.
Discussion: Literature search was done for similar incidence reports of paraplegia due to epidural anaesthetic and possible causes discussed in this presentation.
Evaluation of Range of Motion and Strength of upper limbs in tetraplegic patients to perform self-catheterization

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¹ASST Grande Ospedale Metropolitano Niguarda

Biography:

NO BIO

Introduction: evaluate the ROM and Strength of upper limbs in patients affected by tetraplegia, with stabilized lesion, able to regularly practice intermittent self-catheterization.

Methods: we used the device Pablo® Tyromotion, an electronic dynamometer and accelerometer; it allows to collect informations about strength and ROM of the body districts analysed. We tested 25 patients (23 males, 2 females); average age 37,5y (min 14 – max 66); average years passed by the injury 9,96 (min 1 – max 36); different lesional levels (C0 n. 1, C2 n. 1, C4 n. 2, C5 n. 13, C6 n. 6, C7 n. 2); different injury etiologies (C0 arteriovenous malformation, C2 spinal cord empyema, others traumatic). Inclusion Criteria: cervical SCI; traumatic and non-traumatic etiology; stabilized lesion; intermittent self-catheterization.

Results: We compared the average values of strength for these movements: Terminal pinch I-II fingers (dx 0,708; sx 0,844 Kg); Termino-lateral pinch I-II fingers (dx 1,14; sx 1,276 Kg); Interdigital pinch II-III fingers (dx 1,4; sx 1,4 Kg).

Conclusions: We found out how districts and movements not routinely tested, used or trained can preserve a greater potential for what concerns the Spared Function than other mostly known and studied movements. These data should become a strong input to design devices, for rehabilitation and everyday life, based on a new concept of pinch and function of the hand underlining the importance of clinical experience in the projecting phase of devices.
Evaluation Of Sexual And Fertility Dysfunction In Spinal Cord Injured Men In Jamaica

Dr Rory Dixon¹, Dr Belinda Morrison², Dr Ian White-Gittens¹, Dr Simon Smith¹, Dr Shari St. John¹, Dr Romar Bent¹

¹Sir John Golding Rehabilitation Centre, ²Department of Surgery, University of the West Indies

**Biography:**
Dr. Rory Dixon MB.BS. DM (Orthopaedics) Senior Medical Officer Sir John Golding Rehab Centre

*Orthopaedic surgeon with interest in Rehabilitation and Paralympic Sports. He is a board director of the Jamaican Paralympic Association, and the first Jamaican International Medical Classifier for the International Paralympic Committee (IPC). He is a member of the Jamaica Orthopaedic Association (JOA), the American Academy of Orthopaedic Surgeons (AAOS), and the International Spinal Cord Society (ISCoS).*

**Study Design:** Cross-sectional study.

**OBJECTIVES:** To determine the prevalence of sexual dysfunction and infertility in males with traumatic SCI managed in Jamaica, as well as the therapeutic options offered.

**Settings:** Single SCI rehabilitation center in Jamaica.

**METHODS:** A cross-sectional study including males with traumatic SCI managed at the Sir John Golding Rehabilitation Centre, Kingston, Jamaica was done between January 1 and December 31, 2015. Sexual function was measured with the International Index of Erectile Function Questionnaire (IIEF) and further information on social history, fertility desires, treatment options offered were collected. Data were analyzed using Stata 12 for Windows (College Station, USA).

**RESULTS:** The mean age of patients at the time of study was 38.8±15.3 years (Range 19-71) with a mean duration of injury of 3.7±2.4 years (Range 1.3-15.6). Of 45 patients with traumatic SCI surveyed, 90.7% had erectile dysfunction, with 62.8% being classified as severe and 73.3% of men were unable to ejaculate. Treatment for erectile and ejaculatory dysfunction was offered in only 2 patients, respectively. Most (71.1%) patients indicated that they wanted to have children in the future, however no one had been referred for assisted reproductive techniques.

**CONCLUSION:** Men with traumatic SCI in Jamaica have high rates of severe erectile and ejaculatory dysfunction, but have preserved interests in maintaining fertility. Guidelines for sexual education for men with traumatic SCI in Jamaica are needed.
Evidence-based exercise guidelines to improve physical fitness and cardiometabolic health in adults with SCI: An international project

Professor Kathleen Martin Ginis¹, Dr. Jan van der Scheer², Professor Victoria Goosey-Tolfrey²
¹University Of British Columbia, ²Peter Harrison Centre for Disability Sport, Loughborough University

Biography:
Dr. Kathleen Martin Ginis is a Distinguished University Scholar, Professor, and ICORD Principal Investigator at the University of British Columbia. She is also the Founding Director of SCI Action Canada (www.sciactioncanada.ca). Her research program focuses on physical activity behaviour change, and the psychosocial consequences of physical activity participation. She has a particular interest in knowledge translation and advancing physical activity participation among people with spinal cord injury. She has published over 250 peer-reviewed research articles and book chapters and has received over $10M in research funding.

Introduction: Exercise can improve fitness and reduce risk for developing chronic disease. However, most adults with SCI are insufficiently active to reap these benefits. SCI-specific, evidence-based guidelines are important to support the health and fitness-promoting efforts of SCI consumers, service providers, and scientists. An international project involving systematic and stakeholder-engaged processes, was undertaken to update SCI physical activity guidelines developed through similar processes in 2011.

Methods: Guideline development was guided by AGREE-II (i.e., Appraisal of Guidelines for Research and Evaluation) and principles of community-engaged research. Steps consisted of: (a) conducting a systematic review and evaluation of literature to provide a guideline evidence base; (b) holding three international consensus panel meetings to formulate the guidelines; and (c) engaging with SCI consumers and other end-users to develop a knowledge translation strategy for the new guidelines.

Results: The process resulted in a new guideline for prescribing exercise to improve the cardiometabolic health of adults with SCI. The original 2011 guideline was upheld for prescription of exercise to improve cardiorespiratory fitness and muscle strength. Stakeholders provided direction on several knowledge translation strategies to maximize guideline reach and impact.

Conclusions: A scientifically rigorous, systematic and community-engaged process has resulted in an updated set of exercise guidelines, including a new guideline to improve cardiometabolic health outcomes. By engaging with key stakeholders throughout the guideline development and knowledge translation processes, we can maximize the potential reach of the guidelines and their impact on the health and fitness of adults with SCI.
Exercise May Reduce Neuropathic Pain Sensations in Individuals with Spinal Cord Injury

**Miss Kendra Todd**¹, Dr. Kathleen Martin Ginis¹

¹University Of British Columbia

**Biography:**
I graduated from the University of Guelph with a Bachelor of Science (Honours) degree and am currently a Master's Candidate at the University of British Columbia in the School of Health and Exercise Sciences. I am simultaneously involved in the Canadian Access and Inclusion Project, with the objective of providing information to the Federal Government in order to improve accessibility and inclusion for Canadians with disabilities. My research area focuses on neuropathic pain, exercise, and affect in individuals with spinal cord injury.

**Purpose:** Neuropathic pain (NP) affects up to 75% of individuals with a spinal cord injury (SCI), with many reporting pain as more disabling than the injury itself. Currently, treatments are primarily pharmaceutical, however exercise may alleviate NP symptoms. Daily fluctuations in NP are not well understood, specifically in relation to exercise participation. The purpose of this study was to utilize ecological momentary assessment to measure intra-individual diurnal variations in NP sensations. This study aimed to provide a deeper understanding of how NP differs over time and changes from pre- to post-exercise.

**Methods:** Six physically active individuals with SCI participated in this 6-day protocol. They responded to six daily prompts between 9:00 AM and 9:00 PM, and before and after exercising, using the Smartphone application mEMA. The prompts required participants to answer a modified version of the Neuropathic Pain Scale. NP scores were averaged into a composite score and data were analyzed by plotting NP scores over the 6 days.

**Results:** All participants experienced a decrease in NP (Mchange=-0.203, SD=0.627) following completion of at least one bout of exercise. However, two participants experienced an increase in NP sensations following participation in at least one bout of high intensity wheeling, or isometric resistance training.

**Conclusion:** Overall, these results suggest that exercise can reduce NP symptoms. When promoting exercise as a treatment option, however, it is important to consider that different types of exercise and higher intensity exercise may increase NP in some individuals.
Exoskeleton training and home-use for patients with complete spinal cord injury

**Miss Rosanne van Dijseldonk**, Dr Ilse van Nes, Mr Hennie Rijken, Dr Henk van de Meent, Dr Noël Keijzers

*1 Sint Maartenskliniek Research, 2 Sint Maartenskliniek, 3 Radboudumc*

**Biography:**

NO BIO

Exoskeletons for the lower extremity are developed to enable community ambulation in people with spinal cord injury (SCI). Moreover, the ability to walk can lead to better health and quality of life. Before independent and safe home-use is possible, a training period is necessary. The objective was to examine the feasibility of the exoskeleton training for home-use and to assess exoskeleton home-use.

Nine participants with motor complete SCI (Th1-L1) participated (more will be included). Participants were given 24 training sessions in eight weeks with the Rewalk exoskeleton. After the training, participants’ skill level was measured with an Exoskeleton-safety-test consisting of 20 skills. Participants who passed the safety-test were allowed to use the exoskeleton at home for two weeks. Participants who failed received additional training and were tested again. Outcome measures were number of participants who passed the Exoskeleton-test, amount of exoskeleton home-use (diaries and number of steps) and user experiences (QUEST 0-5-scale and SUS 0-100-scale).

Four out of nine participants passed the Exoskeleton-test after eight weeks of training. Two others passed the test after three additional training sessions. The exoskeleton home-use ranged between 3 and 11 days and they made from 367 to 3267 steps. Satisfaction with exoskeleton home use was rated between 3.4 and 4.5 (QUEST-score) and between 55 and 95 (SUS-score). Six participants experienced skin damage.

Two third of people with motor complete SCI achieved a skills level for safe home-use after 27 training sessions. Exoskeleton home-use was diverse and questionnaires indicated that the exoskeleton design should be improved.
Experience with a long-standing multidisciplinary program of after-care.

Dr Dirk Van Kuppevelt¹, Dr Ilse van Nes¹, Dr Helma Bongers-Janssen¹

¹St Maartenskliniek

Biography:
No Bio

H.J.M. van Kuppevelt, I.J.W. van Nes, H.M.H. Bongers-Janssen:
Sint Maartenskliniek, Nijmegen, The Netherlands.

Background:
Since life-expectance after spinal cord injury increases, more secondary health problems are seen. Often those problems are presented too late with major medical and psychosocial consequences. We looked at an opportunity to detect the problems in an earlier phase and prevent deterioration by an earlier intervention.

Methods:
Since 2004 a multidisciplinary out patient clinic for aftercare was started 24 months after the termination of primary rehabilitation. Yearly, a rehabilitation specialist, nurse specialist, physical therapist, occupational therapist and social worker or psychologist sees every patient for half an hour. This is followed by a multidisciplinary assessment and treatment advices for the patient.

Results:
From 2004 till April 2016 in total 853 patients visited the multidisciplinary out patient clinic. In 213 cases (25,0%) no specific treatment advices were given; re-evaluation was scheduled within 1 year. Monodisciplinary therapeutic intervention was advised in 157 cases (18,4%). In 175 cases (20,5%) an outpatient multidisciplinary program was advised. 27 patients (3,2%) were re-admitted for clinical rehabilitation. Advice to consult another medical specialist was necessary in 171 cases (20,0%). Further X-ray examination, technical adjustments or changes in medication followed in 388 cases (45,5%).

Conclusions:
By a periodic multidisciplinary aftercare program we are able to detect and treat (looming) secondary health problems (in an early stage). We suppose that this will decrease the consequences of these problems and finally will work as prevention.
Experiences with intrathecal drug delivery in patients with SCI related neuropathic pain

Dr Klemen Grabljevec¹, Dr. Neža Hrastar¹, Prim. Dr. Rajmond Šavrin¹

¹University Rehabilitation Institute Ljubljana

Biography:
Specialist in Physical and Rehabilitation medicine (PRM), Head of Brain Injury Rehabilitation Department of SOCA Rehabilitation Institute. Head of the Slovenian ITDD program over the last decade. In his everyday practice he deals with the problems after Brain injury and Multiple sclerosis as well with generalized and focal spasticity of cerebral and spinal origin. He is member of Ability working group, Senior fellow of the European Board of PRM, president of the SISC for spasticity at the European PRM Society and vice-president of the Slovenian PRM Society.

Introduction: After the spinal cord injury (SCI) a chronic pain can appear often and is the main reason for a long term disability and an impaired quality of life. According to data from the literature the pain appears in 45-94% of injured persons, half of them describe the pain as very strong. By the majority of injured persons the pain develops in six months to one year after the SCI. The mechanism of pain following the SCI is not fully explored. In the acute time there is neuropathic pain, which is stronger and is hard to control with peroral drugs. Usually it progresses to chronic and for this reason it becomes able to treat it with intrathecal administration of morphine or poli-analgesic mixture.

Methods: We compared previous studies with the result from four our patients, who received intrathecal administration of morphine after SCI between 2002 and 2011. Results: During the test period all of them reported excellent effects. However, after the implantation of the pump they have been unsatisfied. To control the pain, they still need additional oral analgethic therapy.

Conclusions: Intrathecal delivery of morphine or poli-analgetic mixture does not seem to be a treatment of choice in patients with strong neuropathic pain after SCI.
Exploring mechanisms of peripheral nervous system involvement in acute SCI using a novel electrophysiological method

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¹Dept. of Clinical Neurophysiology, Aarhus University Hospital, ²Spinal Cord Injury Centre of Western Denmark, Viborg Regional Hospital, ³Danish Pain Research Center, Aarhus University Hospital

Introduction: Since new therapies and rehabilitation interventions for spinal cord injury (SCI) are of increasing interest, confirming normal peripheral nerve function is crucial. Affection of the peripheral nervous system (PNS) after SCI has previously been detected and transsynaptic degeneration of anterior horn cells was proposed as the underlying mechanism. In this study we examined the muscle membrane properties in patients with acute SCI to understand the mechanisms of PNS involvement in acute SCI using a novel method so-called muscle velocity recovery cycle (MVRC).

Methods: Six patients with acute SCI (1-3 weeks after trauma), 22 patients with peroneal nerve neuropathy and 18 healthy controls were prospectively included. In addition to routine electrophysiological examinations, MVRC was done in anterior tibial muscle with direct muscle stimulation using Qtrac-software. MVRC parameters comprised muscle relative refractory period (MRRP) and early, late and residual supernormality after 1, 2 or 5 conditioning stimuli.

Results: MRRP, early and late supernormality differed significantly between SCI patients and healthy controls (non-parametric t-test, p<0.05). None of the MVRC parameters differed between SCI and peroneal nerve neuropathy patients.

Conclusions: Significantly prolonged MRRP and slowing in propagation velocity in supernormal period suggest lower depolarization threshold in SCI patients similar to denervated or ischemic muscles. Such early changes before abnormalities in routine electrophysiological tests in acute SCI may suggest other pathophysiology such as inflammatory or metabolic mechanisms directly affecting muscle membrane rather than transsynaptic degeneration in development of PNS involvement in SCI.
Facilitators and Barriers to Caring for Individuals with Spinal Cord Injury in the Community: Experiences of Caregivers and Care Recipients

Miss Gaya Jeyathevan\textsuperscript{1}, Dr. Susan Jaglal\textsuperscript{2}, Dr. Jill Cameron\textsuperscript{2}, Dr. Catharine Craven\textsuperscript{2}

\textsuperscript{1}University Of Toronto, \textsuperscript{2}University Health Network

\textbf{Biography:}

\textit{NO BIO}

Background: Given the numerous roles that family members undertake in the care processes and overall quality of life of individuals with spinal cord injury (SCI), there is an increase in caregiver burden, which could threaten the sustainability of these critical supports if the support needs are not addressed accordingly. Therefore, the purpose of this study was to understand the facilitators and barriers to undertaking the post-SCI caregiving role, particularly in relation to the healthcare and social services system, with the intent of identifying potential strategies that would assist family members in undertaking the caregiving role.

Methods: A qualitative descriptive approach was used and involved semi-structured telephone interviews. Thematic analysis was employed to determine key themes arising from dyadic accounts of individuals with traumatic/non-traumatic SCI (n=19) and their family members’ (spouses and parents) (n=16) experiences within 2 years and after 10 years post-discharge from inpatient rehabilitation.

Results: The following perceived facilitators to undertaking and maintaining the SCI caregiving role were identified: continuity of care, access to community support services, positive dyadic coping, access to social support, and mastery of caregiving roles. Participants identified the following factors as barriers to undertaking and maintaining the caregiving role: lack of access to resources & information, difficulty navigating/negotiating the healthcare system, lack of appropriate training, disintegrating relationships, deteriorating caregiver health, and role conflict.

Conclusions: Consideration of these results in the design of SCI caregiver interventions may lead to more effective targeted interventions to support family members in undertaking and sustaining the caregiver role.
Factors affecting improvement in ability realization during SCI or cauda equina lesion rehabilitation

**Professor Amiram Catz**\(^1,\,2\), Dr. Rotem Gur Pollack\(^1\), Ms. Liraz Yamini\(^1\), Dr. Vadim Bluvshine\(^1,\,2\), Dr. Dianne Michaeli\(^1,\,2\), Dr. Elena Aidinoff\(^1,\,2\)

\(^1\)Loewenstein Rehabilitation Hospital, \(^2\)Tel-Aviv University

**Biography:**
Amiram Catz, MD, PhD
Professor of Rehabilitation, Tel-Aviv University, Tel-Aviv
Medical Director, the Spinal Rehabilitation Department
Medical Director and CEO, Loewenstein Rehabilitation Hospital, Raanana, Israel

**Education**
1970-1976 Hebrew University, Hadassah Medical School, Jerusalem
1982-1990 Residency, Neurosurgery, Physical Medicine and Rehabilitation (PM&R)
1987-1990 Postgraduate Med. School, Tel-Aviv University: Masters in PM&R
1999-2005 Tel-Aviv University: PhD (Physiology)
2007-2009 Tel-Aviv University, Faculty of Management:
Masters in Health Administration

**Introduction:** The improvement in ability realization, which is a main goal of rehabilitation, may vary owing to demographic and clinical factors. The potential effects of such factors were examined in patients with spinal cord injury (SCI) or cauda equina lesions.

**Methods:** We examined the effects of age, gender, SCI level, ASIA impairment scale (AIS) grade, ASIA motor score (AMS), and the Spinal Cord Independence Measure (SCIM) III score at admission, and the length of stay in rehabilitation (LOS), on improvement in the Spinal Cord Injury Ability Realization Measurement Index (SCI-ARMI). Data were retrospectively collected from records of 354 SCI or cauda equina lesion patients aged 56±16, 62% males, admitted for rehabilitation. The injuries were cervical, thoracic, or lumbar (49%, 15%, and 36%, respectively). AIS grades were A, B, C, or D (8%, 5%, 19%, and 68% respectively). Pearson correlation tests, analysis of variance, and linear regression were used to assess the relationship between the independent variables and SCI-ARMI gain.

**Results:** Age, AIS grade and SCIM III score at admission, and LOS were found to be related to SCI-ARMI gain (p<0.02). The correlation with admission SCIM III was noticeable (r=-0.615, p=0.0001), but correlations with age and LOS were weak (r=-0.185 and 0.338 respectively), and controlling for the various factors, only age and admission SCIM III predicted SCI-ARMI gain (r2=0.421, p=0.0001).

**Conclusion:** Of the factors examined in this study, only lower functioning at admission, reflected by SCIM III, predicted a meaningfully greater improvement in ability realization during SCI or cauda equina lesion rehabilitation.
Factors Associated with the Use of Oral Medication Management in Neurogenic Bowel and Bladder After Spinal Cord Injury

Professor Denise Tate¹, Senior Research Associate Martin Forchheimer¹, Associate Professor Gianna Rodriguez¹, Clinical Professor Anthony Chiodo¹, Associate Professor Anne Cameron²

¹University Of Michigan, Department of Physical Medicine and Rehabilitation, ²University of Michigan, Department of Urology

Biography:
Dr. Tate is a Professor and Associate Chair for Research in the Department of Physical Medicine and Rehabilitation, University of Michigan (UM). She served as the PI and Co-Director of the UM Spinal Cord Injury Model Systems for the past 22 years. Her work has been on depression, bladder and bowel complications and quality of life outcomes of patients with SCI. She served on the Board of the American Spinal Injury Association and of the National Center for Medical Rehabilitation Research, National Institutes of Health. Her SCI research has been funded by NIDILRR and the US Department of Defense.

Neurogenic bowel and bladder (NBB) dysfunction is a major physical and psychological problem for persons with SCI impacting quality of life. This study examines the use of oral medications across three classes of drugs: opioids, anticholinergics and antispasmodics and factors associated with the use of these medications and NBB related complications. A sample of 303 SCI adult patients injured at least 5 years and with NBB symptoms were used in this study. Patients were classified by neurological groupings from complete to incomplete paraplegia and tetraplegia. Daily morphine equivalents (DMEs) were used as a unit of analysis for opioids. The sample was 74% male and 83% white, Non-Hispanic; 56.7% had tetraplegia and 40% were married or had a significant other. Hydrocodone and Oxycodone were most frequently used to treat pain. The most common antispasmodic was oral Baclofen, and Oxybutynin was most frequently used anticholinergic. Significant differences were found in relation to opioids use or DMEs in relation to demographic factors (marital status and education). Antispasmodic use was strongly associated with neurological groupings with highest use being among those with complete tetraplegia. While no associations were found among complications and antispasmodic use, those with constipation had significantly higher DMEs. There were no relationships between use of anticholinergics and neuro or complications. Data on those taking a combination of these drugs was not yet analyzed for this abstract. Specific information on medication dose is also available for further analysis. Implications for treatment and quality of life will be discussed as well as recommendations.
Factors influencing return to work after Spinal Cord Injury

Kerstin Hug1, Beate Hummel1, Stephanie Garlepp1, Holger Lochmann1, Margret Hund-Georgiadis1
1REHAB Basel

Biography:
NO BIO

Introduction
Labour market participation is an essential aspect of long-term rehabilitation after spinal cord injury (SCI). The aim of this study was to evaluate health-related and psychosocial factors influencing return to work after SCI.

Methods
In our SCI center all outpatients are assessed by comprehensive questionnaires based on the 'International Classification of Functioning, Disability and Health' (ICF). For statistical purposes, questionnaires completed between 2008 and 2015 were available. Predictors of return to work were analysed by multivariable regression modelling.

Results
The data set comprised 290 outpatients (30% women) with a mean age at SCI of 32.5 +/- 12.5 years and a mean time since injury of 13 +/- 10.3 years. An incomplete paraplegia was found in 139 (48%) of the individuals, a complete paraplegia in 55 (19%), an incomplete tetraplegia in 78 (27%) and a complete tetraplegia in 18 (6%). At the time of the interrogation 124 (43%) subjects reported to work either full-time or part-time. The initial regression model comprised 15 variables. After eliminating non-relevant factors, a statistically significant negative effect on being employed was revealed only for age at SCI (Odds Ratio: 0.96, 95%-CI: 0.93-0.99, p<0.002) and for problems with covering distances (OR: 0.44, 95%-CI: 0.25-0.79, p<0.006). Additionally, a borderline significant association was observed for individuals reporting problems with doing their regular shopping (OR: 0.55, 95%-CI: 0.30-1.02, p<0.059).

Conclusions
Our results indicate that aspects of mobility are crucial for getting back to work after SCI and should therefore be considered as promising targets for interventions.
Feasibility, safety and acceptability of REX robotic exoskeleton for ambulation and upper body exercise in people with SCI

Dr Nick Birch¹, Dr Angela Gall², Dr Andrew Nunn³, Mr Jon Graham¹, Mr Chris Heywood¹, Dr Nada Signal⁴, Dr Mohammed Sakel⁵, Mr Tom Priestley⁶

¹Chris Moody Rehabilitation Centre, ²London Spinal Cord Injury Centre, ³Victorian Spinal Cord Service, ⁴Health and Rehabilitation Research Institute, Auckland University of Technology, ⁵East Kent Hospitals University NHS Foundation Trust, ⁶Rex Bionics PLC

Biography:
Dr Dunn has a 30 year association with engineering and medicine including telehealth, remote ambulatory monitoring, clinical datasets (CI), exercise as SCIPA (CI), bladder management (CI), nerve transplantation (CI) neurodiagnostics (CI), fMRI, sleep health, alertness CRC, diaphragmatic pacing (CI), FES, robots and control

The RAPPER II trial was a prospective, international, cohort study of the feasibility, safety and acceptability of using the REX robotic exoskeleton, to undertake ambulatory tasks and upper body exercise in an upright position, in people with spinal cord injury (SCI: C4-L5) (n=56). Feasibility evaluation was based on; successful transfer, achieving autonomous control, the timed up and go test (TUG) and completion of in-device upper body exercise. Safety was evaluated with adverse events reporting and acceptability with user questionnaires.

All participants could transfer into the device (mean time=412s, range 80s-1007s) and 95% of participants achieved autonomous control of the device within 10minutes, irrespective of the level of SCI. Participants had a mean TUG of 317s (range 209s-763s); 91% required no or one assistant and 9% required two assistants to complete the TUG ambulatory tasks. 95% of participants completed all upper body exercises.

No serious adverse events were reported.

Device acceptability was high, particularly in the domains of confidence, safety, stability, ease of control and comfort (levels of agreement 85-96%).

Responses to secondary outcomes questionnaires (n=36): 15 (42%) reported improved sleep; 11 (31%) improved sleep + less spasticity and 8 (23%) improved sleep + less "Pain woke me up".

The results of RAPPER-II indicate it is feasible and safe to use REX for ambulatory and upper body exercise activities in a rehabilitation environment. This study highlights that REX, distinct from other robotic exoskeletons, is suitable for people with high level lesions and enables a range of rehabilitative activities to be undertaken.
Fecal incontinence in patients with spinal cord injury in the Netherlands

**Dr Janneke Nachtegaal**, Dr Maaike Eken, MD Willemijn Faber, Jorieke Bleumer, Prof Coen van Bennekom, Prof Marcel Post, on behalf of the Dutch-Flemish Spinal Cord Society

Heliomare Research & Development, Brain Center Rudolf Magnus and Center of Excellence for Rehabilitation Medicine, University Medical Center Utrecht and De Hoogstraat Rehabilitation

**Biography:**
Janneke Nachtegaal (human movement scientist & epidemiologist) is working as a senior researcher at Heliomare. She is involved in several studies on spinal cord injury.

**Background:** Bowel dysfunction, including fecal incontinence, is one of the most important secondary health complaints in patients with spinal cord injury (SCI) and has a substantial negative impact on quality of life.

**Purpose:** To determine the prevalence of fecal incontinence (FI) and to identify factors associated with FI in individuals with SCI.

**Method:** The study included 387 people with SCI admitted for inpatient rehabilitation to one of the eight Dutch rehabilitation centers with a specialty in SCI rehabilitation in 2015. Data was derived from the Dutch International SCI Datasets project. FI was determined as involuntary passage of stools.

**Results:** Prevalence of FI at admission was 51.2%, whereas the prevalence at discharge was significantly lower, with 31.0% (p<0.001). During rehabilitation, number of episodes of FI decreased in 79.5% of the patients. At discharge, women experienced FI more frequently than men (OR=2.3; 95%-CI= 1.3 – 4.1), and patients with AIS-A, B or C, had more frequently FI than patients with AIS-D (AIS-A-B-C and NLI-C2-C8: OR=3.3; 95%-CI=1.3 – 8.3; AIS-A-B-C and NLI-T1-S4/5: OR=5.6, 95%-CI=1.6 –11.9). Adjusted for AIS and NLI, length of stay (LOS) in rehabilitation was significantly longer for people with FI at admission compared to people without FI.

**Conclusion:** At discharge, one-third of the patients with SCI experienced FI, confirming the high impact on the SCI population. Factors associated with the prevalence of FI at discharge were gender and SCI severity. LOS was longer for patients with FI, which implies that FI can affect the rehabilitation process of patients with SCI.
Follow-up after a spinal cord injury

Prof Fin Biering-Sørensen\(^2\), Dr Dirk Van Kuppevelt\(^1\), Prof Tom Bryce\(^3\), Prof Nazirah Hasnan\(^4\), Prof Birgitte Perrouin-Verbe\(^5\)

\(^1\)St Maartenskliniek, \(^2\)Rigshospitalet, Neurocentret, \(^3\)Mount Sinai Hospital, \(^4\)University of Malaya, \(^5\)University of Nantes

Aim:
Give an idea how different routine follow-up after spinal cord injury (SCI) may be carried out. Discussion of pros and cons for various regimes and how can we find out what is actually necessary and most efficient to prevent secondary health problems. Which studies should be performed to elucidate this?

Background:
With aging follow up for secondary health problems and prevention is of increasing importance for individuals with SCI. It is largely undescribed which follow-up regimes are used worldwide. A questionnaire related to follow-up routines was sent out to SCI centers worldwide. Results of this questionnaire are summarized.

Some questionnaire results:
33 questionnaires from 23 countries representing 5 continents were returned.
Frequency of a routine follow-up is mostly yearly (some 2-5 years). Often after discharge first controls are more frequent. Most follow-ups are in the outpatient clinic. When distance to the center is a problem readmittance is used. Time scheduled for the doctors session differs from 15 minutes to 3 hours. Most visits include other health professionals as nurse, physio--- and occupational therapist and often psychologist and/or social worker, seldom other disciplines. Routine investigations during the follow-up may include Blood samples (one third did a blood count, electrolytes and renal function, less frequent sedimentation, inflammation proteins, fasting glucose, lipids and liver functions. Other tests were carried out on indication); Urine samples (in majority analysed with dipstick or microscopic examination or culture eventually with antibiotic resistance. Some with the remark: only if urinary tract infection was suspected); Bladder / renal ultrasound in most cases, less often urodynamics, and Cystoscopy by indication. A wide range of other investigations were mentioned including lung function test, bone density measurement, spine imaging and cardiac investigation.

Workshop content:
Fin Biering-Sørensen (chair)
Dirk van Kuppevelt: Results of the worldwide questionnaire investigation.
Tom Bryce: Follow-up regime at SCI center in New York, USA
Nazirah Hasnan: Follow-up regime at SCI center in Kuala Lumpur, Malaysia
Brigitte Perrouin-Verbe: Follow-up regime at SCI center in Nantes, France
Panel discussion with the above mentioned presenters and interactive participation of all delegates.
Food consumption and nutrient intake among individuals with long-standing spinal cord injury in Norway

Miss Hanne Bjørg Slettahjell1,2, Miss Emma Kristine Amory2, Mr Vegard Strøm1, Mrs Monica Hauger Carlsen2
1 Sunnaas Rehabilitation Hospital, 2 University of Oslo, Department of Nutrition

Biography:
Slettahjell is the first Registered Clinical Dietitian and Professional leader of Nutrition at Sunnaas Rehabilitation Hospital from 2014 and has a Master’s degree in Clinical Nutrition from the University of Oslo, Norway (2008). As a dietitian she has gained broad experience from administration and multidisciplinary nutrition work in the community health care setting to nutritional rehabilitation of patients after severe injury/trauma. At Sunnaas she educates health professionals, provides nutritional support to patients, engages in research projects, and supervises students in Clinical Nutrition through a professional collaboration with the University of Oslo.

Introduction
Previous studies suggest sub-optimal nutritional intake in spinal cord injury (SCI) populations. Study objective was to assess the nutritional intake among individuals with long-standing SCI in Norway compared to reference values.

Subjects and methods
A cross-sectional survey in a random sample of 400 persons with SCI (≥ 2 years post injury, all cause, AIS A to D) was carried out with a semi-quantitative food frequency questionnaire. Data from a nationwide survey Norkost3 (N3), dietary guidelines and a Norwegian Antioxidant Study were used as references.

Results
A total of 64 men and 32 women were included (mean age 54 ±15). The study population had similar energy intake (EI) as the N3 population, however, men with SCI had 15% less EI compared to N3 men (p=0.002). Consumption of plant foods, alcohol, vitamin C and E were higher in the SCI group than N3 (p<0.001) and low intakes of vitamin D, -A, calcium, zinc and selenium were identified in parts of the SCI population. Total water intake was significantly lower compared to N3 (410 g/d vs. 925 g/d) (p<0.001). Coffee contributed 54% of total antioxidant intake in the SCI population and 81% used supplements.

Discussion/conclusion
The SCI study population seems more compliant with dietary guidelines than the general Norwegian population; however, insufficient intakes of several micronutrients were identified. Results may be influenced by different assessment methods in the SCI and reference studies. A high proportion of incomplete injuries (60.4%) might explain the comparable EI and compliance with the dietary guidelines.
High spinal cord injuries can cause diaphragm paralysis and result in patients being placed on long term continuous mechanical ventilatory support. It has been possible, for many years now, for patients with high spinal cord injuries and diaphragm paralysis to be implanted with a FES (functional electrical stimulation) device. FES enables the patient to breath, using his diaphragm, independent of a ventilator. The advantages of breathing with the diaphragm as opposed to the ventilator include a lower incidence of pulmonary infections, better speech, and freedom from being attached to a ventilator. In addition, there are substantial monetary savings associated with long-term use of FES devices. The three FES devices currently available for treating diaphragm paralysis are the Avery, Atrotech and Synapse devices. Only the Avery and Synapse devices are authorized for use in the USA. The Avery device has allowed some patients to be free of mechanical ventilatory support for over 35 years of continuous use. The Avery and Atrotech devices are fully implantable via either the minimally invasive cervical route or through an endoscopic trans-thoracic route with power from the transmitter passing through intact skin. The Synapse device is implanted laparoscopically with power transmitted via wires exiting from the abdomen. This poster will describe the indications and techniques for implantation of these FES devices. Long term follow up results will also be presented.
Poster Board Number: 215

Frequency of Growth Hormone deficiency in Complete Spinal Cord Injury patients and Safety/Efficacy of GH treatment combined with Physical Therapy

Dr Hatice Kumru1, Dr Guillem Cuatrecasas2, Dr Mª Jose Coves2, Dr Joan Vidal1
1Fundación Institut Guttmann, Institut Universitari de Neurorehabilitació (UAB), 2Servicio Endocrinología Hospital Quiron-Teknon, CPEN S.L.

Biography:
No bio

GH has been shown in in-vitro models to stimulate proliferation, differentiation, migration and survival of astrocytes and oligodendrocytes. It also promotes myelination and neural arborization. The aim of the study was to evaluate the frequency of GH deficiency in patients with chronic complete SCI and to study the efficacy and safety of GH (Nutropin®) combined with physical therapy (PT).

METHODS: The inclusion criteria were: chronic and complete SCI with GH deficiency. It was a double blind, randomized study with a placebo group. Patients were assessed using ASIA, SCIM-III, modified Ashworth scales, neuropathic pain scale, and neurophysiological tests and quantitative sensory testing. Patients with GH deficiency received subcutaneous injections of either placebo or GH. Medical treatment was 6 days and PT was daily 2h a week for 6 months.

Results: Thirteen of 18 patients (72%) presented GH deficiency, without pituitary alterations in MRI. 12 patients recruited: 7 received GH and 5 placebo. There were no significant differences in relation to age, sex, BMI, waist circumference, or biochemical parameters. At baseline, GH-treated group showed greater GH-deficiency (glucagon test), than placebo group. There was a significant improvement in SCIM III score at 6 months in the GH group and electrical perception threshold showed a significant improvement at the fifth level below SCI on both sides in GH group.

Discussion: GH deficiency is very frequent in our SCI population. Replacement of GH combined with PT can improve functional parameters (SCIM III) and sensory perception at 5th level below the SCI.
From onset to operation: An overview of the current diagnosis pathway for patients with Degenerative Cervical Myelopathy

Mr Bryn Hilton¹, Ms Jenny Tempest-Mitchell¹, Mr Benjamin Davies², Professor Michael Fehlings³, Mr Mark Kotter²
¹University Of Cambridge School Of Clinical Medicine, ²Academic Neurosurgery Unit, ³University of Toronto

Biography:
NO BIO

Introduction
Degenerative Cervical Myelopathy (DCM) often presents insidiously, making initial diagnosis challenging. Surgery has been shown to prevent further disability but existing spinal cord damage may be permanent. Pre-operative duration of myelopathic symptoms is linked to worse post-operative improvement. Therefore, rapid surgical assessment is key to improving patient outcomes. This study aimed to characterise DCM patients’ pathway to reach assessment by a spine surgeon.

Methods
Retrospective cohort of patients with DCM identified by screening 1 year of cervical spine MRI scans conducted at a tertiary neurosciences centre for those showing spinal cord compression (N=43). Disease severity was approximated using a prospectively validated method for inferring modified Japanese Orthopaedic Association (i-mJOA) functional scoring from clinical notes. Results expressed as 5% trimmed mean ± standard deviation.

Results
Patients received a referral to secondary care 6.4±7.7 months after symptom onset. Cervical MRI scanning and neurosurgical review occurred 12.5±13.0 and 15.8±13.5 months after symptom onset respectively. i-mJOA was 16.0±1.7 at primary care assessment and 14.8±2.5 at surgical assessment. 61.0% of patients were offered operations, 17.1% received follow-up, and 22% were discharged. For those who received surgery, time between onset and surgery was 22.1±13.2 months.

Conclusion
Route to surgical assessment was heterogenous and lengthy. Some patients significantly deteriorated during this period. This study highlights the need for a streamlined pathway by which myelopathic patients can receive timely assessment by a spinal surgeon. This would improve outcomes for patients using existing treatment.

Dr Matthias Walter¹, Dr. Brett B. Finlay², Dr. John Steeves¹

¹International Collaboration On Repair Discoveries (ICORD), Faculty of Medicine, University of British Columbia,
²Michael Smith Laboratories, and the Departments of Microbiology & Immunology, and Biochemistry and Molecular Biology, University of British Columbia

Biography:
Dr. Matthias Walter has been certified as a Urologist by the Swiss Board and as a Fellow of the European Board, both in 2016. He is currently pursuing a Postdoctoral Fellowship at the International Collaboration On Repair Discoveries (ICORD), Faculty of Medicine, University of British Columbia, Vancouver in Canada.

Introduction
Changes in the gastrointestinal (GI) microbiota have been linked to evolving transformations in immune system function and infection rates in experimental spinal cord injury (SCI) in animal models. Furthermore, GI microbial metabolism of dietary components has been causally linked to cardiovascular disease, which is an ongoing concern for individuals with chronic SCI. It is probable that alterations of GI microbiota are established acutely after SCI and could subsequently alter medical care and impact health outcomes for people living with SCI.
This is a novel, data-driven project bringing together a world-leading group from the microbiome field along with leading SCI research centers across the globe. There are many relevant stakeholders including people living with SCI and specifically those having ongoing health challenges that have not been adequately mitigated.

Methods
This pilot research project consists of two distinct but complementary studies (individuals with acute and chronic SCI) involving the non-invasive collection of stool and urine samples after they have been passed from the participant’s body. We will compare microbiome data with clinical parameters such as the ISNCSCI assessment and the SCIM, ongoing clinical immune profile, history of infections, antibiotic prescriptions, and any other significant medical treatments. This study has approved by local research ethics board and registered at clinicaltrials.gov.

Conclusion
This is the first pilot study to prospectively investigate changes of GI and UT microbiota and metabolomics in individuals with acute and chronic SCI. Prospective treatment studies can only come after such pilot data has identified potential challenges and treatment targets.
Goal Attainment Scaling as an outcome measure of BTX-A treatment - measuring what's relevant to the person with SCI

Dr Gabriele Righi, Dr Giulio Del Popolo
Spinal Unit - Careggi University Hospital, Florence, Italy

Biography:
I graduated in Medicine at the University of Florence and obtained my Specialty degree in PM&R at the University of Pisa. I started to be interested in Neurorehabilitation since the beginning of my specialty training. I have trained and worked at various hospital in central Italy and I also have had the chance to work for 4 months at the Neurorehabilitation ward directed by Prof. Saltuari in Innsbruck. I am currently working at the Spinal Unit of Florence since more than 1 year. My main fields of interest are: spasticity, neuropathic pain, wearable robotics, rehabilitation techniques, outcome measures.

Introduction:
Botulinum toxin A (BTX-A) treatment for limb spasticity in Spinal Cord Injury (SCI) patients is a complex procedure: in order to be successful it requires adequate patient empowerment and careful setting of realistic goals shared by the treating physician and the patient.

Materials and methods:
We retrospectively analysed result from Goal Attainment Scaling (GAS) and modified Ashworth scale (mAS) of 18 consecutive patients who for the first time underwent treatment of focal spasticity with BTX-A. 13 patients were treated for lower limbs spasticity, 4 for upper limbs spasticity and a single patient for both upper and lower limbs.

Results:
As regards GAS, 11 patients set 3 goals and 7 only 2 goals. The three more frequent goals set for lower limbs were: increase walking ability, reduce frequency of falls during walking/standing, reduce caregiver burden. The three more frequent goals set for upper limbs were improve hand hygiene, improve hand function, ease dressing. Efficacy of the chemodenervation procedures was satisfactory, showing a reduction of mAS score in every patient, with a mean of 1.8 points. Nevertheless, 3 patients showed a GAS T-score <50 (due to excessive loss of muscular strength). In one case we did not repeat the procedure, in the other two we lowered BTX-A doses obtaining GAS T-scores >50.

Conclusions:
GAS seems to be a very accurate tool to measure outcomes of chemodenervation with BTX-A and to provide a more tailored treatment of focal spasticity in the SCI population.
Poster Board Number: 137

Grasp impact on daily life activities after cervical spinal cord injury.

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²National Rehabilitation Center Vaivari

Biography:
Agrita Rubene graduated Riga Stradins University 3 years ago and work as occupational therapist in SCI rehabilitation department of National Rehabilitation center "Vaivari".

Introduction.
People with SCI prioritize regaining upper limb function more highly than others. Guidelines describe the activity limitations for patients with SCI, meanwhile the patient's opinion of activity limitations is neglected. The patient's self-esteem promote a person-centered practice of receiving medical and social services. Aim is characterization of patient's upper limbs function and impact on daily activities.

Methods.
Survey - Quantitative and descriptive study. Arms, shoulders and wrists disability self-assessment (DASH), demographic data questionnaire. The survey was online in Latvian and Russian, among adults who have received rehabilitation in National rehabilitation center "Vaivari".

Results.
There were 20 participants. Most of them were men aged from 18 to 42 (94%) and 52% of them had partially preserved palm extension, but there were no active movement of fingers. Other participants had partial or full finger movements. 73% of participants did not use orthoses. In activities associated with heavy physical work patients were unable to perform or had limited performance. 52% of those surveyed did not consider that the productive and social activities have been limited due to the hand function. Patients consider restrictions on self-care.

Conclusion.
Part of the respondents work despite the limitations of hand function. Participants who have partly functional limitations in their hands, are less satisfied with functional condition and less involved in productive activities. Almost all participants have pain in their hands, but it does not have a significant impact on daily activities.
GRASSP Version 2: A comprehensive SCI upper limb impairment measure.

**Dr Sukhvinder Kalsi-Ryan**¹², Mr. Urs Albisser³, Dr. Michael Fehlings²⁵, Dr. Med Armin Curt³, Prof Molly Verrier³, Mrs Carolina Fellinghauer⁴, Dr. Inge-Marie Velstra⁴

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**Biography:**

Dr. Kalsi-Ryan, is a clinician scientist in the field of upper limb assessment and recovery and spine pathology at Toronto Rehabilitation Institute and is also Assistant Professor at the University of Toronto, Department of Physical Therapy. Her research is oriented to establishing methods to quantify neurological change after injury and studying neuro-restorative methods to enhance and optimize function for those with neurological impairment. Dr. Kalsi-Ryan is the Founder of her own company that manufactures the GRASSP and consults to neurological trials worldwide. Interests: Outcome Measurement, Upper Limb Recovery, Traumatic and Non Traumatic SCI, Quantification of Neurological Disorders

The GRASSP Version 1 (GV1) was made available to the SCI community in 2010. Uptake and interest in the measure has been significant. GV1 consists of 5 subtests GRASSP Strength (GR-Str), Sensation (GR-Sens), Prehension Ability (GR-pa) and Prehension Performance (GR-pp). It has excellent psychometric properties, is sensitive to small changes in impairment and function, however, an abbreviated version to further enhance uptake was of interest to the field. Objective: To reduce the length of GRASSP and improve applicability.

Methods: Cumulative end-user feedback from Europe and Canada was collected and archived. The sum mean score of GR-Str (isotonic testing) was compared to the upper extremity motor score (UEMS). Rasch analysis was conducted to determine redundancy of items within GRASSP. All data gathered were synthesized. Consequential modifications were derived and applied to GV1. Results: Based on end-user feedback: 1) language throughout the manual was refined to clarify subtest/item definitions and instructions to reduce variability of interpretation among assessors. 2) Paired t-test confirmed no significant difference between sumscores of GR-Str and UEMS. Rasch analysis confirmed response thresholds to be disordered, for GR-sens, and GR-pp permitting a smaller set of items to be selected.

Modifications:
1. GR-Str, Isotonic Manual Muscle Testing (MMT) to isometric MMT.
2. GR-Sens, Reduction of 6 test locations to 3 per hand.
3. GR-pp, Reduction of 6 items to 4 items.
4. Instruction manual revised for improved objectivity and standardization.

Conclusions: GRASSP was modified to improve objectivity, reduce assessment time, and improve usability. GV2 was launched in spring of 2017.
Health and Dollar Cost of Pressure Ulcer in SCI: Single Centre Retrospective study (2006-2016)

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¹Burwood Spinal Unit

Biography:
Dr Raj Singhal is the clinical director of the Burwood Spinal Unit, Christchurch, New Zealand. He trained at the National Spinal Injuries Centre at Stoke Mandeville Hospital in U.K. He holds U.K, South Africa, Australia and NZ patents for a traction reduction device to reduce C-Spine fracture dislocations. He is also involved in various other multi-centre trials. Pressure Ulcers in SCI is one of the areas of special interest. He also is involved in setting up charitable community based spinal clinic and workshop in Samoa. He is also the president of ANZSCOS (Australia New Zealand Spinal Cord Society).

Introduction:
Pressure Ulcers in SCI is a global problem. The impact of pressure ulcer in SCI has huge psychosocial and economic consequences both for patients and society in general.

Method:
We did a retrospective analysis of all patients who were admitted to Burwood Spinal Unit following pressure ulcers needing debridement and surgical intervention between 2006-2016. The study was to look at length of stay, Surgical costs and calculate an approximate dollar cost per pressure ulcers treated. We also looked at the psychosocial aspects of these admissions.

Results:
62 patients were included in the study. 40 were admitted under Accident Compensation Corporation and 22 under Ministry of Health funding. There was higher incidence of pressure ulcers in AIS A patients and recurrence of pressure ulcers seen in patients who had pressure ulcers in the past. Average Length of Stay in the Burwood Spinal Unit was 4 months. The break down of surgical costs and each bed day cost was looked into.

Conclusions:
Pressure ulcers in SCI come with a huge socio economic cost to the individual patient. We have tried to calculate the economic and psychosocial cost of pressure ulcers in our study population. We estimate the figures will be much higher than the stipulated cost as we are only looking into the hospital admission data. Community related costs with dressing changes, extra care input for bed rest which in some cases was nearly a year before they could be admitted in the Spinal Unit.
Health-related quality of life findings from the multi-site assessor-blinded Spinal Cord Injury Physical Activity (SCIPA) ‘Full On’ randomised trial

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Biography:
NO BIO

Spinal cord injury (SCI) can profoundly affect health-related quality of life. We investigated health utility and quality-adjusted-life-year (QALY) outcomes from the ‘Full On’ trial, which compared a 12-week intensive therapy program comprising FES-assisted cycling, bodyweight-supported treadmill training, and trunk and lower limb exercises (intervention, “IN”) with upper body training (control, “UB”).

One hundred and sixteen participants (C1-T12, AIS A-D) were randomised. Utility was assessed using Assessment of Quality of Life-8 (AQoL-8) at baseline, post-intervention and six months post-randomisation; QALYs to six months were estimated using the ‘area-under-the-curve’ method. Analysis was per intention to treat.

IN (n=60) and UB (n=56) groups were similar at baseline: 84% male; mean age 42 years; mean time since injury 8 years; 56% had tetraplegia; 61% had AIS A or B injuries.

Overall, both groups made very modest utility gains; between-group mean differences were not significant. Adjusted mean QALY difference was 0.007 (95% CI: -0.02, 0.03, p=0.51).

Exploratory subgroup analysis however showed that for AIS C/D injuries, the six-month between-group utility difference favouring IN approached significance (mean difference: 0.14, 95% CI: -0.00, 0.28, p=0.05). Adjusted mean QALY difference was significant (mean difference: 0.04, 95% CI: 0.00, 0.08, p=0.04). IN’s mobility improvements measured by AQoL-8 item ‘Ease of getting around’ may explain these differences (six-month between-group mean disutility difference: -0.19, 95% CI: -0.33, -0.06, p=0.008).

In conclusion, the intensive therapy program showed no detectable advantage over upper body training for SCI in general, but shows promise for people with AIS C/D injuries. Further research with larger samples is recommended.
Heterotopic ossification in Guillain Barre syndrome: a case report and systematic review of the literature

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1 University of Ioannina Medical School

Biography:
Associate Professor of PMR Surgical Division, University of Ioannina Medical School, Greece
Director of the Department of Physical Medicine and Rehabilitation, University Hospital of Ioannina, Greece
Orthopaedic Spine Surgeon, Private Practise, Thessaloniki, Greece

Introduction: Guillain Barre Syndrome (GBS) is rarely complicated by heterotopic ossification (HO). The objective of this study is to present a case of a GBS patient who developed HO in both hips joints and to systematically review the literature.

Methods: This is a case report of a 67 year-old man who presented with severe motor paralysis (C2 ASIA C) and remained intubated with mechanical ventilation in the intensive care unit (ICU) for 35 days. Following extubation, he was transferred to our PMR Department. Due to painful range of motion of both hips with normal plain radiographs but abnormal serum alkaline phosphatase values (range 260-450), oral indomethacin and etidronate were initiated but two weeks later radiographic appearance of HO was evident in both hips.

A systematic review of the literature of the terms (or synonyms) 'heterotopic ossification' and 'Guillain Barre syndrome' was also performed.

Results: The patient continued the rehabilitation program as inpatient for 10 weeks totally and before discharge he could ambulate with a walker (WSCI 13) but had flexion contractures of both hips. Eight relevant studies with 16 patients with HO and GBS were found. Bilateral hip HO was reported in another 2 patients. Common causative factors of HO were mechanical ventilation-hypoxia, prolonged stay in the ICU and severe paralysis.

Conclusions: In addition to other 16 cases (2 only with bilateral hip HO) in the literature, this rare case reconfirms that mechanical ventilation, prolonged stay in the ICU and severe paralysis are predisposing factors for HO in GBS patients.
High incidence of falls and fall-related injuries in persons with spinal cord injury

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Biography:
NO BIO

Introduction: Knowledge regarding falls and fall-related injuries in persons with spinal cord injury (SCI) is scarce. To enable prevention, further research is required as falls seem to be common and may have serious consequences.

Aim: Identify the 1-year incidence of falls and related injuries, and risk indicators of recurrent falls (≥3/year) and related injuries in persons with SCI.

Methods: 224 persons (73 ambulatory) with traumatic SCI were consecutively recruited at follow-up in two rehabilitation institutions in Sweden and Norway. Inclusion criteria: ≥ 18 years, ≥ 1 year post SCI. Exclusion criteria: motor complete injuries above C5. Falls were reported by text messages every second week and followed up with telephone interviews. Multivariate logistic regression analysis was used to identify risk indicators.

Results: 70% fell and 36% fell recurrently and ambulatory persons fell most, 43% were injured, and 5% had serious injuries. For wheelchair users previous recurrent falls was an indicator of recurrent falls (OR=10.3 CI 4.27-24.74) and quality of life of fall-related injuries (OR=0.86). For ambulatory persons slower maximal walking speed, previous recurrent falls and fear of falling were indicators for recurrent falls (OR=1.35 CI 1.04-1.75) (OR=111, 95% CI 8.6-1425) (OR 6.1, 95% CI 1.43-26), the latter two also of fall-related injuries (OR=4.2 95% CI 1.2-14) (OR=4.3, 95% CI 1.3-14).

Conclusion: Falls and fall-related injuries were common. Despite a broad perspective on contributory factors, risk indicators were difficult to identify. Previous recurrent falls was a strong indicator of future recurrent falls in persons with SCI, both ambulatory and wheelchair users.
Higher drug cost for pregabalin/gabapentin shouldn’t dissuade clinicians from prescribing this intervention in spinal cord injured individuals for neuropathic pain

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Biography:
Brian Chan is a Post-doctoral Fellow with the Neural Engineering and Therapeutics Team at Toronto Rehabilitation Institute. He received his Doctorate of Philosophy from the Department of Pharmaceutical Sciences and Bachelor and Masters of Science degrees from the Department of Pharmacology at the University of Toronto. His Doctoral work examined the “Economic burden of chronic ulcers”. Brian’s research interests are in economic analyses of spinal cord injury. His strengths are in decision modelling, developing cost-of-illness studies and economic evaluations using administrative health care data and translating economic evidence to stakeholders.

Introduction: Canadian guidelines for treatment of neuropathic pain in spinal cord injury (SCI) recommend pregabalin or gabapentin as first-line therapy followed by amitriptyline (second line). To understand the economic impact of this recommendation we evaluated the health care costs of SCI individuals with neuropathic pain prescribed pregabalin/gabapentin compared to amitriptyline.

Methods: Former patients of a tertiary SCI rehabilitation facility in Ontario, Canada were recruited to participate in a one year prospective study evaluating health care utilization, costs and health outcomes. Participants were over 18 years of age, C1-T12, AIS A-D, injury duration greater than 1 year with neuropathic pain and attended quarterly phone follow-up. Information collected include: hospitalizations, physician visits, other health care practitioner visits, drugs prescribed and equipment. Data was converted to 2016 Canadian costs using publicly available sources.

Results: Seventeen individuals were prescribed pregabalin/gabapentin and 7 amitriptyline. Median monthly cost for pain-related prescription drugs was $102 for pregabalin/gabapentin and $66 for amitriptyline. However, total median monthly healthcare costs were $1,987 for pregabalin/gabapentin and $3,357 for amitriptyline. Greatest cost differential was observed in emergency department ($1,211 for amitriptyline and $0 for pregabalin/gabapentin) and mobility equipment/device ($207 for amitriptyline and $0 for pregabalin/gabapentin). There was no difference in physiotherapy and occupational therapy costs. Results were limited to self-report of costs for small case series in Ontario.

Conclusions: Higher prescription drug costs for pregabalin/gabapentin were not the primary cost driver for monthly healthcare costs. Higher total healthcare costs for amitriptyline were driven by higher emergency department visits and mobility equipment/device purchases.
Housing accessibility among older adults with long-term spinal cord injury: Reliability and validity of the Housing Enabler instrument

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\textsuperscript{1}Centre For Ageing And Supportive Environments (CASE), Lund University

Biography:

Registered Occupational Therapist since 2000, accepted as PhD student 2012. PhD project on "Aspects on housing and health when ageing with a Spinal Cord Injury". Especially interested in housing accessibility.

Introduction
The Housing Enabler (HE) is an instrument capturing housing accessibility, not used in samples with long-standing spinal cord injury (SCI) previously. The aim was to investigate potential threats to reliability and validity of the HE, identified during data collection. Diagnose-specific combinations of functional limitations, high frequencies of extensive housing adaptations and use of mobility devices were observed.

Methods
Data from a cross-sectional study on ageing with SCI (N=123, tetraplegia AIS A-C N=22, paraplegia AIS A-C N=41, all AIS D N=60) was utilized. Potential impact on reliability and validity of the HE was evaluated in an iterative process using expert panel approach. Simulated analyses with HE scoring calculation adjusted for housing adaptations and use of mobility devices were conducted. Frequencies of combinations of functional limitations were compared with other samples.

Results
Housing adaptation features and mobility devices like powered wheelchairs frequently observed in the sample were considered to impact on the reliability and validity of the HE. A few complex, diagnose-specific combinations of functional limitations covered 80% of the SCI sample; such patterns in general ageing population samples were dominated by no functional limitations or less complex combinations.

Conclusion
Data collection and analyses of housing accessibility in samples characterized by diagnose-specific combinations of functional limitations and high frequencies of housing adaptations and/or use of mobility devices (such as powered wheelchairs) require attention. For valid assessment and analysis using instruments like the HE, specific instructions/recommendations should be developed. Further studies are needed to propose optimized changes to maintain reliability and validity.
How does a charity like the spinal injuries association support a nhs pathway for people with spinal cord injury?

Mrs Carol Adcock, Mrs Deborah Green

Spinal Injuries Association

The Spinal Injuries Association (SIA) is a national UK charity supporting people with acquired SCI and currently has around 8,000 members. The vision of the charity is ‘A fulfilled life for all after SCI’ and this is achieved via campaigning, education, advice and peer support.

Those previously declined by spinal cord injury centres were usually lost to follow up and outcome measures, other than by anecdotal reports from SIA Regional Peer Support Officers and surveys of its SCI members.

There is a partnership working agreement in place between SIA and two of the key spinal cord injury centres in England, which states that those patients declined by the specialist centre should be referred on to the SIA service for support.

Identifying those who will benefit from spinal cord injury centre outreach services will be a key role for the SIA Nurse Advocates who receive referrals from health professionals and service users themselves.

The existing pathways for SCI people need to meet the requirements of the changing demographics and recent service review of spinal cord injury treatment centres within the UK. Partnership working agreements with neuro-rehabilitation centres / networks need to be in place to ensure that the SCI person still receives multi-professional specialist input. The SIA Nurse Advocate service is a valuable resource to help inform on the outcomes of those who do not access specialist spinal cord injury centres the SCIC’s to help shape services.
Human Rights and Access to Technology by People with Spinal Cord Injury

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¹Case Western Reserve University, ²University of Miami

People with spinal cord injury (SCI) experience limitations that challenge physical, psychological, and social health. Interventions for remediating the effects of SCI are evolving. Unfortunately, such interventions can be financially prohibitive or available only in small clinical trials, often leaving important health needs unmet.

The human rights of people with SCI are inarguable from a moral perspective. Rights to technology are mandated extensively in the United Nations’ Convention on the Rights of Persons with Disabilities, ranging from communication technology to mobility aids. The International Covenant on Economic, Social, and Cultural Rights articulates the right to benefit from scientific progress and its applications. Yet, persistent gaps between research and commercialization prevent those with SCI from benefitting from technology.

This course will explore the challenges and opportunities in making important technology aimed at reducing disability universally available to people with SCI. Human rights are universal, inalienable, and designed to promote equality. It is a violation of human rights to prevent access to technology that can enhance freedom of movement and foster independence. Specific issues surrounding access to technology for an orphan population such as SCI within the context of human rights will be discussed, including the responsibilities, risks, and costs of constituents involved in technology development.

Seeking solutions for technology access from a human rights perspective also has potential value as a model for improving access to broader, specialized, rehabilitation interventions by people with SCI. Interactive discussion will be facilitated with the goal of effecting meaningful avenues for social action and ultimately, policy change.

Upon completion, workshop participants will:
1. Identify the issues surrounding limited access to technology for an orphan population such as SCI.
2. Identify and articulate human rights that can enable people with SCI to access technology.
3. Discuss the responsibilities, risks, and costs of constituents along the technology development path to improve access and availability to the end user.
4. Explore the advocacy roles of people with SCI and other stakeholders and methods by which systemic change can occur.
Idiopathic pachymeningitis, IgG4-related sclerosing disorder?

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Biography:
NO BIO

Idiopathic hypertrophic spinal pachymeningitis is a rare inflammatory disorder characterized by hypertrophic inflammation of the dura mater. Here we report two cases of IHSP with fibrosclerosing disease in other organs.

Male, 41-year-old, presented with sudden pain of left upper extremities. Magnetic resonance imaging (MRI) revealed subdural mass compressing the spinal cord along the C4 to C6 levels. Positron emission tomography revealed that multiple hypermetabolic lesion in pharynx, left cervical lymphatics, C4-6 spines. The tonsil biopsy showed diffuse infiltration of lymphoplasma cells. Two months later, he presented with weakness of all extremities, psoriasis-like eruptions. He underwent C4 to C6 laminectomy and the mass was totally resected. Histology revealed inflammatory sclerotic lesion with lymphoplasma cell infiltration and IgG4/IgG ratio of 10%. The serum IgG4 level was 10.8mg/dl. We initiated oral prednisolone then he had a near incomplete motor recovery.

In the second case, a 60-year-old woman presented with tetraplegia, urinary difficulties, and hypesthesia below T4 dermatome. MRI showed a subdural mass involving from C3 to C6 level with diffuse enhancement. Decompressive laminectomy revealed dural thickening from C4-T5 expanded by perivascular lymphoplasmacytic infiltration(IgG4/IgG ratio of 25%). The patient was treated with steroid pulsed therapy. Unfortunately, she showed no improvement. Eight years later, patient was admitted as flank pain. Abdominal computed tomography revealed cholangitis with infiltration of IgG4-bearing plasma cells (7/high-power field) on biopsy findings. The serum IgG4 level was 27.2mg/dl. The absence of underlying of infective, neoplastic, or systemic autoimmune disease favors IgG4–related sclerosing pachymeningitis.
Imaging characteristics and risk factors of poor prognosis following acute traumatic cervical spinal cord injury with severe paresis

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**Biography:**

**Education and Occupation**

2003- M.D Fukushima Medical University School of Medicine
2003-2013 Resident in Orthopaedic Surgery, Keio University
2013- Ph.D. Graduate School of Medicine, Dept. of Orthopaedic Surgery, Keio University
2013-2016 Medical Staff in National Hospital Organization Murayama Medical Center
2016-2017 Medical Staff in Hokkaido Spinal Cord Injury Center
2017-Present: Medical Staff in National Hospital Organization Murayama Medical Center

**INTRODUCTION**

A prediction of functional prognosis after cervical spinal cord injury (CSCI) remains difficult. The purpose of this study is to reveal the MRI and CT characteristics and risk factors that influenced poor outcomes following acute traumatic CSCI with severe paresis.

**METHODS**

Consecutive 416 traumatic acute CSCI patients, who were evaluated for neurological impairment within 5 days after injury at our institute, were eligible for this study. Patients with Frankel grade (FG) A or B at admission were selected and divided into two groups according to functional outcomes at the time of discharge, retrospectively. Patients with FG B or lower at discharge were categorized as poor outcome group (PO group) and patients with FG C or higher as good outcome group (GO group). MRI and CT characteristics and risk factors that reflected clinical outcomes were assessed.

**RESULTS**

Of 89 CSCI patients with FG A or B at admission, 28 were categorized as GO group and 50 as PO group. Logistic regression analysis revealed that spot sign in injured cord, existence of 50% stenosis and diffuse cord swelling sign of MRI characteristics and presence of DM were significant risk factors of poor outcomes (p<0.05).

**CONCLUSION**

These results revealed that MRI features such as spot sign, 50% stenosis and diffuse swelling sign, and presence of DM were highly indicative of poor prognosis for the patients with severe paresis. We should take a consideration of possibility of poor prognosis when we find such a negative characteristic.
Implementing Best Practices for pain in SCI: What are the indicators telling us?

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1University Of Alberta

**Biography:**
Dr. Rebecca Charbonneau is a clinical assistant clinical professor in the Division of Physical Medicine and Rehabilitation at the University of Alberta. She is also the Medical Lead for Spinal Cord Injury. Dr. Charbonneau received her undergraduate education at McMaster University followed by medical education at the University of Western Ontario. She completed residency training at Dalhousie University in Halifax.

Dr. Charbonneau’s main clinical interests are in the field of spinal cord injury, including neurogenic bladder, pressure ulcers, neuropathic pain, and spasticity.

**Introduction:**
For many patients with spinal cord injury (SCI), pain has a significant impact on quality of life, with over 50% of patients developing chronic pain. Best practice guidelines suggest the completion of an interdisciplinary assessment of pain including etiology, pain intensity, effect on function, and psychosocial stress. Best practice guidelines also recommend that clinicians should discuss and document the patient’s concerns and expectations, the available treatment plan, coping strategies, and provide education.

**Methods:**
The National Implementation Research Network frameworks provided tools for outlining critical components of best practices and process and outcome indicators. A Site Implementation Team developed an action plan to address key implementation drivers such as training, communication, and data support systems. To measure success of implementation, a chart audit was completed to collect indicators on 155 patients from an SCI and general neurology tertiary inpatient rehabilitation unit. The patients with spinal cord injury had both traumatic and nontraumatic SCI ranging from cervical to lumbar level of injury, and AIS A to D severity of injury.

**Results:**
The incidence of pain was over ninety percent. After implementing best practice guidelines for pain assessment: pain was documented on the international SCI pain basic data set (94% post), interprofessional pain plans were complete (93% post), and patient education regarding pain increased (62% pre, 88% post).

**Conclusions:**
Initial analysis indicates that implementation of an interdisciplinary pain assessment has been successful. Patients report that pain interfered less with day-to-day function, sleep, and mood at discharge compared with on admission.
Improved diagnosis of cervical myelopathy through multi-modal neurophysiological assessments

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Objectives: To investigate the sensitivity and responsiveness of multi-modal neurophysiology to assess cervical spondylotic myelopathy (CSM).

Methods: Patients were recruited from the outpatient clinic and MRI scans were performed to verify the diagnosis. A neurological examination and a set of multi-modal neurophysiological assessments including contact heat and cold stimulation (CHEPs and CEPs), pinprick stimulation and dermatomal somatosensory evoked potentials (dSSEPs) were performed to determine neuronal damage.

Results: Impaired cortical responses were found in dermatomes above, at and below the radiological level of lesion. CHEPs displayed a high diagnostic accuracy to discriminate between patients and age-matched healthy controls in cervical dermatomes. Dissociation of pinprick responses and temperature sensation could be objectively documented in one case. CEPs generally paralleled the CHEPs results, being a viable alternative to contact heat stimulation in patients not tolerating the noxious heat stimuli.

Discussion: Multi-modal neurophysiological assessments are of high diagnostic yield in the study of spinal cord impairment related to CSM. The thermal and mechanical stimuli applied specifically activated peripheral Adelta nociceptors and ascended through the spinothalamic tract. Central myelopathic changes often affect the anterior and antero-lateral aspects of the cord where the spinothalamic projections are located, rendering them vulnerable to damage. The extent of the myelopathy can be further localized through a multisegmental approach.

Conclusions: Using multi-modal neurophysiology, subtle alterations in neuronal function can be disclosed. CHEPs are sensitive to track neurological impairment in CSM.
Incidence and types of congenital posterior arch defects of Atlas in Indian population

Dr Saransh Gupta¹, Dr Gururaj Sangondimath¹, Dr Harvinder Singh Chhabra¹

Introduction: Congenital anomalies of the posterior arch of the atlas vertebrae are very rare ranging from partial clefts to total aplasia. Reported prevalence is 0.95 to 4%. Their detection is clinically important, since they can cause chronic neck pain or even myelopathy. Some of the defects can mimic a Jefferson fracture and lead to misguided clinical management.

Methods: We examined 500 CT scans of the upper cervical spine.

Results: Total 23 vertebrae found to have congenital defect accounting 4.6% percentage. Predominant type was type A. Additionally we noted Anterior arch defects in 9(1.8%) vertebrae.

Conclusion: Even though the arch defects are rare, it is worthy to recognize and classify the exact type to prevent further neurological complications, diagnostic error and for proper management.
Incidence of Urinary Tract Infection after urodynamics (UDS) in Patients with Spinal Cord Injury (SCI): Intermittent catheterisation versus reflex voiding

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²Salisbury NHS Foundation Trust

Biography:
Aram Mashoof Fard, MSc, MD, MRCP
Dr Aram Mashoof Fard currently serves as a consultant in spinal Cord Injuries and Rehabilitation Medicine at the Duke of Cornwall Spinal Treatment Centre (DCSTC) in Salisbury, which covers southwest and southeast of England. Her special interest is Respiratory Management of patients with Spinal Cord Injury. She serves as the clinical lead of the centre in this area. She also serves as a recognised Educational Supervisor in Wessex Deanery, in England, and supports the specialty trainees in Rehabilitation Medicine attending the DOCSTC.

Background: Research regarding infection rates after UDS for patients with SCI considering the method of bladder management is scarce.

Aim: This literature review aims to compare the incidence of urinary tract infection after urodynamic in patients with SCI who use intermittent catheterisation and reflex voiding.

Methodology: A review of literature was conducted, searching Medline, Embase, and the Cochrane library and reference list for relevant studies.

Results: In a prospective study of 72 SCI patients in an outpatient setting, 49 patients were performing intermittent catheterisation (IC) and 23 patients were using reflex voiding. Those patients who performed clean intermittent catheterisation had a higher incidence of significant UTI after UDS (8.3%) compared to those patients who emptied their bladder by reflex voiding (1.4%).

Another prospective observational study in Germany published in 2013, reviewed 133 patients [51 using intermittent self-catheterisation (ISC), 63 using intermittent catheterisation (IC) by attendant and 19 using reflex voiding]. There were only minor differences between patients with ISC and IC by attendant (incidence of de-novo-UTIs, 8.82% and 6.67% respectively), but in SCI patients with reflex voiding, the occurrence of de-novo-UTIs post UDS was almost twice as high (14.28%).

Another prospective study reported a very low incidence of urinary tract infection that required antibiotic treatment in patients using clean intermittent catheterisation not receiving prophylactic antibiotics for urodynamic evaluation.

Conclusion:
Multi centre well performed studies are needed to look at the incidence of urinary tract infection after urodynamic procedure in patients with SCI considering the method of bladder management.
Innovations in locomotor training using a practice-based research approach

Ms Stephanie Marrocco1, Ms. Jane Hsieh1, Dr. Dalton Wolfe1,2, Ms. Stephanie Cornell1, Ms. Melissa Fielding3, Ms. Anna Kras Dupuis1, Ms Anna Rudkovska1,2
1Parkwood Institute, 2Western University

Biography:
NO BIO

Introduction
Therapeutic modalities for locomotor training, (e.g., manual/robotic treadmill training) are typically studied in isolation, often without a record of supplementary therapeutic activities. In practice, a combination of these activities are selected based on many factors (e.g., patient characteristics). The Parkwood Program for Rehabilitation Innovations in Movement Enhancement (PRIME) protocol involves a systematic approach for selecting therapeutic activities and standardized assessments. The present submission represents a practice-based research approach to identifying practice patterns that are correlated with optimal outcomes for each patient, as well as the feasibility of this approach.

Methods
Therapy modalities and supplementary activities are recorded using a modified version of the “MaLT” (Mapping of Locomotor Training), in use by EMSCI (Curt et al., 2016). A battery of assessments will be collected for 10 successive admissions to SCI programs at Parkwood Institute, with the Canadian Standing and Walking Assessment Tool (C-SWAT) acting as the primary measure of a given patient’s function, along with measures of therapist feasibility. Relationships of outcomes with practice patterns will be examined.

Results
A preliminary trial of the various processes conducted in isolation (i.e., assessment battery, MaLT, PRIME protocol) demonstrated initial feasibility with each aspect. The C-SWAT was noted to be a useful clinical indicator of walking status.

Conclusion
Gaining further insight into decision making around therapy selection and their effectiveness is integral to better understanding the most appropriate plan for a given patient. This will further inform the development of clinical protocols and advance the field of activity-based therapy research and clinical practice.
Poster Board Number: 159

Intensive exercise program after spinal cord injury (SCIPA Full-On): A randomized controlled trial

**Professor Mary Galea**¹, Professor Sarah Dunlop², Professor Timothy Geraghty³, Professor Glen Davis⁴, Dr Andrew Nunn⁵, Ms Liudmyla Olenko⁶

¹The University Of Melbourne, ²The University of Western Australia, ³Princess Alexandra Hospital, ⁴The University of Sydney, ⁵Austin Health, ⁶Florey Institutes of Neurosciences and Mental Health

**Biography:**
Professor Mary Galea is Professorial Fellow in the Department of Medicine (Royal Melbourne Hospital), University of Melbourne and was previously Foundation Professor of Clinical Physiotherapy based at Austin Health. As a physiotherapist and neuroscientist, her research program includes both laboratory-based and clinical projects with the overall theme of control of voluntary movement by the brain, and factors that promote recovery following nervous system damage. She was the principal investigator on a large multi-site program of research, SCIPA (Spinal Cord Injury and Physical Activity), investigating the effects of exercise after spinal cord injury from acute care to the community.

Introduction: While upper body training is effective for improving aerobic fitness and muscle strength after spinal cord injury (SCI), activity-based therapies (ABT) intended to activate the paralysed extremities have been reported to promote neurological improvement. We investigated the effectiveness of intensive ABT compared with upper body training for people with SCI.

Methods: One hundred and sixteen participants (C2-T12, AIS A-D) were recruited from six SCI units in Australia and New Zealand, and randomised to experimental or control groups. Experimental participants received a 12-week ABT program including locomotor training, functional electrical stimulation-assisted leg cycling, and trunk and lower extremity exercises, while control group participants undertook upper body strength and aerobic fitness training. The primary outcome measures were the ASIA motor scores for upper and lower extremities.

Results: One hundred and three participants completed the interventions and were included in the primary analysis. Mean (SD) upper extremity motor scores for experimental (n=49) and control (n=54) groups were 41.45 (12.11) and 39.39 (11.94), respectively, with an adjusted mean between-group difference of -0.039 (95% CI: -1.12 to 1.04). Mean (SD) lower extremity motor scores were 12.51 (17) and 10.24 (17.19) for experimental and control groups, with an adjusted mean between-group difference of 0.895 (95% CI: 0.48 to 2.27). There were 15 serious adverse events within each group, but only one of these was related to the experimental intervention (bilateral femoral condyle and tibial plateau subchondral fractures).

Conclusion: Activity-based therapy did not lead to greater improvements in ASIA motor scores compared to upper body training.
Interdisciplinary meetings as a core element of rehabilitation management of spinal cord injured patients: a qualitative focus group analysis

Dr Anke Scheel-Sailer\textsuperscript{1,2}, Mirela Nedeva\textsuperscript{1,2}, Prof. PhD Sara Rubinelli\textsuperscript{2,3}, Klaus Schmitt\textsuperscript{1}, Diana Sigrist-Nix\textsuperscript{1}, PhD Claudia Zanini\textsuperscript{2}

\textsuperscript{1}Swiss Paraplegic Centre, \textsuperscript{2}Departhe of Health Science and Health Politics, University of Lucerne, \textsuperscript{3}Swiss Paraplegic Research

Background: Rehabilitation of spinal cord injured (SCI) patients is specific, complex and based on assessments, intervention and evaluation of outcomes in line with the International Classification of Functioning, Disability and Health (ICF). In an inpatient setting rehabilitation management cumulates in interdisciplinary team meetings (ITM).

Objective: To identify challenges of ITMs in SCI rehabilitation and the health professionals’ suggestions for its optimization.

Design: Qualitative explorative.

Subject: A maximum variation purposive sample of established interdisciplinary teams.

Methods: Three focus groups were conducted. Data were inductively analyzed by qualitative thematic analysis.

Results: In total 30 health professionals participated. Challenges in the ITM concerned organization (e.g. time pressure, prioritization of patients), requirements in the interdisciplinary team (e.g. concurrent required tasks as listening, informing, documenting and deciding), information exchange (e.g. time consuming electronic documentation system, missing information due to representatives) and rehabilitation management with emphasis on goal setting (e.g. individual rehabilitation course of the patient, complexity of influencing factors, integration of the patient itself). The ICF’s framework was confirmed in its usefulness, but its concrete application (e.g. codes and language) was discussed ambiguous. Recommendations for optimizing the ITM included better visibility of information, integration of available data, introduction of a person who documents the interdisciplinary information and decisions to reduce the burden of the health professionals in the ITM and integration of the patient.

Conclusion: The study confirmed the importance of the ITM in the SCI rehabilitation management for information exchange and coordination. Health professionals themselves provided valuable ideas for the optimization of the ITM.
International scoping review of facilitators and constraints to daily activities among persons with SCI: Lessons for low and middle-income countries

Mr Yeasir Arafat Alve¹, Prof. Peter Bontje²
¹Doctoral Student, Department of Occupational Therapy, ²Professor, Department of Occupational Therapy

Biography:
Lecturer in Occupational Therapy, Bangladesh Health Professional Institute (BHPI), Centre for the Rehabilitation of the Paralysed (CRP), Chapain, Savar, Dhaka - 1343. Bangladesh.

Study design: Scoping review.

Objectives: To identify and understand facilitators and constraints to occupational participation of persons with spinal cord injury (SCI) living High Income Countries (HICs) and Low and Middle Income Countries (LMICs).

Methods: 62 out of 2406 articles published between 2001 and 2016, identified from electronic database searches, were selected following in- and exclusion criteria. The analysis consisted of categorizing the data according medical, social and human rights models of understanding disabilities, with additional comparisons between LMIC and HIC. The categories were then subdivided into themes around issues that the facilitators and constraints shared.

Result: The findings indicate that (1) under the medical model, self-efficacy and adjustment skills, physical health and functional capacities, availability of cost-effective adaptive equipment, and recapturing occupational performance capacities were key issues. (2) Under the social model, the main issues were the impact of natural and physical environment, and social relationship based on social skills and mutual understanding. (3) Under the human rights model the main issues were sovereignty as a human, and justice through application of policies, advocacy and negotiations.

Conclusion: To enhance the occupational participation of persons with SCI, LMICs need to develop mental health support, prevention of secondary complications, (advanced and affordable) technologies, accessible environments, and positive social attitudes through developing advocacy and social-justice at community level. Further research should address how family, other persons and local social-cultural conditions influence the opportunities for and quality of occupational participation for persons with SCI and how that can contribute to their long-term survival.
International Spinal Cord Injury Male Sexual Function and Female Sexual and Reproductive Function Basic Data Sets - Version 2.0

Dr Marcalee Alexander¹, Dr Peter New², Dr Fin Biering-Sorensen³, Pr Frederique Courtois⁴, Pr Giulio Del Popolo⁵, Dr Stacy Elliott⁶, Dr Carlotte Kiekens⁷, Pr Lawrence Vogel⁸, Dr Jean Gabriel Previnaire⁹

¹Birmingham VA Medical Center Birmingham, ²Spinal Rehabilitation Service, Caulfield Hospital, Alfred Health, ³Clinic of Spinal Cord Injuries, Neuroscience Centre, Rigshospitalet, University of Copenhagen, ⁴Department of Sexology, Université du Québec à Montréal, ⁵Spinal Unit and Neuro-Urology, Careggi University Hospital, ⁶Department of Psychiatry and Urologic Sciences & ICORD, University of British Columbia, ⁷Department of Physical and Rehabilitation Medicine, University Hospitals Leuven, ⁸Department of Pediatrics, Rush University Chicago, Illinois, USA, ⁹Fondation Hopale

Biography: NO BIO

Study Design: Dataset development

Objective: To describe the modifications in the updated International Spinal Cord Injury (SCI) Male Sexual Function Basic Data Set Version 2.0 and the International SCI Female Sexual and Reproductive Function Basic Data Set Version 2.0.

Setting: International

Methods: An international work group was developed to review and revise the International SCI Male Sexual Function and Female Sexual and Reproductive Function Basic Data Sets Version 1.0. This group modified version 1.0 of the data sets based upon published research, suggestions and work group consensus. The revised data sets were then posted on the International Spinal Cord Society (ISCoS) and American Spinal Injury Association (ASIA) websites for 2 months for review. Subsequently, the data sets were approved by the ISCoS Scientific and Executive Committees and ASIA board of directors.

Results: The data sets were modified to a self-report format. They were reviewed for appropriateness for the pediatric age group and modified to include terminology to address the issue of sexual orientation. A clarification of the difference between the data sets and the autonomic standards was also developed.

Conclusion: It is recommend users begin using version 2.0 of the basic sexual function data sets.
Inter-rater Reliability of the Application of the Non-Traumatic SCI Dataset to Neoplastic Cases

Dr. Kimberly Seidel¹, Dr. Marianne Luetmer¹, Dr. Ronald Reeves¹
¹Mayo Clinic

Biography:
Dr. Seidel is a resident physician in Physical Medicine and Rehabilitation at Mayo Clinic in Rochester, Minnesota. Prior to pursuing medicine, Dr. Seidel worked as a chemical engineer. Her interest in spinal cord injury began in medical school while working on a project regarding the bone health of spinal cord injury patients. In residency, she continues to take an interest working with SCI patients and exploring research topics in the field.

Study Design: Reliability Study

Objectives:
Determine inter-rater reliability in the application of the International Data Sets for Non-Traumatic Spinal Cord Injury (IDS-NTSCI) to classify complex cases of spinal cord injury secondary to neoplasm.

Methods:
The International Spinal Cord Society published the IDS-NTSCI to facilitate the standardization of myelopathy classification. During the dataset application to NTSCI cases at our institution, subjectivity was involved in the classification of neoplastic cases such as grade II ependymoma, chordoma, and fibrillary astrocytoma as it was unclear if they were benign or malignant. We summarized 15 representative challenging cases from clinical practice into clinical vignettes including initial clinical presentation, workup, and diagnosis. 23 raters, including resident and staff physicians of various specialties, independently classified each case. Kappa coefficient was calculated to determine the agreement between reviewers among the categorical variable (tumor classification) within the IDS-NTSCI. Inter-rater reliability was considered acceptable if the kappa statistic was 0.8 or greater.

Results:
Overall kappa for all cases was 0.23 with a percent agreement of 6.7% (1/15). There was most variance in the classification of high-grade ependymoma. In cases where pathology revealed astrocytoma, raters selected the least number of classifications.

Conclusion:
Inter-rater reliability among this subset of challenging neoplastic cases was poor. Future revisions of the IDS-NTSCI should consider providing directions clarifying the categorization of difficult cases. Additional inter-rater reliability analysis for different etiologies of NTSCI, including degenerative and vascular, could help identify other areas of disagreement when using the NTSCI Dataset.
Irish Physicians, Patients and Poets: Some Historical

**Professor Avi Ohry**, Professor Wagih ElMasri, Karin Ohry

1Reuth Medical Center, Tel Aviv & Tel Aviv University, Israel, 2Hunters Moor Neurorehabilitation Centre

"Interesting historical revelations of Irish contributions to Poetry and Medicine"

Avi Ohry & W.S. ElMasri

The famous Irish medical eponyms, are well known to every medical student around the world: Cheyne-Stokes respiration, Colles’ law Colles’ distal radial fracture; Adams’ heart-block, Corrigan’s pulse, Graves’ disease, and Rynd’s hypodermic injection, as well as the mineral Babingtonite (William Babington); Sir David Barry’s” hydrophobia and venomous bites” ; Jonathan Osborne’s conduction aphasia ; Jonathan Swift’s Hospital for the Insane; …

Bernard Connor in 1693, described, ankylosing spondilitis;

On May 11th, 1745, during The Battle of Fontenoy, the surgeon Géraud performed an operation on an Irish soldier from the Dillon regiment who had been wounded by a musketball: Géraud tried five times to remove the ball and bone fragments at the level of the third lumbar vertebra. The wound became infected, but the soldier recovered, and may have regained some function in his legs.

The first hospital who took care for the spinally paralyzed in Ireland [1961] was the National Medical Rehabilitation Centre, directed by Dr. Thomas Gregg. Prior to 1961, Sinn Fein's Sea'n Mac Diarmada (1883-1916) suffered from poliomyelitis; James Fintan Lalor (1807–1849) sustained an incomplete spinal injury in an accident in childhood; Constance Mary Lloyd Wilde, Oscar’s wife, sustained spinal injury due to a fall:

James Joyce, described “intellectual and spiritual paralysis” in his Dubliners, as well as the paralytic priest in: ‘The Sisters’,

Thomas Carlyle (1795 – 1881), a Scottish philosopher, satirical writer, essayist, historian and teacher, published his "Reminiscences of my Irish Journey in 1849". In Monday 2nd July, he met: "...Sick gentleman in big wicker cradle lay on the deck; poor fellow! “paralytic in the lower extremities,” going to Dublin for surgery, attended only by a rough clown of a servant; his eyes looked mild and patient, tho’ sad; intelligent white face; age probably about 35; they shifted him round out of the sun; not to embarrass him, we had to forbear looking at his cradle or him..."
Is on-label dosage of intradetrusor botulinum toxin A less effective than previous off-label dosage?

Dr Michele Spinelli¹, Dr Chiara Guerrer¹, Dr Marco Citeri¹, Dr Lucia Giovanna Zanollo¹, Dr Luigi Rizzato¹, Dr Luca Frediani¹, Dr Michele Zarbo¹, Dr Alessandra Leo¹

¹Asst Grande Ospedale Metropolitano Niguarda

Aim: evaluate the effectiveness of two types of botulinum toxin A used (abobotulinum toxin A vs onabotulinum toxin A) in their different dosages.

Methods: since March 2006 to July 2015 120 patients (70 males, 50 females; average age 44 yo; 32 Multiple Sclerosis, 26 quadriplegia and 62 paraplegia both post-traumatic) were subjected to detrusor injection with botulinum toxin A in 2 different occasions. First administration: abobotulinumtoxin A 750 and 500 U or onabotulinumtoxin A 300 U. All these patients repeated the treatment with the on-label indication of onabotulinumtoxin A 200 U in the second administration.

Results: the analysis of these data showed that the time range between first and second administration is reduced in patients treated with on-label onabotulinumtoxin A 200 U, compared to onabotulinumtoxin A at higher dose of 300 U or abobotulinumtoxin A 750 U or 500 U (statistical significance: p (750-200) =0.01; p (500-200) =0.006; p (300-200) =0.05).

The same results have been obtained analyzing the recovered data stratifying patients to pathology: paraplegia: p (750-200) = 0.02; p (300-200) =0.008; tetraplegia: p (750-200) = 0.02; p (500-200) =0.05; multiple Sclerosis: p (750-200) = 0.02; p (500-200) =0.05.

Conclusions: the clinical use of onabotulinumtoxin A 200 U is less effective, in term of duration, compared to the previous off-label dosage. Reducing the effectiveness times obviously involves the enforcement's need of a new invasive manoeuvre with possible complications attached (hematuria, infection) and with an increase of sanitary and social charge.
Poster Board Number: 7

Is there a time difference in conducting the 10 meter walking test if you start / stop statically or dynamically?

**Mrs Elisabeth Luthman**, Mr Tomas Thierfelder, Mrs Gunilla Elmgren-Frykberg

1Department of Rehabilitation Medicine, Uppsala University Hospital, 2SLU, Uppsala University, 3Department of Rehabilitation Medicine, Uppsala University Hospital

**Biography:**
Elisabeth Luthman, registered Physiotherapist at Uppsala University Hospital. Pt degree in 1984. Senior physiotherapist in Rehabilitation medicine, the main focus on rehabilitation of patients with neurological disorders mainly spinal cord injury but also patients with traumatic brain injury and neurological diseases, both inpatient and outpatient clinic.

In depth studies at Uppsala University on medical topics e.g. neurology, physiology, neurophysiology and pharmacology.

Currently finishing Degree of Master (one year) with a scientific paper about the 10 meter walking test

**Introduction**
The quick and reliable 10-meter Walk Test (10MWT), is frequently used of physiotherapists worldwide. However, a standardised way in conducting the 10MWT has not been reported in the literature.

**Method**
The main objective of this study was to investigate if there is any difference in time used during the 10MWT when it is conducted with a static start and stop compared to a flying start and stop. Thirty individuals with neurological disorders were recruited, with SCI (ASIA D), MS and Stroke. Thirty healthy individuals were recruited matching the test persons. All 60 individuals performed the 10MWT in eight different conditions including static start and stop and flying start and stop with different length of the acceleration and deceleration area.

**Result**
- Significant differences in time used between a static start and stop compared to a flying start and stop with a 1,2 or 3 meter acceleration and deceleration area in the SCI group.
- Significant differences in time used to perform the test between the test group and the control group
- The stroke group took the longest time to complete the test and the spinal cord injury group the shortest.
- Separate variables such as spasticity, balance or muscle strength cannot alone explain the differences in time used when performing the 10 MWT.

**Conclusion**
- The results indicate that acceleration and deceleration areas of 1-3 meter do influence time used in 10MWT for subject with spinal cord injuries. Thus, the test needs to be performed in the same way when repeated
Spinal cord injury (SCI) is a major contributor to global disability adjusted life years, and has devastating effects on the physical, mental, social, sexual and vocational lives of the injured. While road traffic crashes are the leading cause of SCI, in low and middle income countries (LMIC) falls from a height is also a major contributor. Even in high income countries (HIC), falls are one of the major causes of hospitalization in people over the age of sixty-five. It has been noted in a study (add reference) that the relative frequency of MVC-related SCI did not change significantly during the period from 1975 to 2009. However, the relative frequency of fall-related SCI has increased in these years significantly. It is therefore prudent that ideal strategies for preventing falls may be identified and an action plan may be finalized for implementation amongst specific regions. The workshop will hence discuss the changing epidemiological profile of SCI, necessitating the need to deliberate on this topic, brainstorm prevention strategies, consider policy implications and how to effectively translate interventions at a population level.

Separate plan proposals for Preventing SCI due to low and high Falls will be formulated based on responses to a questionnaire circulated to all ISCoS members, as well as other relevant documents. The draft plan proposal will then be circulated to Prevention Committee members. The resultant plan proposal incorporating comments/suggestions would be presented in the workshop. The plan would then be finalized based on discussions during the workshop and circulated amongst all stakeholders for implementation in their region of work.

Topic and presenter

1. Epidemiology of SCI: Changing profile on cause from RTA to Fall (07 min): Bonne Lee
2. Plan proposal to prevent SCI due to low falls (10 min): Vanessa Noonan
3. Plan proposal to prevent SCI due to high falls (10 min): James Middleton
4. Panel Discussion: Deliberations on action plan for Preventing SCI due to Fall (50 min): H S Chhabra/Gaurav Sachdeva
5. Take home message (03 min)
ISCoS Prevention Committee Poster: ISCoS Database ASCoN Pilot Project (IDAPP) Final Report

Dr Gaurav Sachdeva¹, Dr Harvinder S Chhabra¹, Dr Apichana Kovindha², Dr Nazirah Hasnan³, Mr Mohd Sohrab Hossain⁴, Dr Yusniza Mohd Yusof⁵, Dr Farhah Amalina Muhammad Ehsan⁶, Dr Narendra Pinto⁷, Ms Esha Thapa⁸, Dr S Rajasekhran⁹

¹Indian Spinal Injuries Centre, ²Chiang Mai University, ³University of Malaya, ⁴CRP, ⁵Cheras Rehabilitation Hospital, ⁶Queen Elizabeth Hospital, ⁷National Hospital of Sri Lanka, ⁸Spinal Injury Rehabilitation Centre, ⁹Ganga Hospital

Biography:

No Bio

ISCoS global mapping project for traumatic spinal cord injury brought out the paucity of data from less and least developed countries. Recognizing this need, IDAPP (ISCoS Database: ASCoN Pilot Project) of one year duration, was proposed as the first step of a long-term International SCI database. The primary objective of the IDAPP study was to capture demographic and selected injury/safety data on SCI patients admitted at selected ASCoN (Asian Spinal Cord Network) centers with a view to formulate the prevention strategies. The secondary objectives of the study were to assess appropriateness of database variables and processes involved with a view to provide guidance for a large scale global project.

Patients were enrolled 1st October, 2015 to 30th September 2016 in 09 centres from 06 Asian countries. Total number of patients enrolled in the IDAPP study was 975, out of which 790 (81%) were males. In the study, fall (n=513) was the most common cause of SCI in comparison to transport related injury (n=374) in the region. Eighty nine percent patients had vertebral injuries, of which 73% underwent spinal surgeries.

More than half (57%, n=547) of all SCI were complete injuries (AIS ‘A’), whereas 43% (n=408) were incomplete (AIS ‘B’, ‘C’, ‘D’ and ‘E’).

The study provided epidemiological data of SCI patients in the region. Results confirmed the relevance of the study, the appropriateness of design as well as data elements and ease of use of web platform. The pilot study has established the feasibility of a larger global database.
ISCOS upper limbs basic data set: does it correlate with functional scales?

Dr Gabriele Righi¹, Mrs Claudia Fortunati¹, Mrs Marta Cannobio¹, Dr Giulio Del Popolo¹

¹Spinal Unit - Careggi University Hospital

Biography:
I graduated in Medicine at the University of Florence and obtained my Specialty degree in PM&R at the University of Pisa.
I started to be interested in Neurorehabilitation since the beginning of my specialty training. I have trained and worked at various hospital in central Italy and I also have had the chance to work for 4 months at the Neurorehabilitation ward directed by Prof. Saltuari in Innsbruck.
I am currently working at the Spinal Unit of Florence since more than 1 year.
My main fields of interest are: spasticity, neuropathic pain, wearable robotics, rehabilitation techniques, outcome measures.

Introduction:
The recently published International Spinal Cord Injury (SCI) Upper extremity basic data set comprises two variables named “Basic hand-upper extremity function” and “Shoulder function classification”.
These variables can be scored rapidly but represent an accurate picture of upper extremity motor control.
We decided to test the correlation between the scores of this two variables and “Self-care” sub-scores of FIM and SCIM.

Materials and methods:
We retrospectively analysed data from 11 in-patients admitted to our Spinal Unit for acute care and rehabilitation.
We collected at admission and discharge the scores of “Basic hand-upper extremity function” and “Shoulder function classification” (both for dominant and non-dominant side) and the sub-scores of FIM and SCIM.
We then calculated Spearman’s rank correlation coefficient.

Results:
We found a significant (p<0.05) positive correlation between the sum of scores of “Basic hand-upper extremity function” and “Shoulder function classification” at discharge (both for dominant and non-dominant side) and FIM and SCIM “Self-care” sub-scores at discharge.
On the other hand, we did not find a correlation between these scores at admission.
In any case, our sample is too small to extend these results to the general population of SCI patients.

Conclusions:
“Basic hand-upper extremity function” and “Shoulder function classification” represent a rapid but reliable and accurate way to assess upper extremity motor control in tetraplegic patients. Larger, prospective trials are needed to assess the correlation between their scores and patients’ functional abilities.
Journal update: Spinal Cord

Professor Lisa Harvey\textsuperscript{1}, Professor John Steeves\textsuperscript{4}, Professor Masaya Nakamura, Dr Sonja De Groot

\textsuperscript{1}University of British Columbia, \textsuperscript{2}University of Alabama, \textsuperscript{3}Hoogstraat Rehabilitation, \textsuperscript{4}University of Sydney

Intended audience: Authors, reviewers and readers of Spinal Cord, and Spinal Cord Case and Series

Aim: To provide an overview of the Society’ two journals, namely Spinal Cord, and Spinal Cord Case and Series.

Objectives: The objectives of this workshop are to:
1. outline the scope and mission of the two journals
2. introduce the new Editor-in-Chiefs, Associate Editors, Editorial Board Members and Editorial Office manager of the two journals
3. describe the types of papers which are publication priorities for the two journals
4. provide an update on the rates of submission, rejection and time to publication of the two journals
5. explain the screening process of all submitted papers including the automatic checks for plagiarism
6. outline the review process and how decisions are made about the types of papers that are accepted
7. discuss some of the common reasons papers are rejected
8. highlight some of the advantages of publishing with the two journals
9. provide a summary of the 5-year plan for each journal including transfer to new website and electronic paper management system
10. explain some of the policies that are being introduced to help minimise bias and improve the reporting and transparency of research
11. describe some of the initiatives that have been introduced to meet funders’ and institutions’ requirements that the results of research be freely available. This includes open access for all papers after one year, freedom to post papers on public databases after 6 months and ability to post a link anywhere on the web to your paper immediately after publication.
12. provide an opportunity for participants to give feedback and suggestions for the future development of the two journals

Format: This workshop will consist of short presentations followed by opportunities for questions and discussion.
Journal update: Spinal Cord Series and Cases

Professor Marcalee Alexander

University of British Columbia, University of Alabama, Hoogstraat Rehabilitation, University of Sydney

Intended audience: Authors, reviewers and readers of Spinal Cord, and Spinal Cord Case and Series

Aim: To provide an overview of the Society’ two journals, namely Spinal Cord, and Spinal Cord Case and Series.

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12. provide an opportunity for participants to give feedback and suggestions for the future development of the two journals

Format: This workshop will consist of short presentations followed by opportunities for questions and discussion.
Ketogenic Diet reduces inflammation and promotes mitochondrial function after spinal cord injury in rodents

BSc Kathleen Kolehmainen¹,², PhD Oscar Seira¹, PhD Robert Boushel³, Professor Wolfram Tetzlaff⁴
¹University Of British Columbia (UBC) - ICORD, ²UBC - Biochemistry and Molecular Biology, ³UBC - School of Kinesiology

Introduction: Recent findings in our lab demonstrated that the ketogenic diet (KD) may be a promising SCI treatment as rats fed with KD acutely after cervical SCI showed behavioural improvement in forelimb function. KD is a high fat, low carbohydrate diet and is clinically used in drug-resistant epilepsy in children. Here we tested the hypothesis that KD improves recovery by reducing inflammation and improving mitochondrial function.

Methods: Male Sprague-Dawley rats had a C5 hemicontusion injury and were subsequently fed with a standard diet (SD) or KD beginning 4 hours after injury. Spinal cords were then extracted and assayed for cytokine levels and mitochondrial function. At 48 hours post-injury, pro-inflammatory (TNFα, IL-6, and IL-1β) and anti-inflammatory (IL-10 and IL-4) cytokine production was assessed using the MesoScale Diagnostics (MSD) multi-spot assay system. At 7 days post-injury, mitochondrial function was assayed using the Oroboros Oxygraph-2K high-resolution respirometry system.

Results: As expected, pro-inflammatory cytokine production was upregulated after SCI while anti-inflammatory cytokine levels at the 48hr time point, it did significantly increase the anti-inflammatory cytokine IL-10 suggesting that KD does have anti-inflammatory effects. As expected, mitochondrial function was reduced after SCI. However, administration of KD partially rescued function of Complex II after SCI and showed an overall improvement in mitochondrial function that approached non-injury levels.

Conclusions: KD can improve recovery from spinal cord injury, in part by promoting production of anti-inflammatory cytokines and rescuing mitochondrial function.

Funding: Craig H. Nielsen Foundation
Knowledge of attendants of persons living with spinal cord injury

Mrs Asha Khunjayum
Indian Spinal Injuries Centre- Vasant Kunj-new Delhi-India

OBJECTIVE: To assess the level of attendant's knowledge during acute phase and chronic phase of a patient with traumatic spinal cord injury.

MATERIAL AND METHODS: A specially designed questionnaire for doing a survey on 45 attendants including close relatives, friends, caregivers.

RESULTS: This study reveals a break up of total score of which, acute stage score is 30% and chronic stage is 70%.

CONCLUSIONS: Since acute phase care is as important as chronic phase care of a SC I patient, there is a compelling requirement of awareness of pre hospital acute phase management of a patient's complications. Competent Knowledge would help in preventing post-injury complications like pressure sores and contractures etc.
Learning from persons with high tetraplegia: a survey of long-term CSCI respiratory function

**Dr Maria Cristina Pagliacci**, S Biscotto, M.G. Celani, E Chiocci, V Cicioni, I Ritacco, D Gaburri, M.C. Tascini, R Maschke

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**Introduction**
Evaluation of long-term respiration related problems from subjective perspective in persons with tetraplegia, looking for new outcomes.

**Patients and methods**
Phone follow-up (FU) questionnaire, including items suggested by patients during preliminary focus group, was administered to traumatic cervical SCI, C2-C5, injured 1995-2015.

**Results**
Out of 30 patients, 2 lost, 10 died, 18 participated: mean age 48.6; mean time since SCI 8 years; neurological level C5 (55.6%), C4 (33.3%), C2 (11.1%); severity by AIS: A (61%), B (11.1%), C (27.8%). At discharge 27.8% were dependent on ventilator. At FU 33.3% were on ventilator. Only 37.8% practiced regular assisted cough (22.2% manual, 15.6% mechanical); 94.4% lived at home, spent 9 hours in wheelchair (range 4-17); went outside home at least 3 times/week (44.4%), once a week (37.8%). 77.7% attended a scheduled outpatient FU; 61% accomplished flu vaccine. 58.3% of smokers (12/18 pts) continued after SCI. 37.8% reported respiratory complications during the last year (15.6% pneumonia); 83% difficult cough management, 50% dispnea, 27.7% impaired communication. Asked about subjective perception of global impact of respiratory function on life organization, 72.2% don’t feel respiratory issues determinant. Asked a non structured question about their wishes related to respiratory function, 25% mentioned: stable environmental conditions (air temperature), periodic rehabilitation or training devices to decrease ventilator necessity, tracheostomy removal, being able to sing as before SCI.

**Conclusion**
To improve awareness of impaired respiratory function and to prevent declining in CSCI it might be useful to integrate medical approach with patients’ perception and preferences.
Lessons Learned: Hurricane preparedness for the SCI population of Haiti

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Biography:
Fiona JVW Stephenson is a Fellow of the Royal College of Nursing (UK) and member of the ISCoS Disaster & Education Committees. She was instrumental in creating and establishing the first SCI unit in Haiti following the 2010 earthquake. Fiona is co-founder of the Haiti SCI Working Group and remains active as the International Co-ordinator of the group. She created and continues to manage the working groups' website, which has many SCI resources (in Creole, French and English). www.haitisci.org. Fiona is also co-founder of The International Network of SCI Nurses and on the ISCoS Nurses Committee. www.scinurse.org

People with a spinal cord injury in Haiti are already an identified vulnerable client group. 150-200 people sustained their Spinal Cord Injury (SCI) in the 2010 earthquake. Since then the main causes of SCI include road traffic accidents, falls and gun violence. Hurricane Matthew in 2016 blew further challenges towards them, damaging houses and personal belongings, ruining food, and decreasing accessibility. New patients with spinal cord injuries (estimated at 5-10 persons), sustained from flying debris and collapsing buildings, were admitted many days after the hurricane had flattened parts of Haiti (rescue efforts were delayed due to road inaccessibility). The authors investigated the effects of this natural disaster by undertaking a telephone survey (small random sample, 30 questions) in March 2017 - Five months after the hurricane. Implications for the SCI community are revealed and include the increased prevalence of pressure ulcers and urinary tract infections along with psychological trauma. Recommendations include preparedness and response by local and international supporting organisations along with preparedness of vulnerable groups to ensure persons with SCIs are recipients of prevention and response efforts.
Poster Board Number: 135

Long-term paired associative stimulation with high-frequency peripheral component: a novel therapeutic approach for incomplete spinal cord injury patients

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Biography:
NO BIO

Therapeutic approaches that can strengthen transmission in weak neural connections to improve motor performance after incomplete spinal cord injury (SCI) are needed. Transient plastic changes in corticospinal tract can be induced through paired associative stimulation (PAS), the synchronization of transcranial magnetic stimulation (TMS) with electrical peripheral nerve stimulation (PNS). It was previously unknown whether PAS can have clinically relevant effects after SCI.

We designed a novel PAS protocol, and recruited two pilot SCI patients (AIS C, neurological level L1 and C3) with chronic injuries. The patients received PAS for 20–24 weeks. Thereafter, five patients (AIS B-D, neurological level C3-C7) received 4 weeks (16 sessions) of stimulation. PAS was given to one hand and PNS combined with sham TMS to the other hand. Patients and the evaluating physiotherapist were blinded to the treatment. Hands were selected randomly. Patients were evaluated with Daniels and Worthingham’s Muscle Testing (0-5 scale).

The results in pilot patients: the paraplegic patient, paralyzed below the knee level, regained plantarflexion and dorsiflexion of the ankles of both legs; the tetraplegic patient regained grasping ability. In the double-blind series of five patients, one month after the last stimulation session, the improvement in the PAS-treated hand was 1.02±0.17 points, the improvement being significantly higher in PAS-treated than in PNS-treated hand (176±29%).

Long-term paired associative stimulation might be an effective tool for improving motor performance in incomplete chronic SCI patients. The availability of the required equipment in many hospitals and laboratories would allow to easily incorporate the technique into medical practice.
Long-term paired associative stimulation with high-frequency peripheral component: first clinical experiences in incomplete SCI patients treated for many months

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NO BIO

Paired associative stimulation (PAS) is a safe noninvasive method that employs navigated transcranial magnetic stimulation (nTMS) to motor cortex (M1) combined with contralateral peripheral electrical nerve stimulation (PNS) delivered simultaneously with nTMS. This association of stimuli repeated over an extended period is thought to lead to beneficial changes in neural excitability and strengthening of synaptic connections between upper and lower motor neurons of the corticospinal tract. Our previous 4-12 week application of the long-term PAS with our novel protocol enabled chronic incomplete paraplegic and tetraplegic SCI patients to regain some voluntary movements. The effects were sustained for at least 1 month after the last stimulation.

In this study, we test the effectiveness of our PAS protocol for longer periods. We administer the stimulation as long as further recovery is observed.

Two patients with traumatic chronic incomplete SCI, one paraplegic (female, 31 years old, AIS C, neurological level L1, time since injury 26 months), and one tetraplegic (male, 38 years old, AIS B, neurological level C7, time since injury 51 months) were enrolled. PAS sessions were applied 3 times per week.

We observed long-term motor improvement for both patients based on clinical evaluation, neurophysiological measurements and self-reports. No serious adverse effects were reported.

Long-term PAS is safe when applied as a long-term treatment. The effect size depends on the duration of the administered stimulation.
Long-term risk of venous thromboembolism in patients with spinal cord injury

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Biography:
No bio

Introduction: Patients with spinal cord injury (SCI) are at high thrombotic risk, and low molecular weight heparin (LMWH) thromboprophylaxis is used near universally in acute care facilities. Data on the risk of venous thromboembolism (VTE) beyond the acute phase are scarce. It is unclear whether extended thromboprophylaxis is warranted. We aimed to evaluate the long-term thrombotic risk of patients after the acute SCI.

Methods: We retrospectively collected hospital record data of consecutive SCI patients admitted at a rehabilitation center in Austria between January 2007 and February 2017. Patients with acute VTE at the primary center or other reasons for therapeutic anticoagulation were excluded. Patients entered the study six weeks after the acute trauma. Primary endpoint was objectively diagnosed deep vein thrombosis (DVT) and/or pulmonary embolism (PE); secondary endpoint was bleeding complications.

Results: Of 183 patients 122 were tetraplegic and 61 paraplegic. All patients received prophylactic LMWH. Their mean (+SD) age was 48±19 years and 162 (89%) were men. During a mean (+SD) hospital stay of 4.7±2 months six patients (five men) developed VTE (four DVT+PE, one isolated PE, one isolated DVT). The probability of VTE after 6 months was 2.6% (95% CI 0.3-5.2%). Mild to moderate bleedings occurred in 19 patients, severe bleeding in one.

Conclusions: Thromboprophylaxis with LMWH effectively prevents VTE in SCI patients during rehabilitation phase. As these patients are also at an increased risk of bleeding, direct oral anticoagulants which are also more convenient should be explored in this setting with regard to safety and efficacy.
Loss of mineral bone density during the acute phase of spinal cord injury. Is it possible to prevent it?

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Introduction

There is a rapid loss of bone mineral density (BMD) following acute traumatic spinal cord injury (ATSCI). This loss occurs predominantly in the lower extremities. Also the markers of metabolism suggest an early reabsorption.

Material and methods

A descriptive cross-sectional study was carried out to quantify the level of BMD by DXA in the lumbar spine and hip (total hip and femoral neck) in the first 8 weeks of the ATSCI and in the 12th month. The analyzed variables were vitamin D, serum calcium, urine calcium, albumin, TSH, IGF-1, parathormone (PTH) and CTX-1 bone catabolism marker. Zoledronic acid 5mg was administered in 13 volunteer patients in a single dose between the sixth and eighth week after ATSCI.

Results

After 12 months, there was no significant difference in the initial BMD and the year in total hip (M = 0.1125 SE = 0.5425, t (12) = 0.7184, p = 0.4875). However, we found differences in the lumbar spine (M = 0.0708 SE = 0.0865, t(13) = 2.9514, p = 0.0121) and femoral neck (M = 0.0577 SE = 0.0797, t(13) = 2.6098, p = 0.0228). Initially augmented CTX-1 levels (5.32 ng/mL) were normalized at 12 months (0.514ng/mL). There is a significant vitamin D deficiency in ATSCI (17.51 ng/mL).

Conclusion

A single dose of zoledronic acid administered early reduces BMD loss to a total hip level, however this effect is not being observed in the femoral neck. Vitamin D values are very low in ATSCI patients.
Male preponderance and traumatic injury, a 26 year cohort study of pediatric and adolescent SCI in Western Denmark

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Biography:
NO BIO

Introduction:
Spinal Cord injuries in children and adolescents are rare. Information regarding the epidemiology is sparse. The aim of the study is to describe and compare epidemiology of the pediatric SCI group with the adult SCI group in a population-based cohort in Western Denmark during August 1990 to January 2017.

Methods:
Children and adolescents (CA) (age 0-25 years) and adults (age + 25 years) with SCI were identified in a local database. Data regarding age, gender, etiology, level and completeness were obtained.

Results:
A total number of 1289 persons were identified regarding, age, gender and etiology. From this group furthermore 1103 persons regarding level and completeness of SCI. In the CA-group (N=247) the male/female-ratio was of 3.3 and in the adult group (N=1042) of 2.2. Incidence calculated for the CA-group was 2.7/mill/year and for adults 11.6/mill/year. Traumatic SCI was encountered in 83 % of the CA-group as compared to 57 % in the adult group. Data regarding tetraplegia in the CA-group accounts for 31% respectively 45% in the adult group. Complete SCI accounted for 37% the CA-group vs. 67% in the adults.

Conclusions:
There is a significant male preponderance (KW, p<0.001) having a SCI and of a traumatic etiology (KW, p<0.001) in the CA-group as compared to the adults. The absolute incidence of CA is higher since not all children survived the acute and subacute phase after the acute SCI besides not all children with a SCI is referred to a highly specialized rehabilitation centre.
Poster Board Number: 87

Malnutrition after spinal cord injuries: a systematic review

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Biography:
NO BIO

Introduction: Malnutrition is a major clinical and public health issue after spinal cord injury (SCI) but little is known about the prevalence of malnutrition in SCI patients.

Methods: We searched Medline, Embase, Cochrane Database of Systematic Reviews, DARE, Cochrane Central Register of Controlled Trials, CINAHL, PsycINFO, AMED and HTA database for articles on disease-related malnutrition in SCI patients. Any articles in English were included. Outcomes include the prevalence of malnutrition or clinical outcomes of malnutrition in SCI patients with a sample size at least 20 subjects eligible for inclusion. The quality of the studies' methodology was assessed by two independent reviewers using published criteria.

Results: Forty-nine articles were identified, of these, 11 studies (n=9 adult SCI; n=2 children with SCI), including 9,382 SCI patients met the criteria for inclusion. There was considerable variability in methodology and in the reported prevalence of malnutrition risk. Four nutrition-risk screening tools were reported, prevalence was consistently in the range of 40-50% for adult SCI patients and 47-51% for children with SCI at the time of admission. Three different body-mass-index cut-offs were reported as over-nutrition’s cut off. The prevalence of overnutrition-risk was consistently in the range of 45-65%. Undernutrition-risk was associated with an increase in clinical complications, length of hospital stay and mortality.

Conclusion: Malnutrition is a highly prevalent condition after SCI that impose a substantial health and economic burden in SCI system. Further research is necessary to characterise screening practices and identify evidence-based interventions to this persistent and costly clinical and public health issue.
Spinal cord injury (SCI) occurs most often to young men at the peak of their reproductive health. Following SCI, the majority of men are infertile. Approximately 90% are anejaculatory. The procedures of penile vibratory stimulation (PVS) and electroejaculation (EEJ) are available to retrieve semen from anejaculatory men with SCI who wish to achieve biologic fatherhood. There is a general lack of information among practitioners, however, regarding performance of these procedures. Consequently, patients are often overtreated with expensive and unnecessary methods, such as surgical sperm retrieval from the testis or epididymis. When sperm are obtained surgically, the couple is committed to the most invasive of the available assisted conception options, such as in vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI). When the ejaculate is obtained by PVS or EEJ, the number of motile sperm obtained in the majority of cases is sufficient to consider the less invasive options of intrauterine insemination or even intravaginal insemination at home. The purpose of this workshop is to provide comprehensive information to practitioners regarding management of infertility in men with SCI. The program is funded by a grant from the Craig Neilsen Foundation. Travel support is available to practitioners who wish more in-depth training in Miami, Florida USA. Interested professionals are encouraged to take advantage of this training opportunity, which will be available through December 2018.

The workshop will cover the following topics.
1. Causes of infertility in men with SCI.
2. Methods of semen retrieval in men with SCI.
   a. Who is a candidate for PVS versus EEJ?
   b. How to retrieve a retrograde semen specimen.
   c. Management of autonomic dysreflexia.
   d. Algorithm of treatment for anejaculation in men with SCI.
3. Semen quality in men with SCI.
   a. What causes abnormal semen quality in men with SCI?
   b. What can be done to improve semen quality in men with SCI?
4. Management of the couple with an SCI male partner.
   a. Who is a candidate for intravaginal insemination (at-home insemination), versus intrauterine insemination, versus more advanced procedures?
5. Video demonstration of procedures.
6. Discussion of opportunities for further training.
Meaning of therapeutic relationship in a Spinal Cord Injuries Unit: a phenomenological study

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Introduction:
Spinal cord injuries (SCI) are one of the most complex and disabling disorders, implying severe consequences on aspects of life of affected people and their caregivers. Communication is considered as an essential component of nursing care, which becomes prominent during the rehabilitation process. Aim of our study was to understand of the meaning given by people with SCI to the therapeutic relationship established with nurses during their rehabilitation.

Methods:
Seven people with SCI were interviewed during their hospitalization at the Spinal Cord Injuries Unit of Turin, Italy. The semi-structured interviews were analysed using a qualitative phenomenological approach, as described by Giorgi.

Results:
Four main themes emerged from the patients’ experience, which comprise the time of the relationship, the way to communicate the professionality, the care of the body and the education towards the everyday life. It stands out the personal characteristics of nurses, both positive and negative, about the experience and expertise of nurses to use communication to drive people with SCI through their rehabilitation.

Conclusions:
Therapeutic relationship is a poorly studied phenomena. Caring realized through communication skills has a deep meaning in the experiences of people with SCI. Despite of its known relevance tied to the therapeutic education, there are some potential barriers to an effective therapeutic relationship, constituted by professional burnout and the reduced time that nursesdevotes to it in favour of technical acts. Future studies should be directed to the conception of body care of people with SCI.
Measure what counts - Quantifying spasticity in spinal cord injury

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Biography:
Shane McCullum is a Research Associate and Physiotherapist at the Stan Cassidy Centre for Rehabilitation. He has worked on several projects involving persons with neurological impairments, with a main interest in improving mobility.

Introduction:
Objective spasticity measurement is important for both clinical and research applications. The BioTone System uses wearable sensors to obtain objective spasticity measures in patients with upper motor neuron syndrome including SCI. It measures spasticity using a Stretch-Reflex test for the elbow and a Pendulum Test for the knee to produce a Relaxation Index (RI) metric. This study’s objective was to use BioTone's Pendulum Test to objectively assess changes in knee spasticity after Functional Electrical Stimulation (FES) treatment in an SCI population.

Methods:
BioTone was originally validated in a cross-sectional, multi-site study with 103 subjects, including 23 with SCI. Post validation, the system was used to measure change in knee spasticity before and after FES cycling with SCI subjects (n=7) at 7 pre-set intervals over a 30 hour period. All level and severity of injury were recruited with the requirement of some level of knee spasticity present.

Results:
A Relaxation Index score between 1.5-1.8 indicates a normal response while a score between 1.0-1.5 indicates mild spasticity and between 0-1.0 indicates severe spasticity. Subjects in the FES study had Average Pre-Cycling RI's of 1.24 and 1.29 for the right and left knees respectively. Post Cycling, the RI's increased by 0.307 and 0.212 in the right and left knees respectively, indicating reductions in spasticity bilaterally.

Conclusion:
The BioTone System's RI measure demonstrated there is a trend towards a reduction in spasticity immediately after FES cycling sessions, although the sample size is small, and spasticity returned to previous levels within 24 hours post-cycling.
Medications for neurogenic bladder in SCI – updates from a multicenter survey on patients discharged from Spinal Unit during 2016

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**Biography:**

NO BIO

**Introduction:**

Increase of age - and subsequent higher incidence of comorbidities - and a growing percentage of incomplete lesions between patients with new onset of Spinal Cord Injury (SCI) are common trends in all developed countries.

**Methods:**

We thus decided to perform a survey to investigate the impact of changing SCI epidemiology on medications prescribed for neurogenic bladder at discharge from Spinal Unit. We involved three Spinal Units located in three different regional areas of our country.

**Results:**

We obtained data from a total of 157 patients, 96 males and 61 females with a male/female ratio of 1.6. We observed a high percentage of cervical lesions (mostly incomplete, 31.9% of our population) with a paraplegic/tetraplegic ratio of 1.34. Our data also showed a very low percentage of lumbosacral complete lesions (only 5.7%). Mean age was 57.7 years in the overall population, 56.5 years for males and 60.2 years for females.

In the survey population, muscarinic antagonists (mostly Oxybutynin) were the most frequently prescribed drugs for females (29.5%) while in males Alpha-blockers (mostly Tamsulosin) were prescribed in 30.2% and muscarinic antagonists in 22.9%. No medication was prescribed for 67.2% of females and 37.5% of males. Other medications and combination therapies were used in a small percentage of both males and females.

**Conclusions:**

Our data showed more frequent prescription of Alpha-blockers in males and higher number of patients of both sexes being prescribed no medications than previously reported: this may be explained by elevated age and high percentage of incomplete lesions.
Poster Board Number: 48

Migration of retained dressing materials causing non healing pressure ulcers in spinal cord injury patients – A case report.

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Biography:
NO BIO

Introduction:
Pressure ulcer is a significant cause of morbidity in spinal cord injured patients. It is becoming increasingly common to manage these patients in community. Choosing the wrong type of dressing material to pack the wounds and loss of the material into the depths of the wounds can have disastrous consequences. We report a case of rare complication of migration of retained dressing material in the pressure ulcer.

Clinical details:
A 67 year old male with T4 AIS A neurological deficit following spinal cord injury developed a chronic right ischial pressure sore. This was treated in community with regular dressing changes with various types of dressings. MRI scan showed inflammatory changes in the soft tissues and possible changes of osteomyelitis in ischial tuberosity.
A fluctuant lump was noted over right trochanteric region which showed a foreign body on further investigations. Surgical exploration of the lump revealed a dressing material which has migrated from ischial pressure ulcer. This was evident on the radiological investigations.

Conclusions:
There is a potential for retained foreign bodies in pressure ulcers to migrate. Health care professional should be cautious in avoiding retained dressing materials in pressure ulcers. A high index of suspicion is needed to identify retained dressing materials in radiological investigations.
Patients with spinal cord injuries at or above C3 are often found to have diaphragm paralysis due to injury to the upper motor neuron of the phrenic nerve. These patients are frequently reliant upon mechanical ventilatory support. For many years now it has been possible for patients, with high cervical spine injury and resultant diaphragm paralysis, to be implanted with a FES (functional electrical stimulation) device enabling the patient to breathe using their diaphragm, independent of a mechanical ventilator. The three FES devices approved for phrenic nerve/diaphragm pacing are the Avery, Atrotech and Synapse devices. The Avery and Atrotech devices can be implanted through the cervical or thoracic route whereas the Synapse device is implanted laparoscopically. Cervical implantation without a general anesthetic or entering a body cavity is the least invasive of any of the implantation techniques for phrenic nerve/diaphragm pacing. The phrenic nerve is found through a small incision above the clavicle. The electrode is then placed under this portion of the phrenic nerve with the attached wire tunneled under the skin and connected to a subcutaneously implanted receiver. An antenna connected to a transmitter is placed on the skin over the implanted receiver. A radio frequency produced by the transmitter travels through the intact skin to the receiver. The receiver produces a small current stimulating the phrenic nerve and normal diaphragmatic breathing. Indications for phrenic nerve/diaphragm stimulator implantation, the cervical approach and advantages of this technique will be presented.
Misleading outcomes of determining sensory incompleteness by S4/5 and DAP examination (preliminary results of the study)

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Biography:
Assoc. Prof. Kriz is head of the Spinal Cord Unit in University hospital Motol in Prague. He focuses mainly on autonomic dysfunctions and assessment methods in SCI patients. He is also president of the Czech Spinal Cord Society.

Introduction
According to ISNCSCI, a sensory incomplete lesion is defined as sensory preservation in sacral segments S4/5 and/or deep anal pressure (DAP). Sacral segments examination, especially DAP, often causes considerable autonomic response in patients with spinal lesion above T6, which might be incorrectly interpreted as sensory preservation. Recently, Marino et al. questioned the importance of DAP examination in determining sensory incompleteness and proposed to modify it by the pressure sensation at S3 dermatome.

Method
In our study, the presence of autonomic response to S3, S4/5 and DAP examination has been observed. We’ve tested S3 pressure, S3 and S4/5 pin prick (PP) bilaterally, digit rectal exam, and DAP with continuous blood pressure (BP) measurement. We’ve monitored the difference of BP changes during each step comparing to at rest values and patients´ response while examined.

Results
Thus far, we’ve examined 12 patients – NL C2-T1, motor complete. Average resting BP was 114/70 mmHg which remained unchanged during S3 pressure. Performing S3 PP resulted in non-significant BP increase. A significant rise of BP was observed in S4/5 PP, during digital rectal exam and DAP. Nine patients (75%) reported regular symptoms of autonomic dysreflexia (AD) related to BP elevation and five patients (41.6%) reported vague sensation in anal area during S4/5 and DAP examination.

Conclusion
The S4/5 sensory preservation or anorectal sensation might be confused with AD symptoms and therefore it should not be crucial for definition of sensory incompleteness. We support the idea of S3 examination because there is no autonomic response.
Mobility Clinic team composition: optimizing access to interprofessional care

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**Biography:**

Dr. Lee is a family physician and Chair and Lead Physician for the Centre for Family Medicine Family Health Team, Kitchener, Ontario, Canada, Associate Clinical Professor, Department of Family Medicine, McMaster University, Hamilton, Ontario, Canada, Adjunct Professor Department of Family Medicine, Western University, London, Ontario, Canada and, Assistant Professor (Adjunct), School of Pharmacy, the University of Waterloo, Waterloo, Ontario, Canada.

Background: Specialized interprofessional primary care-based mobility clinics are a significant opportunity to improve spinal cord injury (SCI) care, however, there are no gold standards to inform ideal team composition. The purpose of this study was to explore the ideal mix of skill sets and competencies for mobility clinics.

Method: Twelve individual interviews were conducted with primary care and rehabilitation clinicians and representatives from professional associations representing health disciplines. Participants received briefing notes on the mobility clinic model of care and roles of each discipline within this model. Questions were asked related to discipline specific scope of practice, ideal team composition to meet consumer needs, and opportunities for expanding and sharing discipline roles.

Results: Discipline specific role descriptions within the Mobility Clinic were perceived to be comprehensive and accurate; in some cases additional activities were suggested for some disciplines. Suggestions were made for cross discipline sharing of roles/activities (e.g., some social worker activities can be assumed by occupational therapists (OT) or nurse practitioners (NPs). Recommendations for core team members included a physician, nurse, OT, and exercise therapist and a representative from SCI Ontario or community service navigators, with linkages to specialists or interprofessional rehabilitation teams for consultation support. Potential roles were described for disciplines not currently represented in this care model (NPs, physiotherapists, physician assistants, recreation therapists).

Conclusions: As there exists a critical balance of optimizing care and availability of resources, this study informs appropriate mobility clinic team composition, adaptable within the context of existing human resources.
Mobility outcomes following physiotherapy based rehabilitation in spinal cord injury and the factors that influence it: A retrospective chart review.

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Biography:
Dr Olive Lennon is an assistant professor at University College Dublin, School of Public health, Physiotherapy and Sports Science. With over 20 years clinical experience in Ireland and the US broadly in the field of neuro-rehabilitation in sub-acute and chronic populations in primary and community care sectors, her research interests include neuropathic pain in stroke and SCI, aerobic fitness testing and exercise prescription in individuals with physical disability and the use of robotics in rehabilitation. She was awarded a Health Research Board Fellowship in 2007 and holds an MSc(Health Informatics), and PG diplomas in Statistics and Health Services Management.

This study determines the effects of inpatient physiotherapy rehabilitation on mobility outcomes following spinal cord injury and identifies determinants of improvement. No published data from an Irish perspective, currently exist.

Methods and procedures: Retrospective chart review of medical records at the National Rehabilitation Hospital for SCI admissions from September 2015-Sept 2016. Outcomes of interest included the Spinal Cord Independence Measure (SCIM) mobility subscale, the 10Meter walk Test (10MWT), WISCI and the 6 minute push test (6MPT). Within cohort change scores were examined by paired t-test or Wilcoxon Signed Ranks test (alpha 0.05). Hierarchical linear regression models explored predictive ability of traumatic/non-traumatic; AIS classification; time to admission; number of co-morbidities; pain profiles on admission; length of stay(LOS); number of physiotherapy sessions and treatment intensity on mobility improvement, controlling for age, gender and baseline mobility.

Results: 100% (N=95) of SCI admissions from September 2015-2016 were reviewed. 70.2% were male, mean age 51years. 51% had a traumatic injury, 16% were classified as AIS A, 83% B-E. The SCIM mobility subscale improved from 16.89(12) to 23.9 (11) on discharge, P<0.001, with significantly more improvement noted in those SCI of traumatic origin(p=0.012). Significant improvements in the 10MWT; 6MWT; 6MPT ; and WISCI were also noted (p<0.01). With SCIM mobility change score as dependent variable, Length of stay (p=0.008), treatment intensity (p=0.005) ; and total dosage of one-to-one physiotherapy sessions contributed to the regression models.

Conclusion: Intensity and dosage of physiotherapy treatment and length of stay predict improvement in mobility post-SCI with implications for service structure and delivery.
Modelling the potential of neurological remission at admission after TSCI: The elastic net approach.

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Biography: NO BIO

Introduction: The study is designed as a clinical prospective observational study estimating the initial role of serum proteins and trace elements as protective factors after acute TSCI with respect to clinical covariates.

Methods: We examined the levels of 58 (14 female, 44 male) patients after TSCI at the BG Trauma Centre Ludwigshafen. Surgical decompression of the spinal cord was performed in all patients within two hours after the injury. Serum concentrations of selenium were measured with atomic absorption spectroscopy. Estimation of MMP-2, MMP-8, CCL-2, CCI-3, CCL-4, IL-8, and IL-10 was performed via Luminex Cytokine Panel.

Elastic net multivariate logistic regression was used to examine the predictive value of each factor and clinical covariate with respect to neurological remission vs. no neurological remission. KNN-imputation performed on data subsets was used within the bootstrapping procedure to generate the database for elastic net regression modelling and most predictive factors were used to set up the final predictive model based on raw data.

Results: The resulted model including the clinical covariate sex as well as the initial serum levels of CCL-2, MMP-2 and IL-10 and selenium revealed an AUC of 87.7 % (CI: 73.5% - 100.0 %).

Conclusion: The results strongly indicate elastic net regression modelling to be a promising procedure in the disclosure of a predictive biomarker in the field of TSCI. Based on the present data the chances of assigning a higher model-based score to patients that actually show an improvement as compared to those who do not is 87.7%.
Mortality and longevity after traumatic spinal cord injury in Switzerland from 1990 to 2011: A 21-year longitudinal study

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**Biography:**
Dr. Jonvia Chamberlain is a postdoctoral researcher at Swiss Paraplegic Research (SPF) working with the Swiss Spinal Cord Injury (SwiSCI) cohort study team. Funded by a grant awarded by the Swiss National Science Foundation, Dr. Chamberlain is working on a project titled, “Differences in mortality patterns and life expectancy between spinal cord injured persons and the general population in Switzerland since 1990”. This project aims to assess differences in all-cause and cause-specific mortality outcomes in the Swiss traumatic spinal cord injured (TSCI) population compared to the general population and to investigate factors associated with mortality and longevity outcomes after TSCI.

**Introduction:**
Limited data are available about risk factors for mortality and diminished longevity following a traumatic spinal cord injury (TSCI). Presently, Switzerland has no estimates on mortality and life expectancy (LE) after TSCI.

**Methods:**
We used data from the Swiss Spinal Cord Injury (SwiSCI) cohort study to model mortality in relation to age, sex and lesion characteristics. We estimated hazard ratios (HRs) using flexible parametric survival models of time since discharge from first rehabilitation to death or September 30, 2011, whichever came first. Skew-normal regression was used to estimate marginally adjusted LE at age 30 years.

**Results:**
2'215 persons were included that incurred a new TSCI between 1990-2011, contributing a total time at risk of 18'846 person-years (median 7.8 years) and 380 deaths. 73.4% were male, 59.1% were paraplegic, and the average age at injury was 43.4 years (SD=18.8; IQR=31). Controlling for age and sex, there was a 58% increased risk of mortality for tetraplegics compared to paraplegics (HR=1.58; 95% CI=1.23-2.02) and a 48% higher risk for complete versus incomplete lesions (HR=1.48; 95% CI=1.16-1.88). At an attained age of 30 years, comparing the highest, more severe lesions (C1-C4: AIS A, B, or C) to all levels with AIS D/E, estimated LE was reduced by 17 years.

**Conclusion:**
This study provides the first estimates of mortality and LE following TSCI in Switzerland. Main factors identified were: Age at injury, severity and lesion level. Future research should identify risk of cause-specific mortality for targeted interventions to improve LE and reduce avoidable mortality.
Poster Board Number: 220

Multicenter Validation Study On An Assessment Scale Of Sitting Balance In Subjects With Spinal Cord Injury: preliminary results

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Biography: NO BIO

INTRODUCTION
The recovery of the ability to control the trunk and maintain the balance in sitting position is an important goal of the physiotherapy treatment for people with spinal cord injury (SCI). It is essential an appropriate assessment tool to evaluate this ability during the rehabilitation period. A new scale, the "Sitting Balance Assessment for Spinal Cord Injury" (SBA-Sci), as been developed to assess the balance in sitting position in subjects with SCI. Objective of this study is to verify the face validity, construct and concurrent validity of SBA-Sci.

METHODS
To verify SBA-Sci face validity were collected data through a questionnaire sent to 15 physiotherapists in 5 different Italian Spinal Unit.
Successively SBA-sci was administered on 80 subjects with SCI, complete and incomplete neurological lesion, levels between C4 and L3.
The comparison variables observed on the same sample were: Sitting Balance Scale (SBS) used as the primary reference measure, American Spinal Injury Association motor score (UEMS,LEMS), Spinal Cord Independence Measure (SCIM), Thoracic-Lumbar Control Scale (TLCS).

RESULTS
The score defining face validity is very satisfactory. The internal consistency of SBA-Sci is excellent (Cronbach's alpha=.968). SBA-sci correlates significantly with SBS (r=.982; p.<0.001) and with all variables of interest. Differences recorded by SBA-Sci in subgroups (complete-incomplete, paraplegic-tetraplegic, innervated-non-innervated abdominal) are coherent with clinical (UEMS,LEMS) and functional (SCIM,TLCS) characteristic of the sample.

CONCLUSIONS
Preliminary results demonstrate face, construct and concurrent validity of SBA-Sci in subjects with complete and incomplete SCI. Results for other validities are still under statistical analysis.
Multi-loculated empyemas in Mediastinum after needling in paraplegia: case report

Mrs Seryun Choi

1Chungnam National University Hospital

Biography:
NO BIO

Background: There are several reported possible complications of acupuncture including hepatitis, pneumothorax, and cardiac tamponades, but the development of empyema is unusual. The authors experienced the case of a 62 years old female patient with paraplegia who came to our service after acupuncture.

Case: A 62-years-old female patient came to emergency room due to Anterior chest wall pain and tenderness. She has suffered from anterior chest wall pain 1 days ago. Laboratory studies showed normal. A chest CT scan showed normal finding. The patient was diagnosed with costochondritis. She was prescribed painkillers and discharged. Since the pain persisted, she took acupuncture on anterior chest wall. A few days later she came to our hospital due to swelling on anterior chest wall. Laboratory studies showed a white blood cell count of 22,900/mm3 and a C-reactive protein level of >40mg/dL. A Contrast enhanced chest CT scan showed Multi-loculated fluid collection with wall enhancement in lower anterior mediastinum. The patient was diagnosed with mediastinal abscess, mediastinitis and transferred to chest surgery. Abscess evacuation were done and chest tube insertion were done for empyema drainage.

Discussion: Most adverse effects that acupuncture develops seem to be due to either a lack of adequate anatomic knowledge or non-sterile technique. Specially if a acupuncture needle is misplaced in chest and shoulder area, the tip of the needle can be placed in the mediastinum or the thoracic cavity penetrating the lung, heart, or great vessels causing life threatening complications like pneumothorax, hemothorax, cardiac tamponade, or endocarditis.
Musculoskeletal problems following childhood onset spinal cord injury – review of UK national database

Aims
The aim of this study was to quantify the prevalence of scoliosis and hip instability in children with spinal cord injury (SCI). This data has not previously been published for UK patients.

Patients and Methods
This is a retrospective review of hip and spine radiographs of patients aged up to 17 years who had sudden onset SCI between C1 and L5 from 1991 to 2016. A hip was considered subluxed if the migration index was greater than or equal to 33%, and scoliosis was defined as a Cobb angle of greater than 10 degrees.

Results
Records of 424 patients were reviewed. 261 patients had whole spine and pelvic radiographs available for review.

Scoliosis was identified in 55% of patients. 76% of patients injured before the age of 6 years old developed scoliosis.

20% of patients had hip instability.

35% of patients with scoliosis also had hip instability, and only 6 patients (3%) had hip instability without scoliosis.

60% of patients with high cervical injuries (C1-4) had scoliosis. 30% of patients with C5-8 had scoliosis. 63% of patients with T1-T12 injuries had scoliosis. 46% of patients with L1-L5 injuries had scoliosis.

Conclusion
In the majority of cases of hip instability, scoliosis is also noted and usually developed first. SCI before 6 years of age significantly increases the risk of developing both scoliosis and hip instability.

This study highlights the importance of care in the management of spinal posture for spinal cord injured patients.

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Objective: To analyse complications associated with surgery for pelvic pressure ulcers: their frequency, nature and rate of surgical revisions. The secondary aims are to analyse the rate of recurrence, length of stay and time to healing, and to determine factors associated with complications and recurrence.

Design: Single-centre, retrospective cohort study with a 10 year follow-up

Setting: Nantes University Hospital, France, a specialist centre for Spinal Cord Injury (SCI).

Participants: All patients who were admitted to the Neurological Physical Medicine and Rehabilitation (PMR) department for surgery for pelvic pressure ulcers between 1st of January 2004 and 30th September 2014.

Interventions: Flap coverage of pelvic pressure ulcers.

Main outcome measures: Rate of complications, rate of recurrence, length of stay and time to healing, as well as factors associated with complications and recurrence.

Results: One hundred and sixty-six patients underwent 252 flap procedures during 239 operations. The majority of patients had spinal cord injury (78.3%). The ulcer sites were mainly ischial (67%), sacral (20%) and trochanteric (12%). Gluteus maximus was used most often (75.3% of flaps) (ischial and sacral ulcers), followed by tensor fascia lata (16.2%) (trochanteric ulcers). The rate of complications that delayed return to wheelchair at 6 weeks was 34.5%. The factors associated with complications were more than one surgical ulcer and drainage time greater than 10 days. The rate of recurrence was 20.04%. Factors related to recurrence were young age, scoliosis and an oblique pelvis.

Conclusions: Management within a specialised medical-surgical pathway limited post-operative complications and recurrences in this sample of subjects who mostly had SCI.
Neglected Cauda Equina Syndrome: Is There A Role Of Surgical Decompression?

Dr Saransh Gupta\textsuperscript{1}, Dr Ashok Reddy\textsuperscript{1}, Dr Gururaj Sangondimath\textsuperscript{1}, Dr Harvinder Chhabra\textsuperscript{1}

\textit{Isic Biography:}

NO BIO

INTRODUCTION: The Management of Cauda equina syndrome(CES) secondary to lumbar canal stenosis(LCS)/Prolapsed Intervertebral disc(PIVD) has been well documented in the literature. The best results are with decompression as early as possible. However, there is a dearth of literature on management of patients presenting late with neglected CES (>3 months). The purpose of this study is to discuss the management and results of surgery in such patients.

METHODOLOGY: A retrospective case series study of patients admitted at our institute from august 2012-2016, diagnosed as having LCS or PIVD with neglected CES were included in the current study. Surgery was done after explaining the guarded prognosis. All patients were evaluated for Back pain, leg pain, voluntary anal contraction, bladder function, motor and sensory status preoperatively and then at every follow up.

RESULTS: A total of five cases presented (two LCS and three PIVD) with neglected CES, duration ranging from 3-24 months. All five patients had bladder involvement and four had motor deficit in lower limbs. Post surgery at latest follow up(6-24 months) four among five had complete and one had partial improvement in bladder function. Three out of four patients had improvement in motor power by two grades.

CONCLUSION: Our case series show that there is chance of improvement of neurological function in neglected CES with surgery and all patients with neglected CES should be given an option of surgery irrespective of duration of symptoms.
Neurogenic bladder dysfunction with vesicoureteric reflux in a woman with SCI, AIS D(T12) with high-energy expenditure ambulation, a case report.

Aim: To present the long-term follow-up of a female patient with incomplete SCI and neurogenic bladder dysfunction not responding efficiently to anticholinergic drugs.

Material-Method:
Sixty-five-year-old female with paraplegia AIS D, neurological level of injury T12 and neurogenic bladder dysfunction due to myelitis. MRI revealed spinal cord lesion from T9 to conus medullaris.

Results:
Three months post SCI: First urodynamic study: detrusor sphincter dyssynergia, low reflex-volume (90ml), and Pdet/max= 100cmH2O. Retrograde cystography: Pear shaped bladder, no vesicoureteral reflux (VUR).


33 months post SCI: incontinence and symptomatic UTI. Ultrasound: Bilateral RPD. Retrograde cystography: Bilateral VUR grade IV(R) and V(L). Recommendations: Addition of Mirabegron 50mg/ day. Follow up in 3 months: incontinence had significantly improved. No UTI. Urodynamic study: Phasic detrusor overactivity, Pdet/max (60cmH2O), decreased bladder compliance (7ml/cmH2O). Recommendation: Intravesical injection of botulinum toxin-A. Following direct Radionuclide Cystography showed improvement with transient VUR in the region of the right ureteral ostium (grade I).

Conclusions: Treating patients with neurogenic bladder and bowel dysfunction is a dynamic process especially challenging in patients with incomplete SCI. It demands long term and regular follow-up with interdisciplinary collaboration.
Neuropathic pain causes changes in the temporal summation of pain after spinal cord injury: A longitudinal study

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Biography:
NO BIO

Neuropathic pain (NP) after spinal cord injury (SCI) is a common and debilitating problem often presenting early after injury and persisting into chronic stages. Unfortunately, our understanding of the underlying mechanisms of NP remains limited. Temporal summation of pain (TSP) is the normal amplification of noxious C-fibre activity in the spinal dorsal horn. (i.e., clinical correlate of windup). Studies have suggested that impaired TSP accompanies central sensitization in patients with NP. However, few studies have addressed whether TSP precedes the development of NP (or vice versa). Our study investigated the relationship between the development of NP and TSP after SCI. Eighteen individuals (tetra- and paraplegic, ASIA A-D) underwent tonic heat testing above the level of lesion at admission and discharge. Preliminary analysis revealed 3 distinct response groups at admission: 1) 56% presented with a “normal progression” (i.e. a gradual decrease (adaptation) and subsequent increase (TSP) in pain rating) 2) 17% presented with progressive TSP throughout the examination, and 3) 27% presented with no TSP. At admission, NP was present in all 3 groups. By discharge, the majority of individuals with persistent NP presented with a TSP-only profile. Patients in whom NP had resolved presented with a normal profile. These observations are consistent with the notion that TSP failure does not cause NP, but rather the presence of NP is altering TSP. Continued progress in assessing sensory physiology early after injury may help clarify the mechanisms of NP and allow for a more effective mechanism-based therapeutic approach.
Across species, loss of sensorimotor drive prompts the reorganization of the brain, including areas representing the intact body parts. Knowledge regarding underlying mechanisms and temporal progression has been gained entirely from animal models of deafferentation. In order to refine our understanding of the human’s brain response to deafferentation, 37 patients with acute traumatic spinal cord injury (SCI; AIS A-D, lesion level C8-T3) were followed over time with repeated neurophysiological assessment at 1, 3, 6, and 12 months post injury. Recorded from above the level of lesion, neurophysiological assessments comprised somatosensory (SSEP) and motor evoked potentials (MEP) – objective measures of dorsal column and corticospinal tract pathway integrity, respectively. In a reverse-translational approach, we thereafter investigated whether the observed brain response in humans can be mimicked in a porcine model of SCI. Twelve Yukatan pigs underwent SSEP and MEP assessments pre- (baseline, post-laminectomy) and post-SCI (10min, 3hrs, 12 weeks) caused by a contusion of the spinal cord at T10. In both species, the sensory responses (SSEP) progressively increased from immediately post injury to later time points. Motor responses (MEP) increased immediately after experimental injury in pigs, remaining elevated at 12 weeks. In humans, MEPs remained unchanged over time, but were significantly higher compared to healthy control individuals. Despite notable differences between experimental models of SCI and the human condition, the brain’s response to a spinal insult is remarkably similar across species. Our findings further underscore the utility of pigs in translational research and development of spinal cord repair strategies.
Nocturnal Hypoventilation Associated with Cervical Spinal Cord Injury

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Introduction
To evaluate multivariable factors which were affected by nocturnal hypoventilation (NH) of cervical spinal cord injury (CSCI) and investigate clearly the incidence of NH in individuals with CSCI.

Methods
We retrospectively reviewed medical records of patients with CSCI who received inpatient rehabilitation treatment from January 2014 to July 2016. The index including tc-PCO2, SpO2, Hypopnea Index (HI) and pulse rate was measured by the portable recorder.

Results
Fifty patients who had sleep disorder breathing were initially enrolled. As 2 patients were excluded by old age over 80 years and the data of eight patients had missing value, the number of final participants was 40 (male, 82.5%; age, 56.0 ± 14.6). NH was detected in 25 subjects of experimental group. There was a patient whose data was remarkably abnormal. Minimum SpO2 was checked by 53%, and desaturation time below 88% was almost 1 hour during sleep period. The mean value of tc-PCO2 was about 5.41 kPa, whereas maximum value was checked by 8.91 kPa. There was not only significant correlation of sensory injury level and sleep disturbance but also strong correlation between ASIA Impairment Scale and long or mean duration of hypercapnia.

Conclusion
In our study, tc-PCO2/SpO2 monitoring was useful for screening NH. We suggested that early tc-PCO2/SpO2 monitoring in CSCI patients can help to screen NH more earlier. And then, we can apply the appropriate treatment such as continuous or bi-level positive airway pressure before respiratory complication frequently occurs in CSCI patients.
Non-invasive neuromodulation to suppress neurogenic detrusor overactivity post spinal cord injury: a site comparison study

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**Biography:**

Sean Doherty is a medical engineering PhD student working with London Spinal Cord Injuries Centre and Aspire CREATe, UCL, on developing wearable neuromodulation devices for managing bladder overactivity following spinal-cord injury.

Neurogenic detrusor over-activity (NDO) is prevalent in the SCI population and often refractory to current treatment. Neuromodulation through non-invasive electrical stimulation could add to existing pharmaceutical and surgical management options. The genital nerve (DGNS), tibial nerve (TNS), sacral roots (SRS) and spinal cord (SCS) have been suggested as effective stimulation targets.

We have assessed the acute effect of conditional stimulation over the 4 sites using standard urodynamics. Each site was tested in a separate session where baseline and with-stimulation fills were used to allow within-individual comparison. Conditional stimulation was triggered at a detrusor pressure of 10 cmH2O using stimulation parameters of 15Hz, 200μs PW and maximum tolerable amplitude in all sites. Maximum cystometric capacity (MCC), maximum detrusor pressure and time to leakage (Tsec) were recorded.

Six male patients with chronic supra-sacral SCI (ASIA A-D), urodynamically proven NDO and reported incontinence were tested. In all six subjects, DGNS was found to increase MCC and Tsecs by more than other sites, with a mean(±SD) improvement from baseline of 176(±133)ml, range 85-460ml, and 187(±161)secs, range 44-530secs, respectively. TNS and SRS showed small improvements, SCS was tested in 4/6 participants and gave small negative results.

This study is limited by sample size and the fixed stimulation parameters used, however it does go some way to showing that DGN is the most effective site to acutely suppress NDO following SCI. This is relevant in furthering design of a clinically useful tool to help manage incontinence.

**Acknowledgment:** Funded by The INSPIRE Foundation, Salisbury, UK
Non-traumatic Spinal Cord Injury: 6-year results of a reference inpatient rehabilitation center

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Centro de Medicina de Reabilitação de Alcoitão, Centro Hospitalar do Algarve

Biography:
Master’s Degree in Medicine by the Faculty of Medicine of Coimbra
Last year of residence in PMR at CMRAcoitão
Postgraduate in Sports Medicine

Doctor in the Portuguese Athletics Federation and in the Paralympic Committee of Portugal

Introduction: Historically, the incidence of non-traumatic SCI (nontSCI) has been lower than traumatic. It seems that this paradigm is changing, despite the lack of evidence in literature. We aim to characterize a population with nontSCI, for the first time admitted to a rehabilitation center, from January 2010 until December 2015, and its functional outcomes.

Methods: This study is a descriptive and retrospective study of 433 individuals with SCI in inpatient regimen. Neurological examination and SCI classification was conducted according to the ASIA criteria and the FIM scale was used to assess functional status.

Results: Male/female ratio was 1:1. 66,7% had a nontSCI (n=289). The peak age distribution was 66-80 (34,3%). The overall leading cause was degenerative disease (39,4%), affecting mostly an elderly population. The inflammatory/autoimmune disease was the most common cause in 18-35 age group. Excepting degenerative disease, most patients had paraplegia (65,1%). At admission, 11,4% were classified as AIS A and 21,45% had a FIM value between 104-126. At discharge the latest raised up to 64,01%. The average FIM gain at discharge in relation with injury time until admission was: 21,99 (< 3 months); 19,52 (3-12 months); 15,61 (> 12 months).

Conclusions: There was a higher incidence of nontSCI. This data represents an expected tendency in western countries, where nontSCI tend to exceed traumatic lesions. Degenerative disease was the leading cause, probably due to population aging and higher incidence of cervical spondylotic myelopathy. The average FIM gain reveals that the earlier rehabilitation, the more relevant the functional gains.
Novel rehabilitation protocols after reconstructive arm-hand surgery for C-SCI patients: a single case experimental design

**Miss Charlotte Catharina Geelen**1,2, Miss Diana Vanmulken1, Mr Joris Vannebosch3, Mr Henk Seelen1
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**Biography:**
Charlotte Geelen MD, works as a rehabilitation physician at the SCI unit at Adelante Center of Expertise in Rehabilitation and Audiology in Hoensbroek and at the Maastricht University Medical Center (MUMC+). She combines her work as a physician with clinical research at the Department of Rehabilitation Medicine, Research School CAPHRI, Maastricht University in The Netherlands.

Introduction: In patients with a cervical spinal cord injury (C-SCI), functioning in daily life is strongly determined by decreased arm-hand dexterity. Novel reconstructive arm-hand surgery procedures have led to reduced length of inpatient stay post-surgery, necessitating novel rehabilitation treatments that need to be protocolling and tested as to their effectiveness. This study aimed to (a) develop such rehabilitation treatment protocol, and (b) examine the ‘order-of-magnitude’ of its potential benefit.

Methods: One C-SCI patient was studied in a single case experimental design. Primary outcome parameters were: arm-hand dexterity (Rasch-analysed Van_Lieshout_arm-hand_test_for_Tetraplegia_Short_Form (r_VLT-SF100)) and quality of life. Secondary outcome parameters were: patient’s perceived therapy effectiveness; active range of motion (AROM); muscle tone; muscle strength; and grip and pinch strength. Data were gathered at baseline (t1), post-intervention (t2) and twelve weeks follow-up (t3). Data were analysed descriptively.

Results: Reconstructive arm-hand surgery included novel procedures in tendon transfer to improve hand grip. Post-surgery rehabilitation included faster/early mobilization (within days), a condensed clinical rehabilitation treatment (2-weeks) and a home-based modular personal goal-oriented, functional treatment (8-weeks). Improvements were found for r_VLT-SF100 (mean: 53.3 (t1); 52.2 (t2); 56.3 (t3)); AROM of the wrist, metacarpo-phalangeal and proximal interphalangeal joints of the thumb and index finger; muscle tone; muscle strength; grip strength (mean force: 214.1N (t1); 191.1N (t2); 230.2N (t3)); and patient’s perceived therapy effectiveness (GAS: -2 (t1); +1 (t2); +2 (t3)). No changes in quality of life were observed.

Conclusion: The novel protocol looks promising. Further research is warranted to provide conclusive evidence on the protocol’s effectiveness.
Objective burden, subjective burden, or lack of positive aspects of caregiving:
What matters for caregivers’ health?

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¹Swiss Paraplegic Research, ²Department of Health Sciences and Health Policy, University of Lucerne, ³Faculty of Medicine, University of Duesseldorf, Life-Science-Center

Biography:
NO BIO

Background: Informal caregiving is a primary public health issue that concerns an increasing part of the population and may have serious consequences on caregivers’ health. Yet, little is known on the distinct association of objective and subjective caregiver burden and positive aspects of caregiving with self-reported health in partners of persons with physical disabilities.

Methods: Data of the pro-WELL study including 118 partners of persons with spinal cord injury were used. Regression modelling was applied to investigate associations of objective burden (time, supported activities), subjective burden (Zarit Burden Interview) and positive aspects of caregiving (deeper sense, satisfaction) with self-reported health indicators, including general health, role limitations due to physical and mental health, sleep, pain, mental health, and vitality.

Results: Subjective caregiver burden was related to all self-reported health indicators. A high subjective burden was associated with poorer general health (OR 6.5, 95%CI 2.0-21.5), more role limitations due to physical (OR 4.2, 95%CI 1.4-12.8) and mental health (OR 3.6, 95%CI 1.1-11.7), more sleep problems (OR 5.3, 95%CI 1.6-18.4), higher pain intensity (OR 4.0, 95%CI 1.4-11.5), poorer mental health (coefficient -17.9, 95%CI -24.5- -11.2), and lower vitality (coefficient -20.3, 95%CI -28.4- -12.1). Partners who indicated positive aspects of caregiving further reported better mental health (coefficient 6.5, 95%CI 0.2-12.8). Objective burden was not associated to any health indicator.

Conclusions: Interventions that target the reduction of stressful experiences and strengthen positive feelings related to caregiving are needed to promote caregivers’ health.
Occurrence Of Urinary Tract Infections In Spinal Cord Lesion Patients In A Rehabilitation Hospital - A Two Years Slovenian Experience

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¹University Rehabilitation Institute Soča

Biography:
NO BIO

Introduction. Urinary tract infections (UTIs) are frequent in patients with spinal cord lesion with neurogenic bladder. In our rehabilitation department we noticed a rise in the occurrence of UTIs in the phase of starting performing clean intermittent (self) catheterisation. The aim was to analyze characteristics of patients that had symptomatic bacteriuria and to improve our protocol of performing and teaching intermittent (self) catheterisation.

Methods. Analysis of medical records of all patients admitted in a two year period (250) was performed and a more in depth analysis was carried out for those who had symptomatic bacteriuria (forty percents).

Results. Performing clean intermittent (self) catheterisation (both in learning and self performing phase) shows higher occurrence of UTIs than when patients have indwelling urinary catheters.

Conclusions. According to our findings we improved the protocol for teaching the technique of clean intermittent (self) catheterisation. We prolonged the period of learning, improved the system of recording all the steps of the protocol, included relatives in the educational program. The most important measure was to start using only hydrophilic catheters for the clean intermittent (self) catheterisation
Online Symptom Checkers: A Novel Insight into the Challenges of Diagnosing Cervical Spondylotic Myelopathy

Mr Colin Munro, Dr Benjamin Davies, Dr Michael Fehlings, Dr Mark Kotter

1 University of Cambridge School of Clinical Medicine, 2 Academic Neurosurgery Unit, Department of Clinical Neurosciences, University of Cambridge, 3 Anne McLaren Laboratory for Regenerative Medicine, Welcome Trust MRC Cambridge Stem Cell Institute, University of Cambridge, 4 Division of Neurosurgery, University of Toronto

Biography:
I am a 4th year medical student at the University of Cambridge currently working within Mark Kotter’s group researching various aspects of Degenerative Cervical Myelopathy.

Introduction:
Cervical Spondylotic Myelopathy (CSM) is a common degenerative condition of the cervical spine. Whilst decompressive surgery can halt disease progression, existing spinal cord damage is often permanent, leaving patients with lifelong disability. Treatment <6 months offers the best chance of full recovery, yet most patients wait >2 years for a diagnosis. Online symptom checkers are widely used by patients before consultation. This study aimed to use these checkers to represent current diagnostic knowledge of presenting symptoms and identify which presenting symptoms, or combination, are specific for CSM.

Methods:
Textbook CSM symptoms were amalgamated from leading review articles. These symptoms were entered into the online symptom checkers (N=4) used by the top 20 symptom checker websites (Google Search), to ascertain their predictive power for diagnosing CSM. The most widely cited symptom checker, WebMD, was used to characterise the differential diagnosis for CSM symptoms.

Results:
31 textbook CSM symptoms were identified. Of these 14 (45%) listed CSM as a differential, of which 3 (10%) placed CSM in the top 20% of the differential. Sensory symptoms had the greatest predictive power. On WebMD, only one combination of symptoms resulted in CSM as the primary differential; neck, shoulder and arm pain with hand weakness. 151 differential diagnoses for CSM symptoms were recorded on WebMD. Multiple sclerosis and peripheral neuropathy were the most common differentials, shortlisted for 52% and 32% of CSM symptoms respectively.

Conclusions:
CSM symptoms overlap with many conditions and no individual CSM specific symptoms were found. This heterogeneity challenges early diagnosis.
Open surgery for haemorrhoids in persons with SCI

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Biography:
No Bio

Introduction
Haemorrhoids are a common complication in persons with spinal cord injury (SCI). While first and second degree haemorrhoids can be treated conservatively, surgery is the treatment of choice in case of third and fourth degree haemorrhoidal disease. This surgical approach is rarely proposed to them by fear of cutaneous or continence complications.

Aim
To assess the outcome of open surgery for grade 3-4 haemorrhoids in persons with SCI.

Material and method
Retrospective study in 19 patients. There were mainly men (n=17) with paraplegia (n=15), and complete (AIS A) lesions (n=17). Mean age was 54 years, mean time since injury 17 years. Main complaints were rectal bleeding and difficulties with evacuation.
Open haemorrhoidectomy (Milligan Morgan procedure) were performed, associated with Bellan technique (posterior anoplasty and internal sphincterotomy) for associated anal fissures (n=13). The wounds were left open at the end of the procedure.

Results
At 6 weeks follow-up, complete cicatrisation was obtained in all, and full therapeutic success was seen in all but one patient (anal fissure).
Long-term results showed complete or significant healing of haemorrhoids in 16 (84%); healing of anal fissures in 10 (77%); healing of rectal prolapse in 2 (66%). Patient satisfaction was high in 15 patients (79%).
Incontinence was seen in 2 patients, with soiling in one and gas and stool incontinence in another, that were successfully treated with anal plug (Peristeen) and transanal irrigation, respectively.

Conclusion
Open surgery can be proposed to persons with SCI, with few complications and high level of satisfaction.
Osteoporosis and long bone fractures after SCI: a retrospective study

PhD Angela Frotzler¹, MSc, PT Stefanie Tesini¹, MSc, PT Anne Katrin Brust¹, PhD Jörg Krebs¹, MD Michael Baumberger¹, MD Markus Berger¹, MD, PhD Inge Eriks-Hoogland¹

¹Swiss Paraplegic Centre

Introduction: Osteoporosis is a severe secondary condition after SCI. The reduced bone strength results in an increased risk for minor trauma fractures mainly in the lower extremities. Therefore, the aim of the study was to analyse which bone parameters are prognostic factors for long bone fractures after SCI.

Method: Osteodensitometry data of SCI patients of a single SCI rehabilitation center were collected and analysed retrospectively. Osteodensitometry data of the lumbar spine, the hip and the distal tibia were generated by dual x-ray absorptiometry (DXA) or peripheral quantitative computed tomography (pQCT). Furthermore, the number of extremity fractures after SCI were assessed. ROC analysis was performed to analyse bone parameters which distinguish best between patients with and without long bone fractures.

Results: The data of 269 patients (68.8% men, 61.7% paraplegics, 70% AIS A/B) with a mean age of 54.0±15.5 years and a mean lesion duration of 12.8±13.6 years were analysed. A total of 41.3% were classified as osteoporotic, and 37.2% were classified as osteopenic. Fractures of the extremities were reported in 31.6% of the patients, of whom 70.1% were classified as osteoporotic. ROC analysis revealed that the total bone mineral density of the distal tibia discriminates best between patients with and without extremity fractures following SCI (AUC: 0.830, p<0.001), using a cut off value of 186.2mg/cm³ with a sensitivity of 82.7% and a specificity of 70.9%.

Conclusion: The bone density measurement of the distal tibia seems to be a useful parameter for the estimation of the risk for long bone fractures.
Poster Board Number: 105

Outcome of Rehabilitation of patients with Spinal Cord Injury in Level 1 Inpatient Neurorehabilitation Unit (INRU)

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¹Birmingham Community Healthcare NHS Foundation Trust

Biography:
NO BIO

Objective

To review the functional outcome measures of spinal cord injury patients in INRU

Design

Retrospective study of consecutive patients admitted for rehabilitation after spinal cord injury over 3 year period

Setting

32 bedded Level 1 Inpatient Neurorehabilitation Unit offering rehabilitation for people with acquired brain and spinal cord injuries

Patients

80 consecutive patients (58 male and 22 female) admitted with spinal cord injury of both traumatic and non-traumatic in origins. The age range was from 25 to 87 years.

Main Outcome measures

Functional outcome (FIM+FAM), nursing dependency score, length of stay, and discharge destination

Results

We noticed the significant improvement in the level of functional status between admission and discharge states; there were mean improvements of 20.52 in the Functional Independence Measure and 28.28 in the Functional Assessment Measure following therapeutic interventions.

The improvement in activities of daily living, safety awareness, and bladder, bowel and behavioural management were reflected in the average reduction of nursing dependency score by 6.82.

Average length of stay was 63.34 days. 58 people were discharged to home while 9 people went to care homes and 13 were transferred to acute hospital.
We noticed the significant improvement in the level of function measured by FIM+FAM and nursing dependency score.

Conclusion

This study shows people with spinal cord injury made considerable progress in INRU in terms of self-care, mobility, and adjustment to limitations. Most of the patients returned home.
Introduction:
High CSI pose a tremendous financial burden to society because of the expensive and prolonged treatment. Patients also face huge challenges in terms of survival. There is no literature available on the outcomes of such patients in India whereas there are numerous challenges for community inclusion even for low tetraplegics and paraplegics. This study was thus initiated to determine the outcomes, satisfaction with life and community inclusion of high CSI.

Aim:
To find the complications and outcomes in high CSI post discharge.

Methods:
Demographics, satisfaction with life scale (SWLS). Reintegration to Normal Living Index (RNLI), Medical Issues (re-hospitalization) and return to employment were assessed retrospectively.

Results:
Mean age was 41.7 years (range 17 to 89). 24 were married and 9 unmarried. 18 were AIS-A, 7 AIS-B, and 8 AIS-C. Average follow up was 9 months (range 4-15). Of the 33, 6 died within average of 2 months. 80% were dissatisfied in life as determined by SWLS. None of the patients were able to return to a normal life style as per RNLI scale (3.44). Complication rate was 42% whereas 36% were re-hospitalized. Only 6 were employed post injury. All patients achieved less than 50% of functional independence.

Conclusions:
Person with high CSI are completely dependent on personal assistance throughout their ADL's and services like mobility, transportation and return into employment. Satisfaction with life was low. Similarly, the community inclusion was substantially hindered in keeping with physical limitations of the group.
Outcomes of Pilot Education Session on Autonomic Dysreflexia

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Biography:
NO BIO

Introduction/Objective
Staff working with individuals with spinal cord injury (SCI) access educational resources during their time spent on a spinal injury unit or centre. Regular education sessions are required to ensure continued professional development and to enhance departmental learning. The objective was to evaluate the learning outcomes after a short education session on Autonomic Dysreflexia (AD) in staff working in a Spinal Injury Centre.

Methods
A short multiple-choice questionnaire was given to attendees at a departmental education session. Five questions with four stems were prepared in a true/false response fashion. The same questionnaire was requested to be completed again after the education session lasting 45 minutes. The education session was conducted using a Microsoft PowerPoint and involved case studies with questions and discussions at each step. The questionnaire was distributed to all attendees (N=20). P-Value was set at 0.05.

Results
Twelve out of the twenty questions showed an improvement in overall correct responses after the education session, whereas three questions showed a slight decrease in correct responses (by 5%) which may be indicative of the vagueness of the question given. Two of the improved responses were significant (p<0.05). There was no change in response score in five of the questions (100% gained both times).

Conclusions
Education sessions are an effective tool for staff education to ensure continued professional education and should be done regularly to maintain an adequate level of knowledge. Autonomic Dysreflexia is an important subject which needs to be addressed on a regular basis; not just at induction.
Pain Profiles Following Spinal Cord Injury in Ireland: A National Survey

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Biography:
Dearbhla is qualified physiotherapist from University College Dublin and is undertaking a PhD in the area of spinal cord injury pain. She has a particular interest in the prevalence and non-pharmacological management of chronic pain after spinal cord injury. To date she has completed a national prevalence study on pain post injury in Ireland, an international systematic review on the prevalence of neuropathic pain after injury and has been principal investigator piloting a multi-disciplinary pain management programme both in a rehabilitation centre and online.

Introduction: Up to 60% of patients develop chronic pain following spinal cord injury (SCI), limited data currently exists on the prevalence and profile of pain post SCI in community dwelling populations.

Methods: Following ethical approval members registered to a national SCI database (Spinal Injuries Ireland) (n=1,574) were surveyed. The survey included demographic and SCI characteristics items, the International Spinal Cord Injury Pain Basic Data Set, the Douleur Neuropathique 4 questionnaire (interview), and questions relating to health care utilisation. Data were entered into the Statistical Package for the Social Sciences (version 20). Significance was set P < 0.05 for between group comparisons.

Results: In total 643 (41%) surveys were returned, levels of SCI were mainly across cervical (34%, n=218) and thoracic (34%, n=219) regions and 50% were incomplete (n=321), 458 (71%) respondents experienced pain in the previous week. Neuropathic pain (NP) was indicated in 251 (39%) of responses and nociceptive pain in 206 (32%). Common treatments for pain included medications (76%, n=347), massage (29%, n=133) and heat (25%, n=115). Respondents with NP reported higher pain intensities and increased healthcare service utilisation (P= < 0.001) when compared to those with nociceptive pain presentations. A higher proportion of females than males reported pain (P = 0.003) and NP (P = 0.001) and those unemployed presented with greater NP profiles compared with those in education or employment (P= 0.006).

Conclusion: Pain, in particular NP post SCI interferes with daily life, increases health service utilisation and remains refractory to current management strategies.
Participation in persons with chronic spinal cord injury in Switzerland: evidence from a population-based community survey

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Biography:
NO BIO

Objective: To describe participation and evaluate socio-demographic and spinal cord injury (SCI)-related characteristics as determinants of participation in community-dwelling individuals with SCI in Switzerland.

Methods: Community survey as part of the Swiss Spinal Cord Injury (SwiSCI) cohort study. Subjects (N=1549) were Swiss residents, aged ≥16 years and living with traumatic or non-traumatic SCI. Participation was measured by the Utrecht Scale for Evaluation of Rehabilitation-Participation, a questionnaire with 3 scales (Frequency, Restrictions, Satisfaction). We used univariable and multivariable regression modelling to evaluate determinants of participation.

Results: Most participants were male (71.5%), mean age was 52.3 years, and mean time since injury 16.8 years. Traumatic SCI was the most frequently reported etiology (78.4%). Frequency of participation in productive, outdoor leisure and social activities was reduced, with 35-45% of persons reporting major restrictions in these activities (i.e., not possible or needing assistance). In comparison, indoor activities and relationships with others were less affected (i.e., in 10-25%). Participants were generally satisfied with their current daily life activities, ranging from 53% for sports to 84% for leisure activities, contacts and relationships. Multivariable regression analysis revealed that particularly younger participants, those with less severe SCI, and those with higher education showed more favorable participation scores (all p< 0.0001). Longer time since injury and having a partner were only related to satisfaction with participation (all p<0.01).

Conclusions: This study provides an in-depth analysis of participation restrictions experienced by individuals with SCI in Switzerland. Further research on the impact of personal and environmental factors on participation is warranted.
Participation rate of observational- compared to interventional studies: is there a difference?

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Introduction
An accurate estimation of the patient participation rate is crucial for planning clinical trials. During primary rehabilitation approximately 50% of the patients participate in at least one clinical trial. The objective of this investigation was to determine, whether the participation rate differs between observational- and interventional studies.

Methods
From June 2013 to December 2016, all acute (<6 weeks post injury) spinal cord injured patients of a specialized rehabilitation hospital were routinely assessed regarding inclusion criteria of prospective studies running at that time. The number of qualifying patients was documented. The participation rate of observational and interventional studies was identified retrospectively.

Results
During the observational period, four interventional and four observational studies were running. In total, 265 men and 96 women qualified a total of 777 times for clinical studies. Inclusion criteria of observational studies were fulfilled in 85.6% (665/777) of the cases, whereas inclusion criteria of interventional studies were fulfilled in 14.4% (112/777) of the cases. The participation rate of observational studies was 35% (95% CI 31-39%), whereas 26% (95% CI 18-35%) of qualifying patients participated in interventional studies (p=0.058).

Conclusions
In acute spinal cord injured patients the participation rate of observational studies was higher compared to interventional studies. However, it was not statistically significant. Patients seem to be less reluctant to participate in observational studies, maybe due to the “more passive character” of those studies. Further aspects, i.e. expenditure of time or potential personal benefits in terms of participation may affect participation rate more than the study design.
Participation restriction in people ageing with spinal cord injury – a 20 year longitudinal study

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**Biography:**

NO BIO

Aim: Examine changes in participation and in assistance needs over a twenty year study period in a sample of people with long-standing spinal cord injury (SCI), and to identify potential risk factors.

Design: Prospective observational.

Method: The sample consisted of the British ageing with SCI study participants who were seen at baseline (1990 or 1993) and in the final follow-up (2010). Outcome measures were Craig Handicap Assessment & Reporting Technique (CHART), and interview questions about assistance needs.

Results: Of the 293 original Ageing study participants, 85 entered the sample. In 2010 the mean age was 67.65 and the mean time since injury 46.26 years. The mean CHART physical independence subscore decreased from 97.55 in 1990 to 91.30 in 2010 (p=0.008), mobility from 95.71 to 81.94 (p<0.001), occupation from 85.95 to 64.55 (p<0.001), and social integration from 96.55 to 92.7 (the only subscore change not statistically significant, p=0.068). Increasing need for assistance was reported by 10.6% of participants in 1990, and by 36.6% in 2010 (p=0.002). The mean daily assistance increased from 0.61 hours/day to 2.18 hours/day (p=0.008). Persons requiring more assistance were older and injured longer, had a more severe SCI and lower self-reported quality of life (p<0.05).

Conclusions: An increase in participation restriction and in assistance needs was reported over the 20 year follow-up period. Clinical awareness of how participation changes as individuals age may help provide timely intervention and offset declines.

Patient experiences of 'Diagnosis and Prognosis' discussions in spinal cord injury.

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¹Royal National Orthopaedic hospital

Biography:
Dr Meenakshi Nayar is a final year registrar in Rehabilitation medicine at the London Spinal Cord Injury Centre. She has published research looking into outcome measures in neurological rehabilitation. She is particularly interested in understanding and developing patient experiences and perceptions of medical care.

Objective/Background
Breaking bad news about ‘poor prognosis’ in Spinal cord injury is a necessary task for clinicians. There is limited literature about delivering news about prognosis after spinal cord injury. At the London Spinal Cord Injury Centre, a formal meeting known as diagnosis and prognosis meeting (D&P) is carried out, usually 2-3 weeks after admission to the SCIC. The aim of this study was to get feedback from previous inpatients on timing, content and delivery of these conversations and their suggestions for improvement.

Methods
This study had a cross-sectional convenience survey design. Retrospective data was collected from patients attending outpatient clinics. The inclusion criteria was that they should have had an admission as an inpatient. A mixed methods approach was used to obtain demographic, quantitative information of the background of the patients’ injury and qualitative data about their experiences and recommendations for D&P meetings.

Results
78 surveys (73% male and 27% female) were completed. 50% had an incomplete spinal cord injury, 32% complete and 18% did not know the completeness of their injury. Thematic analysis showed that 75% of patients found the D&P informative and useful. The majority of patients wanted as much detail about their injury and as early as possible in their admission.

Conclusion
D&P meetings are helpful to the majority of patients. This study is an important first step in identifying patient perception and preferences for receiving diagnosis and prognosis information. Additional work will be to obtain prospective data from the patients after the D&P meeting during the same admission.
Poster Board Number: 43

Patient’s Satisfaction with Neurogenic Bowel Conservative Treatment in Spinal Cord Injury

Dr Moh'd Rami Al-ahmar

Mohammad Rami Al-Ahmar, MB,JB Physical Medicine & Rehabilitation, Spinal Injury Senior Specialist, King Hussein Medical City, Jordan. Dr. (Moh'd Rami) Al-Ahmar is holding a position of Physiatrist & Spinal Injury Senior Specialist in Jordanian Royal Medical Services-King Hussein Medical Centre. He acquired his MBBS, MD from Damascus University (Syria). He completed his residency in Physical Medicine & Rehabilitation (Jordanian Board PM&R) in 2008. In 2012 he achieved Spinal Cord Injury Fellowship (Robert Jones & Agnes Hunt, Oswestry, UK). During his prosperous career he has obtained numerous titles and membership: Senior specialist of Physical Medicine and Rehabilitation (PM&R JB); International Spinal Cord Injury Society (ISCoS) Educational Committee member and representative for Middle East and North Africa (MENA) region; WHO Liaison officer for Eastern Mediterranean-Sub Committee; Chief of infection control committee at RRC; Wound Care and Ostomy committee member at RMS; Executive Member of the Jordanian PM&R Society; Executive Member for the Charitable Spinal Injury Society (JoSCIS) etc. Dr. Al-Ahmar has acquired following honors: ISCoS & ASIA Award winner for best research in Pressure Ulcer and Bacterial strains 2015 Montreal (Canada); United Nations Medal 2008 (Medal of Administrative Competence 2008), Royal Rehabilitation Centre/SCI Unit

Biography:

Mohammad Rami Al-Ahmar, PM&R, SCI Senior Specialist in SCI_Unit-King Hussein Medical Centre. MBBS, MD(Syria). Physical Medicine & Rehabilitation Residency KHMC (Jordanian Board PM&R) in 2008. In 2012 achieved Spinal Cord Injury Fellowship (Robert Jones & Agnes Hunt, Oswestry, UK). Obtained numerous titles and membership: (ISCoS) Educational Committee member; WHO Liaison officer for Eastern Mediterranean-Sub Committee; Chief of infection control committee at RRC; Wound Care and Ostomy committee member at KHMC; Executive Member of the Jordanian PM&R Society; Executive Member for the Charitable Spinal Injury Society etc. Award: ISCoS & ASIA Award winner 2015 (Canada); United Nations Medal 2008 (Medal of Administrative Competence).

Introduction:
SCI is a devastating disease and multi system injury which play a considerable role in the morbidity, mortality, psychosocial and quality of life for SCI subjects.

Objective:
To examine conservative care in neurogenic bowel dysfunction and its impact among Jordanian individuals with Spinal Cord Injury (SCI).

Methods:
Prospective study was done in our spinal unit and OPD at the Royal Rehabilitation Centre. All patients diagnosed to have SCI more than one year attended the OPD clinic or readmitted to Spinal Unit were assigned and given a validated Neurogenic Bowel Dysfunction score (NBD score).

Results:
Among 162 SCI patients, 154 recruited and 8 eliminated. 120 men (78%), 34 women (22%), aged 4–83 years (mean 38.5 years). Mean time since injury (14 years). 38 Cervical (25%), 94 Thoracic (61%), 22 Lumbar (14%), 86 complete (56%). Median general satisfaction of bowel management was (5.8), Median NBD score was 14 (range 3–28). 77 patients reporting severe impact on QOL; mean NBD score was 19.6 (SD 3.7), 35 patients reporting moderate impact on QOL; mean NBD score was 12.2 (SD 1.3). 20 reporting minor impact; mean NBD score...
was 8.5 (SD 0.7) while 22 reporting very minor impact; mean NBD score was 4.5 (SD 1.4). Overall, differences in NBD score between the groups were highly significant.

Conclusion:
Learning to manage a bowel following SCI is one of the most difficult things to cope with. The main aim is to establish an effective, straightforward routine to suit Patient’s lifestyle, and to prevent accidents and problems from occurring.
Peer mentoring in SCI neurorehabilitation

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Biography:
NO BIO

Introduction
Incidence of spinal cord injury (SCI) in Denmark is 130/year, prevalence 3500. Worries about the future are common to all newly-diagnosed SCI patients. In a joint project between Danish Spinal Cord Injuries Association (RYK) and the two nationwide SCI neurorehabilitation centers, we established a corps of volunteer peer mentors in order to evaluate the effect of peer mentoring as supplement to professional rehabilitation efforts.

Methods
In an interventional study with questionnaires before and after interventions, newly-diagnosed SCI patients were offered 1 - 3 meetings with a peer mentor during an inclusion period of 1 year. Topics of the study are the participants’ individual gains from mentoring and satisfaction with organization of mentoring in a neurorehabilitation hospital setting. Outcome measures are QOL, pain scores and information regarding issues, addressed during mentor sessions.

Results
The project closed ultimo 2016 and analysis of results is ongoing. Members of the mentor corps (n=57) are 37 (65%) men and 20 (35%) women, aged 20 – 76 years. 53 mentees participated, 33 (62%) men and 20 (38%) women aged 19.5 – 77 years, mean age 47.4 years at time of intervention. 43% traumatic and 57% non-traumatic SCI. 78.4% had 2 or more meetings with mentors, and 33.3% would have liked more. 94% would recommend others to take up the offer to meet with a peer mentor.

Conclusions
94% recommend other newly-diagnosed to meet with a mentor and 2/3 of participants seem to be content with 1-3 meetings. This and other findings will be further analyzed.
Perceived injustice after spinal cord injury: Risk factor for physical and psychological outcomes

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**Biography:**
Kimberley Monden, PhD, earned her graduate degree in Counseling Psychology from the University of Kansas. She is a Principal Investigator and Psychologist at Craig with experience working with individuals with traumatic injuries such as SCI, amputation, and other musculoskeletal traumas. Her research interests include resilience, injustice, pain, pain-related fear and other psychosocial factors and interventions that can impact adjustment following injury. Dr. Monden's research efforts aim to improve quality of life, long-term psychosocial outcomes, and clinical effectiveness.

Introduction: Perceived injustice—the belief that one’s pain/injuries are undeserved and attributable to another’s error or negligence—is predictive of negative physical and psychosocial outcomes in acute and chronic pain conditions, which suggests that patients with a variety of traumatic injuries may endorse injustice-relevant appraisals. The goals of the present study were: (1) to characterize injury-related perception of injustice among a sample of individuals with SCI, and (2) to examine the associations of perceived injustice with participants’ pain, depression, post-traumatic stress, anger, and perceived disability.

Methods: Participants included 47 (30 male) adults admitted to an inpatient rehabilitation facility following acute hospitalization for SCI. The mean age of participants was 49 years. Level of injury was as follows: 26 cervical, 15 thoracic, and 2 lumbar. ASIA Impairment Scale (AIS) scores were as follows: 11 A, 8 B, 11 C, and 10 D. Perceived injustice was assessed using the Injustice Experience Questionnaire (IEQ). Bivariate correlations examined associations between participants’ IEQ score and the following outcome variables: pain, anger, symptoms of depression and post-traumatic stress, and perceived disability.

Results: Results indicate that higher scores on the IEQ are moderately (r ranging from .41 to .60) and significantly associated with anger, perceived disability, symptoms of depression and post-traumatic stress, and future expectancies regarding return to work.

Conclusions: The current study increases our understanding of risk factors for poor physical and psychological recovery following SCI. Gaining an in depth understanding of how injustice appraisals impact outcomes following SCI will help guide future interventions.
Perception of pain and depression in patients with spinal cord injury

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Biography:
NO BIO

Aim: Aim of the study is to evaluate the relationship between perception of pain and depression in SCI patients. Some researches show that SCI patients with pain, compared to control subjects, have recorded lowest pain thresholds (Kumru, et al., 2011) and at least 13-45% of SCI patients presents an anxious and depressive symptomatology.

Method: Pain threshold and pain tolerance (cold pressor test), the Italian Questionnaire of Pain (QUID) were used to assess perception of pain, Hospital Anxiety and Depression Scale (HADS) to investigate psychological factors. Population includes 28 subjects assessed using ASIA classification.

Results: An higher affective dimension of pain was found in the ASIA A (complete) SCI persons than in incomplete SCI (F=4.197 Sign.=0.016) although no difference between complete and incomplete SCI was found in the perception of a pain stimulus induced by a cold water. Despite no differences in the depression scoring was found between different ASIA SCI groups, the complete SCI subjects rated showed higher levels of anxiety compared other groups (F=2.99; p=0.051).

Conclusions: Preliminary results of this study show that the completeness of spinal lesion corresponds to a rise of the component of unpleasantness of pain associated with an increase in anxiety level.

Bibliography:
Pharmacological inhibition of myostatin in a contusion model of spinal cord injury improves measures of metabolism and skeletal muscle function

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University Of Miami Miller School Of Medicine, Scholar Rock, Inc.

Introduction: Spinal cord injury (SCI) leads to sub-lesional skeletal hypokinesis, muscle atrophy, and metabolic dysfunction. Myostatin, a member of the TGFβ family of growth factors, is a key negative regulator of muscle mass and is associated with muscle pathophysiology in many diseases and degenerative processes. Here we examine the effect of myostatin inhibition on metabolic and functional outcomes in a murine contusion model of SCI.

Methods: Myostatin signaling was blocked by systemic delivery of a highly selective monoclonal antibody, muSRK-015P, that blocks release of active growth factor from the latent form of myostatin. muSRK-015P is a parental counterpart of Scholar Rock’s lead compound, SRK-015, expressed on a mouse IgG1 framework. Adult female mice were subjected to a severe (65 kDyne) SCI (T9), and immediately administered test articles - muSRK-015P or controls (vehicle or IgG). Test articles were re-administered 1-week post-SCI. A control group receiving laminectomy only was included (sham). Animals were sacrificed 2-weeks post-SCI.

Results: SCI controls showed significant decreases across outcomes compared to sham. muSRK-015P significantly improved lean mass and energy expenditure over SCI controls (p < 0.05; no difference compared to sham). 1- and 2-weeks post-SCI, muSRK-015P significantly improved hind limb locomotor function (BMS) and grip strength over SCI controls (p < 0.05) but not to the extent of sham.

Conclusions: muSRK-015P treatment improves lean mass, energy expenditure, and functional measures of locomotion and strength following experimental SCI. These pre-clinical findings identify myostatin inhibition as a potential adjunctive therapy for metabolic dysfunction and motor deficits observed with SCI.
Poster Board Number: 184

Prediction of bladder outcomes after ischemic spinal cord injury (ISCI): a longitudinal cohort study

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Biography:
Giorgio Scivoletto is the coordinator of the spinal unit at S. Lucia rehabilitation hospital and head of the Spinal Rehabilitation lab. He has a strong research background on the outcomes of spinal cord injuries and lesions and on the validation and use of outcome measures.

Objective
The recovery of bladder function after spinal cord injury (SCI) is of major importance for patients and their families. We recently developed two prediction models of bladder outcomes (urinary continence and complete bladder emptying) one year after traumatic SCI (Pavese et al. PLoS Med 2016) and investigated if these models would also be applicable to patients with ISCI.

Patients and methods
From the European Multicenter Study about Spinal Cord Injury (EMSCI), we extracted data of all ISCI patients with available International Standards for Neurological Classification of Spinal Cord Injury (ISNCSCI) and Spinal Cord Independence Measure (SCIM) within 40 days and bladder outcomes one year after ischemia. The full model relies on three predictors: lower extremity motor score (LEMS) of ISNCSCI, light-touch sensation in the S3 dermatome of ISNCSCI, and the subscale respiration and sphincter management of SCIM. The simplified model is based on LEMS of ISNCSCI only. Bladder outcomes were assessed through item 6 of SCIM.

Results
We included in the study 85 patients (56 males (66%), mean age 55 years). Twenty-three patients (27%) showed urinary continence and complete bladder emptying one year after ischemia. Both models showed a very good predictive power: The area under the receiver operating characteristics curve (aROC) of the full and simplified model was 0.825 (95% confidence interval [CI]: 0.717-0.933) and 0.822 (95% CI: 0.721-0.923), respectively.

Discussion
Our study demonstrates the validity of the two prediction models for bladder outcomes also in patients with ISCI thus providing a reliable clinical and research tool.
INTRODUCTION: The aims of this workshop are to provide 1) the latest information regarding the understanding of fertility, pregnancy, labor, delivery and postpartum state, and 2) resources for health care practitioners to gain knowledge to support the obstetrical experiences of women with SCI. FERTILITY. Injury to the spinal cord often disrupts the autonomic and central nervous systems communication and causes Spinal shock. Disruption of the reproductive equilibrium may result in many menstrual cycle abnormalities which impact fertility if not treated. PLANNING: Studies suggest that women with SCI become pregnant for the first time at an older age than able-bodied women. This may be related to functional level and psychosocial issues. The fecundability (i.e. capacity or probability of achieving pregnancy within one menstrual cycle) decreases after age 32 years old. Iezzoni (2016) et al, reported a 2% pregnancy prevalence related to age, marital status, motor score, mobility, functional and occupation scale scores. Average age for this cohort was 31.2+-6.7. SCI-RELATED CONDITIONS: Physiological changes of pregnancy often impact bowel, bladder, and circulatory function after SCI requiring adjustments of routine management. Physical restrictions from spasticity, contractures, heterotopic ossification (H.O.) kyphosis/scoliosis may prevent mobility and alter circulation and capacity to carry the fetus. Pulmonary dysfunction from the gravid uterus diminishes vital capacity creating poor oxygenation. Development of decubitus ulcers, lower extremity edema, weight gain, urological complications, gastrointestinal dysfunction, and postural hypotension can become problematic. Women with SCI may experience anxiety and fear regarding pregnancy and caring for a child. Concomitant medical problems are more frequent in older pregnant women (> 35 years) and associated with increased risk of pregnancy and labor complications. LABOR AND DELIVERY: Past reviews reveal that the parturient with SCI has a two times higher risk of experiencing a pre-term birth which is associated increased morbidity and mortality in the infant. The most critical complication of labor and delivery is autonomic dysreflexia. Sequelae of fetal distress, maternal intracranial hemorrhage, coma, seizures, and even death may occur. Autonomic dysreflexia must be distinguished from pre-eclampsia-eclampsia. Urinary Tract Infections are associated with preterm and low-birth-weight infants. POST-PARTUM: Care involves lactation and psychological concerns.
Objective: analyse the integrity of sacral area sensory pathways in all its components (Aβ, Aδ and C fibres). We evaluated the relative activation state of each single fibre and correlated these data with the clinical conditions, especially the AIS (American spinal cord injury association Injury Score), to define the grade of SCI completeness.

Methods: we examined 25 patients affected by acute post-traumatic SCI and admitted between June 2015 and 2016. Lesion level: 10 quadriplegic (all incomplete) and 15 paraplegic patients (8 complete, 7 incomplete); average age 36,2y (12-71); time between traumatic event and evaluation <1y. Examination: AIS grading; evaluation of sensory fibres with the technological device Neurometer®; we analysed the pudendal nerve (Penis Dorsal nerve in male and Superficial Perineal nerve in female).

Results: in 3 of the 8 AIS A patients we found out a residual activity of sensory fibres (normal activity of C fibres and inactivity of Aβ fibres) showing a discrepancy in AIS score between clinical and instrumental findings (discomplete lesions). Accidentally we found out that this typical sensory fibres activation pattern (observed in 13 of 25 patients) was also associated with non-responder, high-grade neuropathic pain (NRS 8-10/10).

Conclusions: the presence of a discomplete lesion could lead to a different rehabilitation programme; early identification of patients presenting a typical fibers activation pattern associated with neuropathic pain could give us the opportunity to design a tailored therapy before the onset of chronic pain and overactivities; could the neuromodulation of inactive Aβ fibers be a new therapeutic target?
Poster Board Number: 179

Prevalence of autonomic dysreflexia in patients with spinal cord injury above T6

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Biography:
NO BIO

Objective
To investigate the prevalence of autonomic dysreflexia (AD) using ambulatory blood pressure monitoring (ABPM) and the autonomic dysfunction following spinal cord injury (ADFSCI) questionnaire in patients with spinal cord injury (SCI) above T6.

Methods
Twenty-eight patients diagnosed with SCI above T6 were enrolled. ABPM and ADFSCI were utilized to assess AD. Using ABPM, systolic blood pressure (SBP), diastolic blood pressure, and heart rate (HR) were measured at 30-minute intervals. AD was defined as SBP 20 mm Hg higher than basal SBP, and the number of AD events was counted. The ADFSCI questionnaire was administered to evaluate the AD symptoms.

Results
Average daytime and nighttime SBP were 119.9±18.8 mm Hg and 123.8±21.2 mm Hg, respectively, and the nighttime mean SBP appeared to be 4 mm Hg higher than daytime mean SBP. These findings suggest the loss of nocturnal BP dipping in SCI patients. According to the ABPM, AD occurred in 26 patients and AD events occurred 5.8±4.7 times. ADFSCI results revealed that 10 of the patients evaluated were symptomatic while 8 were asymptomatic.

Conclusion
AD following SCI above T6 was highly prevalent and several patients seemed asymptomatic. These results suggest the necessity of proper diagnostic and therapeutic interventions for managing AD.
Prevalence of dyslipidaemia in patients with spinal cord injury admitted to UK Spinal Injuries Centres.

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Biography:
NO BIO

Introduction: Evidence from meta-analysis suggests an unique lipid profile after SCI and a potentially increased risk of cardiovascular disease (CVD). This study aims to (1) assess the uptake of lipid profile screening (LPS); (2) describe the prevalence of dyslipidaemia using ATPIII guideline and 10-years CVD risk using QRISK2; (3) describe the characteristics of elevated CVD risk in patients with SCI.

Methods: 1,606 adults were admitted during Jan 2012 to Dec 2016, 529 patients were admitted to rehabilitation wards, 224 (42.33%) patients (mean age: 54.4 years, 30.3% female) with SCI (38.9% tetraplegia; 28.7% complete SCI) had their baseline lipid profile measured.

Results: The compliance of LPS has improved significantly overtime [2014: 21.3%; 2015: 35.4%; 2016: 65.5%, p<0.01]. Hypercholesterolemia, low HDL-cholesterol, high LDL-cholesterol and hypertriglyceridemia were found in 33.4%, 46.4%, 27.4% and 48.6% of patients, respectively. 125 (58.7%) were at risk of developing CVD in the next 10 years (≥10%) and 56 (26.3%) were at high risk (≥20%). Twenty-four (42.8%) high risk patients were on lipid lowering medications. Elevated CVD risk associated with BMI ≥25 kg/m², p=0.045, systolic blood-pressure >120mmHg, p<0.01 and age ≥60 years, p<0.01 but it was not associated with female gender, tetraplegia, complete injury nor onset of SCI.

Conclusion: The compliance of LPS appears to have improved. A high percentage of apparently healthy SCI patients are at risk of CVD, characterised by low HDL-cholesterol but few are on appropriate treatment. Routine systematic LPS in rehabilitation stage is recommended before SCI-specific CVD guidelines are established for this population.
Poster Board Number: 185

Prevalence of Fatigue in a SCI population

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Hospital Nacional De Parapléjicos

Biography:
NO BIO

Fatigue has a profound impact on Spinal Cord Injury (SCI) patients, but only limited treatments are available. The aim of this study was to determine the prevalence of fatigue in spinal cord injury (SCI), and its association with clinical and demographic factors. We used an Internet based survey and a Face-to-Face interview to estimate the prevalence of fatigue in a SCI population. Fatigue was measured using the Fatigue Severity Scale (FSS). Clinically significant fatigue was defined as FSS scores greater than or equal to 4. A total of 253 SCI patients were included in the study. Clinically significant fatigue was present in one third of our sample. There was no relationship between fatigue and injury level or completeness. We found significant correlations between depression, pain, and level of injury. The relation of fatigue with completeness of injury, and spasticity is less clear. Moreover, the online survey and the standard face-to-face interview showed similar results concerning fatigue evaluation. However, several factors may contribute to fatigue. Future studies should be conducted to clarify which are the most relevant ones, and if possible, to determine which factors are modifiable.
Prevalence of neurogenic bowel dysfunction and impact on QoL among persons with spinal cord injury and spina bifida in Japan

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¹Department of Rehabilitation Medicine, Tokushima University Hospital, ²Department of Urology, Hyogo Rehabilitation Central Hospital, ³Department of Occupational Therapy, Faculty of Medical Technology, Niigata University of Health and Welfare

Biography:
2012-present Professor, Department of Rehabilitation Medicine, Tokushima University Hospital, Japan
1992-1993 Research Fellow, the Midlands Centre for Spinal Injuries, Oswestry, U.K.

Honorary Secretary, Japan Medical Society of Spinal Cord Lesion

Introduction: Limited evidence exist on the prevalence and impact of neurogenic bowel dysfunction in Japan and the study objective was to provide more knowledge via a web based survey.

Methods: The survey consisted of 42 questions/items and was distributed to members of the relevant disability organisations. The survey included questions on bowel management and the following validated tools: Neurogenic Bowel Dysfunction Score (NBDS), EQ-5D-5L, Health Utility Index (HUI) and Work Productivity and Activity Impairment Questionnaire (WPAI:SHP).

Results: A total of 364 responses were collected (275 SCI/89 SB). The NBDS showed that 55%/52% of SCI and SB-respondents suffer from severe bowel dysfunction (≥ 14 points). Moderate bowel dysfunction (10-13 points) was present in 19%/25% of the SCI/SB group while 26%/23% of the SCI/SB-population had very minor (0-6 points) or minor (7-9 points) bowel problems. There was no significant difference in NBDS between the SCI/SB groups (p = 0.8225). NBDS was correlated with EQ-5D-5L and HUI (EQ-5D-5L: R = -0.282, p <0.0001, HUI: R = - 0.298, p <0.0001). SCI-respondents with "severe" NBDS had average QOL-values of 0.45 (EQ-5D-5L) and 0.15 (HUI), while respondents in the "very minor"-group reported QOL-values of 0.62 (EQ-5D-5L) and 0.30 (HUI). The SCI-population experienced an average of 33% bowel-related productivity loss, compared to 30% in the SB-population.

Conclusion: Bowel dysfunction is prevalent in the Japanese neurogenic population and has a large impact on QOL as well as costs to the health care system and society. Bowel dysfunction requires more focus from clinicians as well as decision makers.
Prevention of diving-induced spinal cord injuries – preliminary results of the first Romanian mass-media prophylactic educational intervention

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**Biography:**
Asst. Prof. Aurelian Anghelescu, MD, PhD, Senior consultant in neurology & neurorehabilitation Founding Member (2007) and Prime Vice-President of the Romanian Society for Neurorehabilitation (RoSNeRa) - affiliated to WFNR. Founding Member and Prime Vice-President of the Romanian Spinal Cord Society (RoSCoS) - affiliated to ISCoS and ESCIF. Member of ISCoS (since 2000), WFNR (since 2008), Euroacademia Multidisciplinaria Neurotraumatologica (EMN, since 2014), and in many Romanian Scientific societies. He participated at the educational project “eleanSCI.org”.
Coordinator of the Romanian team in 5 international and 4 national research projects, co-author at 2 patent certificates, 9 books, and over 60 published papers

**Study Design:** observational study of the seasonal incidence of diving accidents, according to the summer weather pattern and the influence of an educative prophylactic intervention.

**Objectives:** The study analysed the preliminary results of a national project, disseminated on social networking (Facebook) and broadcasted on main National and international Romanian TV channels.
**Setting:** Neurorehabilitation, Teaching Emergency Hospital “Bagdasar-Arseni”

**Methods:** The study had a dichotomous design (a retrospective review and a prospective component), and analyzed the evolution trends of diving accidents, before and after the prophylactic intervention. The retrospective branch analyzed 41 diving accidents, registered during 2011-2015. The prospective component focused on cases registered in 2016. Spearman’s Rho non-parametric test was used to evaluate the association between two variables (the air temperature and number of diving accidents).

**Results:** The study involved 46 males and 1 female, with a mean age (at the time of injury) 26.4 +/- 7.02 (median 25, mode 23), admitted on Rehabilitation in an early post-acute status after surgical intervention. Male youths and young adults <35 years old represented 85% of all cases. During 2011-2015 was noticed a monotonic association between the summer climate and the incidence of diving-induced tetraplegia (R=0.97468; P=0.00482). Analyzing the evolutionary trends of similar cases registered in 2016, variables did not increase in value together (R=0.73561; P=0.09561). In 2016 the number of diving-induced quadriplegics was reduced on average by 26.8%.

**Conclusions:** One year is not enough for a successful, durable educative intervention. It is compulsory to continue, extend and intensively promote this program.
Promoting job retention post-SCI: Participation in interventions designed to minimise withdrawal from jobs obtained following the suffering of SCI

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Biography:
Gregory Murphy, Ph.D. is a professor of Rehabilitation Psychology at Latrobe University in Melbourne, Australia, who has had a long-established program of research into the post-injury vocational achievements of those living with spinal cord injury. He has been accorded visiting staff member status at numerous internationally-recognised universities and centres of excellence in spinal cord injury, including Johns Hopkins University in Baltimore, Maryland and the Swiss Paraplegic Centre in Notwill, Germany.

Introduction: While rehabilitation researchers have long regarded return to work as the 'gold standard' by which to judge the success (for working-age persons) of the rehabilitation effort, there has been almost total neglect of job retention. Thus, information about interventions to enhance job retention seems vital to the achievement of high rates of durable returns to work. This study aimed to identify the predicted use of interventions designed to prevent (unnecessary) job withdrawals among those with a spinal cord injury. Established social psychology theory (theory of reasoned action; theory of planned behaviour) was used to predict participants' intended intervention use.

Method: Using purposive sampling, 35 SCI participants completed a structured on-line survey to assess their beliefs about 10 interventions designed to minimise the influence of specific job-withdrawal factors.

Results: The predictability of intended participation use was suitably high, with over 60% of outcome variance (intended use) predicted from assessments of constructs drawn from the two theories. The theory of planned behaviour (TPB) was the better predictor of participation intention, except for two interventions (tele-rehabilitation; pre-employment workshops on assertiveness, social networking etc.) for which the TRA explained an equal amount of variance in reported intended use.

Conclusion: Application of the TRA and TPB conceptual framework provides rehabilitation professionals and policy makers with rarely-reported evidence about potential intervention participation to better guide public-health decision-making about the allocation of resources to minimise unnecessary job withdrawal following a post-injury return to work.
Poster Board Number: 250

Prophylactic Antibiotics with Urodynamic Studies in Patients with Spinal Cord Injury (SCI): Literature review

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Biography:
Aram Mashoof Fard, MSc, MD, MRCP
Dr Aram Mashoof Fard currently serves as a consultant in spinal Cord Injuries and Rehabilitation Medicine at the Duke of Cornwall Spinal Treatment Centre (DCSTC) in Salisbury, which covers southwest and southeast of England. Her special interest is Respiratory Management of patients with Spinal Cord Injury. She serves as the clinical lead of the centre in this area. She also serves as a recognised Educational Supervisor in Wessex Deanery, in England, and supports the specialty trainees in Rehabilitation Medicine attending the DOCSTC.

Background: The incidence of urinary tract infection (UTI) following urodynamic testing in general population has been reported to vary from 1.5-36%. The incidence of UTI after urodynamic examination in patients with SCI using intermittent catheterisation or reflex voiding has been reported as high as 15.79%.

Aim: Should patients with SCI who undergo urodynamics receive routine prophylactic antibiotics?

Method: A comprehensive electronic search of main databases; MEDLINE, Embase and Cochrane Library was performed using appropriate search terms and Medical Subject Headings.

Results: Studies in able-bodied patients demonstrated no significant difference in the rate of infection after urodynamic testing with or without prophylactic antibiotics.
A study has reported the incidence of symptomatic UTI after urodynamic testing as high as 14% in hospitalised SCI patients who did not receive antibiotic prophylaxis. Although statistical analysis did not demonstrate a significant difference, a trend for lower rate of symptomatic UTI has been reported in SCI patients who received ciprofloxacin.
A Cochrane review in 2012 reported that prophylactic antibiotics reduce the risk of significant bacteriuria following the urodynamic procedure. In this Cochrane review the number of participants with SCI was too few to provide reliable results in this subgroup (RR 0.17, 95% CI 0.01 to 3.14).

Conclusion: A lack of clear knowledge exists about the value and necessity of antibiotic prophylaxis in SCI patients. A large multicentre study is needed to look at whether antibiotic prophylaxis can support a statistically significant reduction in the rate of symptomatic UTI following urodynamic studies.
Introduction: This study aimed to investigate the degree of depression, anxiety, hopelessness, and self-esteem of the person who has SCI and their primary caregiver, and to examine difference of the psychological appraisal between the person with SCI and primary caregiver.

Methods: Thirty-five persons with SCI (27 men, 8 women; mean age 50.8±10.6) and 24 primary caregivers (4 men, 20 women; mean age 50.0±12.2) and 38 healthy control (17 men, 21 women; mean age 45.0±11.2) participated in the study. Patients with complete injury (ASIA A) were 11 (31.4%), and incomplete injuries (ASIA B, C, D) were 24 (68.6%). Measure of depression, anxiety, hopelessness, and self-esteem for person with SCI and primary caregivers was the Korean-Beck Depression Inventory-II, Korean-Beck Anxiety Inventory, Korean-Beck Hopelessness Scale, and Self-esteem Scale, respectively. Education level and sex ratio were controlled as a covariate in the statistical analysis.

Results: The SCI group and their primary caregiver group had significantly higher depression, anxiety, and hopelessness, and lower self-esteem than healthy control group (P<0.01). SCI group and primary caregiver group did not differ in the level of depression and anxiety. However, SCI group experiences higher hopelessness, and lower self-esteem than primary caregiver group (P<0.01).

Conclusion: These results indicate that the primary caregiver undergoes psychological difficulties as well as person with SCI. Person with SCI and primary caregiver whose scoring above clinical cut-off scores for depression, anxiety, and hopelessness highlight the need to continue to ensure that appropriate psychological care should be provided in rehabilitation setting.
Psychological aspects and alexithymia in spinal cord injury patients (SCI).

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Biography:
No bio

Introduction:
The term alexithymia means the inability to get in contact, be aware of and express the own emotional sphere. Aim: to assess the correlation between the level of alexithymia, and the levels of depression, anxiety, self esteem, motivation, and quality of life.

Materials and methods: 43 consecutive patients (29 males and 14 females; mean age 45,5 ± 17,3), admitted between 2015 and 2017 for their first rehabilitation cycle were evaluated by: American Spinal Injury Association standards to assess neurological status; Spinal Cord Independence Measure (SCIM) for daily life independence; Cognitive Behavioural Assessment STAI X 2 sheet 3 for anxiety, CBA-QD sheet 8 for depression; self esteem and motivation tests; Short Form-12 – Quality of life (SF 12); Toronto Alexithymia Scale for alexithymia.

Results: 10 patients resulted alexithymic (TAS score > 61). No significant correlation were found between alexithymia and the level of depression, anxiety, motivation and self esteem. However, the level of alexithymia positively and significantly correlated with the mental domain of the SF12. Conversely, no correlation was found between SCIM scores and quality of life both in non alexithymic and alexithymic subjects.

Conclusions:
The study did not highlight any correlation between emotional disregulation and the psychological status. We suggest that alexithymic subjects, being unable to get in contact with the emotional sphere, are unaware of anxiety and depression which are usually correlated with a severe condition as SCI. This could also explain why high levels of alexithymia correlate with good scores of the mental domain of the SF12.
Poster Board Number: 224

Qualitative MRI reporting in Cervical Spondylotic Myelopathy influences patient referral to spinal services

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¹University Of Cambridge, School of Medicine, ²University of Toronto

**Biography:**

NO BIO

**Background:**

MRI imaging is gold standard in investigation of Cervical Spondylotic Myelopathy [CSM]. MRI features of CSM correlate poorly with disease severity and recent international guidelines recommend all CSM patients are assessed by a spinal surgeon.

**Aims:**

To examine whether descriptions used in radiological reports correspond to the quantitative degree of cervical cord compression on MRI, and their influence on surgical referrals.

**Method:**

MRI Cervical spine images from a single centre, over one year, were reviewed (N=1123). For each spinal level deemed compressed by radiologists (N=196), four quantitative measurements were calculated: ‘Mean Canal Compression’ (MCC); ‘Mean Spinal Cord Compression’ (MSCC); ‘Spinal Canal Occupation Ratio’ (SCOR) and ‘Compression Ratio’ (CR). These were statistically compared to qualitative description. Data tracking patients’ clinical progress was collected from their medical records.

**Results:**

MCC (p<0.001), MSCC (p<0.001), SCOR (p=0.003) and CR (p<0.001) all varied significantly with main descriptive term (e.g. compressed), however only MCC (p=0.021) and MSCC (p<0.001) showed significant variation with its qualifier (e.g. mildly). Whilst ordinal trends were present amongst common terms (Compressed> Flattened > Indented> Touched > Abutted), their quantitative values overlapped.

Of patients referred to secondary specialists (N=61), those referred to spinal surgeons (31.1%, N=19) showed significantly greater MSCC (p=0.013) but no significant difference in MCC, SCOR or CR. The chosen description of cord compression significantly predicted spinal referral (p=0.009).

**Conclusion:**

The language describing cord compression partially reflects quantitative features, however there is overlap. This is significant, as the chosen term appears to influence decision to refer to a spinal surgeon.
QUALITY OF LIFE AFTER SPINAL CORD INJURY (SCI): THE ROLE OF TIME SINCE INJURY

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¹Patras University Hospital, ²National Rehabilitation Centre

Introduction: Our aim was to determine in which extent the quality of life among SCI individuals is affected by time passing since injury.

Methods: We studied 164 individuals with SCI of any etiology who live in community. They were residents of urban, suburban and rural areas of Greece. Participants completed demographic questionnaires. WHOQOL-BREF scale was used for the assessment of participants’ quality of life. For the statistical analysis of the findings we used the Pearson correlation coefficient.

Results: The participants appeared with no difference in WHOQOL-BREF-physical capacity (p=0.105), WHOQOL-BREF-physiological capacity (p=0.194) and WHOQOL-BREF-social relationships (p=0.415) subscales regarding time since injury. However we found statistically significant correlation between time since injury and both WHOQOL-BREF-general health (p=0.05 και Pearson’s r=0.147) and WHOQOL-BREF-environment (p=0.015 και Pearson’s r=0.189) subscales. Specifically the increase of years since injury is related with higher scores of both subscales.

Conclusions: The passing of years after injury exerts a beneficial role in quality of life of SCI individuals who live in community regarding the dimensions of general health and environmental conditions.
Quality Of Life And Psychological Distress In Patients With Spinal Cord Lesions (SCI).

Dr Lina Di Lucente, Dr Alessandra Cicuti, Dr Federica Ricci, Dr Sara Simonelli, Dr Elena Di Marzio, Dr Federico Pettirossi, Dr Giorgio Scivoletto, Dr Monica Torre

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Introduction:
The World Health Organization (WHO) defined QoL as an ‘individual’s perceptions of his position in life, in the context of the culture and value system in which he lives and in relation to his goals, standards, and concerns. Aim: to assess the correlation between clinical features of the SCI patients and the Quality of Life, taking in to account the level of depression, anxiety disorder, the self-esteem, motivation, awareness of disease and family support.

Materials and methods: 66 patients (48 males and 18 females; mean age 42.7 ± 15,759, referring to our Spinal Cord Unit, were evaluated by the American Spinal Injury Association standards to assess neurological status; SCIM (Spinal Cord Independence Measure) to assess daily life independence, CBA STAI X 2 sheet 3 for anxiety, CBA-QD sheet 8 for depression; self-esteem and motivation tests and the SF-12 (Short Form-12 - Quality of Life).

Results: Significant associations were found between the MCS12 (SF12) and the level of the self-esteem (-0.309 p<0.05) and between PCS12 and extroversion (-0.270 p<0.05). Motivation was associated with the awareness of the disease (.329; p<0.05 ) and family support (.372 p<0.05).

Conclusions
The negative correlation between self-esteem and extroversion and QoL is probably due to the fact that, after the trauma, patients with high extroversion and self-esteem suffer more from a rapid decrease of their activities compared to those with low extroversion and self-esteem, and therefore have a worse perceived quality of life.
Quantitative Analysis of Sudomotor Function on Dermatomal Level of Cervical and Thoracic Spinal Cord

Mrs Misun Kang

Pusan National University Yangsan Hospital

Biography:

NO BIO

Purpose: Individuals with spinal cord injury at thoracic level 6 or higher show symptoms of autonomic dysfunction and may sweat profusely above the level of the lesion but usually display no signs of perspiration below the lesion. The purpose of this study is to investigate quantitative sudomotor function of the cervical and thoracic sensory segmental area in healthy individuals.

Subjects and methods: Twenty-one healthy male volunteers (27.4±3.2 years of age, 176.0±4.9 cm of height, 75.4±8.4 kg of body weight) without dermatological, neurological, or autoimmune disease influencing sudomotor function were enrolled. According to anatomical characteristics of cervical and thoracic key sensory point, 4 sensory areas were investigated; upper cervical (UC) sensory area, middle cervical (MC) sensory area, lower cervical (LC) sensory area and upper thoracic (UT) sensory area.

Results: Latencies of UC, MC, LC, and UT sensory area were 2.56±1.02 min, 2.50±0.91 min, 2.18±0.75 min and 2.76±0.67 min, respectively. Sweat volume of UC, MC, LC, and UT sensory area were as follows: 0.08±0.07 µL, 0.33±0.30 µL, 0.83±0.64 µL, and 0.16±0.22 µL. There was no significant difference in latency among 4 sensory areas. Sweat volume of MC sensory area and LC sensory area was significantly higher than other sensory areas.

Conclusion: This study is a study to have normative values of quantitative sudomotor function of cervical and thoracic sensory segmental areas. Further study for large sample size including female could be suggest the reference values to demonstrate sudomotor dysfunction in spinal cord injuries.
Poster Board Number: 26

Rehospitalization of patients with spinal cord injury in recent one year following discharge

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¹Aijinkai Rehabilitation Hospital

Biography:
1973 graduate of Kyouto University Medical School
1975 resident of Osaka City University Medical School Hospital
1979 Viena Lorenz Boler Hospital
1980 member of Ortho. Surgery The Disabled Children Hospital Osaka Seisigakuinn
1983 Chief of Physiatrists Dept. of Physical Medicine of Kansai Rosai Hospital
2010 vice president of Aijinkai Rehabilitation Hospital

Objective: the purpose of this study was done to investigate prospective longitudinal study using simple questionnaires which consisted of 8 items (Classification of welfare disability, intervention of medical and welfare services, family doctors (departments of speciality), medical sufferings, methods of incontinence and care givers and rehospitalization) since 2010 March until 2016 Dec. Also we tried to compare with SCI Model systems reported in 2015 in USA.

Result: 1. Among total registered 494 cases, 262 cases (53%) answered. The age distribution showed single peak (at seven decades). The neurological level was followed: Tetraplegia complete 8.2%, tetraplegia incomplete 54.7%, paraplegia complete 8.2% and paraplegia incomplete 25.8%.
2. Rehospitalization rate in recent one year after discharge was 20.6% (54 cases). The average age was 67.1 years SD 15.4. In Model System it was 34.9 (0 ~ 98).
3. Causes of rehospitalization are as followed: First UTI 16.7%, second pneumonia 11.1%, third Decubitus 9.3%, fourth colon polyp 5.6% and fifth digestive hemorrhage 3.7%.
4. Length of Stay of rehospitalization was 38.8 days SD 83.7, median 14 days. Model System showed 23.8 days.

Conclusion: Our study shows that mainly in rehabilitation stage it have to consider patients and care givers in themselves preventing several causes of rehospitalization especially UTI, decubitus and pneumonia.
Reimbursement models for inpatient treatment of deep pressure ulcers in four spinal cord injured patients - A qualitative congruence analysis

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Biography:
Anke Scheel holds a degree in Human Medicine and a doctorate from the Private University Witten/Herdecke (D). Between 1994-2006 she worked as a physician in different clinics in Germany and Switzerland to become a specialist for Physical Medicine and Rehabilitation, General Internal Medicine and Psychosocial/ psychosomatic Medicine. Since 2006 she worked as a Consultant and since April 2013 she leads the department for Rehabilitation Quality Management Research at the Swiss Paraplegic Centre (CH). Her research topics are currently Rehabilitation Management and Outcome research in SCI. Since 2014 she lectures as a Cluster Partner Functioning and Health, University of Lucerne.

Background: Quality improvement and cost reduction in healthcare are envisioned by health politicians, economists and healthcare providers. The effects of different reimbursement models are still unclear in case of cost-intensive and high-complex disorders.

Aim: To compare different reimbursement models to collected total costs and cost-course in complex treatment concepts.

Design: Qualitative congruence analysis.

Methods: Five different reimbursement models for inpatient care were exemplarily applied in four spinal cord injured patients with deep pressure ulcer. Results were compared with total costs and cost courses. The treatment phases and milestones in the collected costs were analysed.

Results: The cost-course represents the multimodal treatment concept and surgery as two of its milestones. Flexible reimbursement models follow the cost-course most adequately, but do not necessarily cover the total costs. In the four investigated cases the data show a clear underfunding of high-complex treatment under the actually planned reimbursement model combination of diagnosis-related-groups and the tariff strategy rehabilitation. In all discussed reimbursement models the functional highly dependent patient has the least cost-coverage.

Conclusion: The results of this study indicate, that at the actual stage of development, the existing reimbursement models are not able to gain confidence of clinicians, economists and society for high complex disorders. To develop a transparent and cost-covering reimbursement for the investigated study population a larger sample of cases needs to be tested with the included reimbursement models. Otherwise, healthcare providers will refrain from health service provision for these patients in the future due to the risk of potential systematic underfunding.
ReInventing yourself after SCI: A bridge from rehabilitation to real world

Ms Jennifer Coker¹, Dr Susan Charlifue¹
¹Craig Hospital

Biography:
Ms. Coker has worked in SCI research since 1997. She obtained a MPH from the Rollins School of Public Health at Emory University in 2001, where she won the Alley Award for Outstanding Service to Disadvantaged Populations, and is currently a PhD student in the Clinical Sciences program at the University of Colorado. She has presented at national conferences and has won several awards for research presentations and publications. Ms. Coker has been with Craig Hospital since 2012 and is the PI for a Neilsen Foundation-funded project as well as the SCI Model Systems module for Craig Hospital.

For individuals with SCI, self-efficacy beliefs are essential for successful psychosocial adjustment, and are paramount for coping with stressors experienced after discharge from rehabilitation. Self-efficacy has been shown to improve during rehabilitation, but plateaus from three to six months after discharge. New limitations and challenges after leaving rehabilitation can lead to anxiety, depression, and poor satisfaction with life.

This study was a randomized controlled trial of a structured group cognitive behavioral approach to enhance self-efficacy beliefs using positive psychology concepts to challenge, reframe, and restructure individuals’ thoughts and beliefs about their capabilities after SCI.

Participants were individuals with SCI who were within six months post-discharge from inpatient rehabilitation. The primary outcome measure was self-report of SCI-specific self-efficacy, using the Moorong Self-Efficacy Scale (MSES); secondary outcomes included general self-efficacy, satisfaction with life, participation, depression, and anxiety. Measures were collected at baseline and 6, 12, and 18-weeks post-treatment. A mixed model analysis of repeated measures will compare scores between the groups and test the time by treatment interaction.

We have complete data from 38 of 48 total participants (20 treatment, 18 control); data collection will be complete in August 2017. At baseline, groups were equally balanced on demographics and the primary outcome. There was a significant difference at baseline between groups in depression severity scores, although both scored in the mild severity range; there were no differences at baseline between groups for the other secondary outcomes. Final results will demonstrate whether the intervention is successful in improving self-efficacy in people with SCI.
Relationship between work participation and pain in people with Spinal Cord Injury (SCI): results from a comprehensive long-term cross-sectional study.

**Drs. Ellen Roels**, Dr. Marcel Post, Prof. Dr. Michiel Reneman

1University of Groningen, University Medical Center Groningen, Department of Rehabilitation Medicine, Center for Rehabilitation, 2Center of Excellence in Rehabilitation Medicine, Brain Center Rudolf Magnus, University Medical Center Utrecht and De Hoogstraat Rehabilitation

**Biography:**
Dr. Ellen Roels is a Rehabilitation Physician specialized in spinal cord injury (SCI) rehabilitation and currently employed at the University Medical Center Groningen, The Netherlands. Previously, she has worked in SCI rehabilitation centers in the United Kingdom and Belgium. The differences amongst countries in attitude of society on work participation in disabled people as well as the differences in vocational rehabilitation practices in SCI, has triggered her to start further research in this field. Currently she is undertaking a PhD project on work participation in SCI.

Introduction: Employment in SCI is low when compared to the open population. This could be explained by different factors. In this study we aim to investigate the relationship between pain and employment in SCI.

**Hypothesis:** patients who are experiencing more pain are less likely to work.

**Design:** multicentre, cross-sectional study

Methods: A total of 282 subjects with a traumatic or non-traumatic SCI, time since injury (TSI) ≥ 10 years, age at injury 18-35 years, current age 28-65 years and wheelchair-user at least for longer distances (>500m) were included. Information on employment and pain was collected through a self-reported questionnaire and a clinical interview. Work was defined as paid work for ≥1 hour/week. Descriptive analyses were performed using SPSS. We used logistic regression analyses to predict the chance of work participation depending on experienced pain, controlling for sex, age, TSI, lesion level and relationship level.

Results: Median age 47.8 years, median TSI 22 years, 74.1% male, 68.4% complete SCI ,58.5% paraplegia and 41.1% tetraplegia. 46.8% of subjects reported to work; 62.8% had musculoskeletal pain on or above injury level; 48.2% had neuropathic pain and 30.1% had other pain. Logistic regression analysis showed no statistically significant independent relationships between pain and work participation. Work participation was associated with male gender, lower age at time of measurement and higher level of education.

Conclusion: Contrary to our hypothesis, we found no independent relationships between pain and work participation. Possible explanations for this will be described in the poster.
Reliability and agreement of standard and potential alternative sacral sparing items at 1 month post-injury.

Dr Ralph J Marino, Mary Schmidt-Read, Dr. Steven Kirshblum, Dr. Trevor Dyson-Hudson, Dr. Keith Tansey, Dr. Leslie Morse, Daniel Graves
1Thomas Jefferson University, 2Magee Rehabilitation Hospital, 3University of Mississippi Medical Center, 4Methodist Rehabilitation Center, 5Kessler Institute for Rehabilitation, 6Kessler Foundation Research Center, 7Craig Rehabilitation Hospital, 8University of Colorado School of Medicine

Biography:
Dr. Marino is Professor of Rehabilitation Medicine at Thomas Jefferson University. He is board certified in Physical Medicine and Rehabilitation and in the subspecialty of Spinal Cord Injury Medicine. He is the Project Director of the Regional Spinal Cord Injury Center of the Delaware Valley, which is funded as a Spinal Cord Injury Model System of Care by the Administration for Community Living, HHS. He has over 60 peer-reviewed publications and over 70 abstracts.

Introduction: The sacral examination components required to determine completeness of injury, namely deep anal pressure (DAP) and voluntary anal sphincter contraction (VAC), are often difficult to perform. We evaluated potential alternative testing: 1) pressure sensation at the S3 dermatome - over the ischial tuberosity (S3P), and 2) voluntary hip adductor or toe flexor contraction (VHTC). Here we report the test-retest reliability and agreement of these components at 1 month after traumatic spinal cord injury (SCI).

Methods: Subjects with acute traumatic SCI, neurological levels T12 and above, AIS grades A-C were recruited by 4 centers. The ISNCSCI examination and S3P and VHTC were conducted at 1 month post injury, with a retest of the sacral exam within 3 days. Follow up examinations at 3, 6, and 12 months are ongoing. Reliability and agreement among the components were evaluated using kappa statistic.

Results: There were 129 subjects with 1-month data, 69 with tetraplegia, AIS grades A=72, B=24, C=33. Of these, 110 had S3P retest and 46 VHTC retest data. Reliability was excellent for all data: kappa for S3P = 0.94, VHTC = 1.0, DAP (n=50) = 0.96, VAC (n=50) = 0.85. For agreement between S3P and DAP, kappa=0.79, with 16/129 disagreements (12.4%), equally split S3P+/DAP- and reverse. For VHTC and VAC, kappa = 0.81, with 3/49 disagreements (6.1%), all VHTC+/VAC-.

Conclusions: Both S3P and VHTC show promise as alternatives to DAP and VAC for determining sacral sparing. Reliability and agreement should be evaluated at other timepoints, especially in the first week post-injury.
Reliability and validity of subjective measures of aerobic intensity in adults with spinal cord injury: a systematic review

Dr Jan W Van Der Scheer¹, MSc. Michael Hutchinson¹, Dr Thomas Paulson¹, Prof Dr Kathleen A Martin Ginis², Prof Dr Victoria L Goosey-Tolfrey¹

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Biography:
Please see:
http://www.lboro.ac.uk/departments/ssehs/staff/jan-van-der-scheer/

Objective: To systematically synthesize and appraise research in which test-retest reliability or criterion validity was assessed of a subjective measure for regulating aerobic exercise intensity in adults with SCI.

Methods: Databases were searched from inception to 1-1-2016. Included studies involved participants with SCI (≥50%) who performed an aerobic exercise test that included measurement of subjective and objective intensity based on test-retest reliability or criterion validity protocols. Each study was evaluated for risk of bias based on strength of the study design and a quality checklist score (COSMIN).

Results: The seven eligible studies (reliability: n=1; validity: n=6) evaluated overall, peripheral and/or central ratings of perceived exertion on a 6-20 scale (RPE 6-20). The evidence for reliability and validity were synthesized and appraised separately for each measure using GRADE. Overall, very low GRADE confidence ratings were established for reliability and validity evidence generalizable to the entire population with SCI and various upper-body and lower-body modalities. There was low confidence for the evidence showing that overall RPE 6-20 has acceptable validity for adults with SCI and high fitness levels performing moderate to vigorous-intensity upper-body aerobic exercise.

Conclusions: Health care professionals and scientists need to be aware of the very low to low confidence in the evidence, which currently prohibits a strong clinical recommendation for the use of subjective measures for regulating aerobic exercise intensity in adults with SCI. However, a tentative, conditional recommendation regarding overall RPE 6-20 seems applicable depending on participants’ fitness level as well as the exercise intensity and modality used.
Poster Board Number: 59

Reliability of accelerometer-based measurements of physical activity in spinal cord injured patients

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¹Balgrist University Hospital

Biography:
Sophie received her Bachelor’s degree in Biology with a focus on Theoretical Biology in 2009 from the Humboldt-University Berlin, Germany and her Master’s in Bioinformatics in 2012 from the University of Potsdam, Germany. Until 2015 she worked at the Max-Planck-Institute of Molecular Cell Biology and Genetics on image processing.

Sophie started her PhD thesis in 2015 and is working on long-term monitoring of physical activity in people with spinal cord injury using an Inertial measurement unit.

The functional recovery of patients after a SCI is substantially driven by compensatory strategies and functional adjustments to accomplish tasks. Since neural plasticity seems to respond to activity-based rehabilitation programs there is a need to quantify physical activity in an objective and seamless way.

Wearable sensors are increasingly applied in research to measure physical activity, however, it remains unclear how many days of monitoring are needed to achieve reliable and representative results about the true physical activity level of the subject.

We measured 42 wheelchair-bound spinal cord injured patients during five different time points during in-patient rehabilitation as well as 24 chronic wheelchair-bound individuals after discharge in their home-setting using an Inertial Measurement Unit (IMU). The Interclass correlation coefficient (ICC) was calculated to estimate the reliability of the measurements. Spearman-prophecy formula was used to calculate the number of days needed for a reliable measurement.

Depending on the time after injury, different numbers of days are needed for a reliable assessment of overall physical activity levels. Up to 6 months after injury, measuring for at most two days is sufficient for a reliable result. In chronic spinal cord injured patients, three days are needed to get reliable assessments of an individual’s physical activity level.

The findings reveal that the assessment schedules need to be adjusted to conclude on patients true overall physical activity levels and to monitor active rehabilitation programs.
Reliability of the Brazilian Portuguese Translation of the SCI International Dataset for the Lower Urinary Tract

Professor of Nursing Fabiana Faleiros¹, Master Student Adriana Cordeiro¹, Professor of Physical Medicine and Rehabilitation Denise Tate², Senior Research Associate Spinal Cord Injury Program Martin Forchheimer²

¹School of Nursing Ribeirao Preto University of Sao Paulo, ²Department of Physical Medicine and Rehabilitation University of Michigan

Biography:
Dr. Tate is a Professor of Physical Medicine and Rehabilitation at the University of Michigan. She has published extensively in spinal cord injury research especially in the areas of quality of life, depression, community participation and more recently on the impact of neurogenic bowel and bladder on psychosocial outcomes. She has led the work of translating the bowel and bladder data sets with her colleagues, Dr. Faleiros and Ms. Cordeiro, in the School of Nursing at the University of Sao Paulo, Brazil.

INTRODUCTION: Addressing neurogenic bladder problems is key to improve the health, quality of life and functioning of individuals after spinal cord injury (SCI). To enhance clinicians and researchers’ ability to compare results from treatments in this area, it is important to standardize data collection instruments to allow for further international multi-center studies in this area. OBJECTIVES: As a first step to validation, to test the reliability of the translated version of the lower urinary tract data set proposed by ISCoS and ASIA.

METHODOLOGY: The English version of this dataset was translated into Brazilian Portuguese according to the recommendations made by Biering Sorensen et al. This translated version was then tested with a sample of 50 individuals with chronic SCI in Ribeirao Preto. Participants’ answers were evaluated using two different examiners (inter-rater) and between the same examiner at two different time periods no longer than one week apart (intra-examiner). Reliability was assessed using both the AC1 statistic, developed by Gwet, and Cohen’s Kappa Coefficient. Alpha was set at .05 for all analyses. The AC1 statistic has the advantages of greater resistance with respect to marginal homogeneity and the prevalence trait.

RESULTS: For inter-rater reliability, the significance level was above 0.5 in 100% across all items. Inter rater reliability was of 72.42 % across all items.

Conclusion: Results show good reliability indicators for the translated version of the Lower Urinary Tract Dataset, allowing its use in future multisite studies of international cooperation. Future studies on the validity of this dataset are warranted.
Poster Board Number: 240

Reliable voiding induced for 30 days by a neurokinin-2-receptor agonist in a rat spinal cord injury model of urinary retention

Professor Lesley Marson1,2, MD Marcalee Alexander3,4, Mary Katofiasc1, PhD Karl Thor1
1Dignify Therapeutics, 2UNC Chapel Hill, 3University of Alabama at Birmingham School of Medicine, 4Harvard School of Medicine Department of Physical Medicine and Rehabilitation

Biography:
Lesley Marson is currently Head of Preclinical Research at Dignify Therapeutics and Adjunct Professor in the School of Medicine, Urology and School of Pharmacy at UNC Chapel Hill. Dr Marson directed a successful NIH-funded a preclinical research program, served as Study Coordinator for several clinical trials and chaired the IACUC during her prior employment at UNC Chapel Hill. Before moving to Dignify, she was Director of Sexual Health Research at Urogenix Inc. She is an internationally-recognized expert in pelvic and sexual function.

Background: Urinary retention is a critical and irreversible problem for many individuals with spinal cord injury (SCI). Evidence for drug induced voiding in the chronic SCI rat would provide support for an on-demand therapy. This study examined the efficacy of repeated dosing of the neurokinin-2 receptor agonist, DTI-100.

Methods: Adult male and female rats received complete spinal transection at T9/10. Four-5 weeks later rats received saline or DTI-100 (10 or 100 ug/kg SC) twice a day for 1 month. Ten observations/rat were recorded in the morning, over the treatment period. Voided volume, residual volume (via crede), fecal output and general behavior were recorded in metabolism cages, up to 30 min post-dosing.

Results: Drug-induced voiding occurred within 5 min after DTI-100. The incidence of voiding after 10 or 100 ug/kg DTI-100, was 57 and 97%, respectively and the voiding efficiency (VE, 10 min post dosing) was ~33% and ~71%, respectively, with minimal urine release across the remaining 30 min. In vehicle-treated rats, spontaneous leaking randomly occurred and continued throughout the observation period. DTI-100 also induced an increase in defecation compared to vehicle. Side effects observed after DTI-100 included transient flushing of the skin in the extremities. Importantly, VE was maintained consistently over the 1 month treatment period.

Conclusions: These data demonstrate that DTI-100 evokes efficient, dose related, voiding in a chronic SCI model that is reproducible over 1 month, suggesting that DTI-100 may be a useful tool for repeated use to induce voiding after SCI.
Resilience among adults living with SCI and their caregivers

Dr Susan Ryerson Espino\textsuperscript{1,3}, Dr Lawrence Vogel\textsuperscript{1,2,3}, Kerry O’Rourke\textsuperscript{1}, Dr Erin Kelly\textsuperscript{1,4}, Dr Azadeh Ghaffari\textsuperscript{5}, Dr Gerald Harris,\textsuperscript{1,3} Dr Michael Richardson\textsuperscript{5}, Dr David Chen\textsuperscript{6}, Dr Ray Lee\textsuperscript{7}
\textsuperscript{1}Shriners Hospital for Children, \textsuperscript{2}Rush Medical College, \textsuperscript{3}Marquette University, \textsuperscript{4}American Academy of Pediatrics, \textsuperscript{5}Hines Veteran Administration, \textsuperscript{6}Rehabilitation Institute of Chicago, \textsuperscript{7}Schwab Rehabilitation Hospital

Biography:
Lawrence C. Vogel, M.D. has been the Chief of Pediatrics at the Chicago Shriners Hospitals for Children since 1981 and the Medical Director of the Spinal Cord Injury program since in 1983. Dr. Vogel is a diplomate of the American Board of Pediatrics and is certified in the Subspeciality of Spinal Cord Injury Medicine (American Board of Physical Medicine and Rehabilitation). Dr. Vogel is a Professor of Pediatrics at Rush Medical College and an Adjunct Professor of Biomedical Engineering at Marquette University. Dr. Vogel is Past President of the American Paraplegia Society, and the American Spinal Injury Association.

Background: Studies addressing caregivers commonly emphasize negative outcomes. This study explored facilitators of well-being for caregivers of civilians and veterans with spinal cord injury (SCI).

Design: Mixed methods study of 32 civilian and veteran dyads.

Methods: Qualitative interviews were guided by a semi-structured protocol. Quantitative data included standardized surveys on caregiver burden, problem solving, and leisure time satisfaction, mental health and well-being surveys. Average injury age of SCI participants was 22 years (17-37); average age of interview was 37 years (26-53); 71% tetraplegia; 68% male; 23% veterans. Average age of caregivers was 50 years (22-77); female (81%); and were a parent (48%), spouse/significant other (42%), sibling (7%), or other relative (3%).

Results: Qualitative narratives spoke to important facilitators of dyad well-being including family cooperation, positive interpersonal relations, self-care, and collaboration with paid non-family caregivers. Caregivers who demonstrated fewer challenges with problem solving and greater leisure time satisfaction experienced lower burden (p<0.01); together these accounted for 65% of variance in caregiver burden. Caregiver burden and challenges with problem solving were associated with mental distress among civilians (but not veterans) with SCI.

Conclusion: Findings suggest importance of caregiver self-care, leisure time satisfaction, skills development (problem solving and interpersonal communication), and collaboration with other family members and personal care assistants. Training to reduce tendency to view problems as insurmountable and reduce reliance on avoidance and applying hurried/incomplete solutions may contribute to well-being of caregivers and adults living with SCI.
Responding to the need for a specialist SCI nurse forum

Miss Debbie Green¹, Ms Fiona Stephenson²
¹Spinal Injuries Association, ²Network of International SCI Nurses

Biography:
Debbie Green (BA(Hons)) and Fiona Stephenson (FRCN) have extensive experience of working with nurses and spinal cord injured people in the UK and internationally. Their passion and concern for the speciality led them to become the co-founders of the International Network of SCI Nurses.

With the concerns over the future of specialist spinal cord injury (SCI) nurse availability and the specialism as a whole, consideration was given to developing a network for nurses working in SCI across the world. Since its launch at the 2013 ISCoS meeting in Istanbul, the International Network of Spinal Cord Injury Nurses has grown in numbers and strength. This poster will highlight the need for such a forum, how it has grown and how it will develop further in the future. It will also demonstrate how it is responding to the needs, and raising the profile of nurses who work in the specialism of SCI Nursing around the world.
Responsiveness of the "Spinal Cord Independence Measure" (SCIM) and the "Functional Independence Measure" (FIM) in Subjects with Spinal Cord Injury

Caroline Stumm¹, Kerstin Hug¹, Carolina Saskia Fellinghauer², Margret Hund-Georgiadis¹

¹REHAB Basel, ²Swiss Paraplegic Research (SPF)

Biography:
NO BIO

Introduction
The study investigated if the "Spinal Cord Independence Measure" (SCIM) has a higher responsiveness than the "Functional Independence Measure" (FIM) in patients with spinal cord injury (SCI) during inpatient rehabilitation.

Methods
A sample of 123 individuals with SCI (34% tetraplegics, 66% paraplegics) were evaluated at admission and at discharge. SCIM and FIM data was extracted retrospectively from the routine care documentation. The responsiveness of both assessment tools was analyzed using Wilcoxon Signed Rank Tests and Standardized Response Means (SRM).

Results
On average, both assessments documented a significant improvement of the patients' functional ability from admission to discharge. This held true for the total SCIM scale as well as for the motor FIM scale and for all of their subscales (all p<0.001). Both measures demonstrated a high responsiveness of the total scales and subscales (all SRM >0.8) except for the FIM-subscale 'sphincter control' and for the SCIM-subscale 'mobility indoors and outdoors' (both SRM <0.8). Overall, three SCIM-sub scales were significantly more responsive than the comparable subscales of the FIM. In contrast to these results, the responsiveness of the FIM-subscale 'locomotion' was higher than the SCIM-subscale 'mobility indoors and outdoors' (SRM: 1.01 vs. 0.75).

Conclusions:
Both assessments are appropriate to evaluate changes in the functional ability of persons with SCI during inpatient rehabilitation. For three SCIM subscales, a slightly higher responsiveness was revealed than for the respective FIM subscales. However, the construct validity of the SCIM-subscale 'mobility indoors and outdoors' should be improved in order to increase its responsiveness.
Poster Board Number: 153

Risk analyses of pressure ulcer in tetraplegic spinal cord-injured persons: a French long-term survey.

Dr. Marc Le Fort1,3, Mme Maude Espagnacq2, Prof. Brigitte Perrouin-Verbe1, Dr. Jean-François Ravaud3,4
1Pmr Department - University Hospital, 2Institute for Research and Documentation in Health Economics, 3House of Social Sciences and Disability – High School of Public Health, 4CERMES3, INSERM, CNRS, EHESS, Université Paris Descartes

Biography:
Marc Le Fort is a PMR practitioner heading the neurological department of Nantes'University Hospital (France), with responsibility for the spinal unit of this department. He takes part in several multidisciplinary consultations for SCI patients and in the long-term follow-up. His main topics of research are neuro-urolgy and neuro-sexuality, secondary conditions (pressure ulcers...) and preventive organization of healthcare, notably through methods of the social sciences.

Objective: To identify the long-term clinical, individual, and social risk factors for the development of pressure ulcers (PUs) in traumatic spinal cord-injured persons with tetraplegia (TSCIt).


Participants: A total of 1641 tetraplegic adults were surveyed after an initial post-traumatic period of at least 2 years. Eleven years later, a follow-up was done for 1327 TSCIt, among whom 221 were deceased and 547 could be surveyed again.

Main Outcome Measures: The proportion of PUs documented at the various defined time points, relative to the medical and social situations of the TSCIt, by using univariate analyses followed by logistic regression.

Results: Of the participants, 73.4% presented with a PU during at least one period after their injury. Four factors had a proper effect on the occurrence of PU at the long term. On the one hand, a protective feature for this population, persons with incomplete motor impairment (OR = 0.5) and moreover those who were able to walk (OR = 0.2); on the other hand, a strong predictive factor was the development of a PU during the initial post-trauma phase (OR = 2.7). Finally, a significant situational factor was the lack of social network (OR = 3.1).

Conclusions: We believe that these results indicate the crucial role of initial management and of long-term follow-up.
Poster Board Number: 235

Robotic assisted training in combination with functional electrical stimulation to improve lower limb function after spinal cord injury

Mrs Ines Bersch¹, Mrs Anne Katrin Brust¹, Mrs Sabrina Koch¹, Mrs Angela Frotzler¹

¹Swiss Paraplegic Centre

Background:
Functional electrical stimulation (FES) is applied in acute and sub-acute stage after spinal cord injury (SCI) to support the neurological recovery. Following neurological recovery motor function and power output increase. Robotic assisted training of the lower limbs in combination with FES seems to be a promising method to support this process.

Objective:
The aim was to investigate the difference in increase of FES-induced and voluntary power output of the lower limb.

Method:
In this retrospective study data of inpatients with acute and sub-acute SCI were included. Data of patients who trained active limb mobilization for neuromodulation using a stationary robotic system (MotionMakerTM) were analyzed. Each training session consisted of FES-induced and voluntary repetitive movements of the lower limbs in flexion and extension. Primary outcomes were the differences in Torque (Newton) of the legs during FES-induced as well as voluntary flexion and extension between the first (baseline) and the last training session. Secondary outcome was the sum score of active muscle function of seven lower limb muscles before and after the training period. Data were analyzed using Wilcoxon and Spearman’s correlation.

Results:
32 patients with SCI (AIS A to D, median age 57.58 years, median lesion duration 67 days) completed a median of 13 (range 3 to 25) training sessions. There was a significant increase in median torque from 2.38 to 3.48 N for FES-induced extension (p<0.001) and from 1.29 to 30.03 N for voluntary extension (p<0.001) within the observation period. In addition, the FES-induced flexion (p<0.018) increased significantly from 1.96 to 2.62 N as well as the voluntary flexion (p<0.001) from 0.91 to 1.89 N (Figure 1). No significant correlations were found between FES-induced and voluntary movements for flexion (r=0.275, p=0.128). In contrast to the extension (r=0.592, p<0.001), there significant correlations were found within the trainings period. The median muscle sum score was 17 points at baseline and 24 points at the last session.

Conclusion:
Robotic assisted training with FES seems to support the recruitment of further motor units during recovery, that results in increased motor function and power output of the lower limbs.
Poster Board Number: 120

Robotic exoskeletal gait training: Changes in SCIM III, pain, spasticity, bowel function, bladder function and quality of life

Mr Carsten Bach Baunsgaard¹, Ms Ulla Vig Nissen¹, Ms Angela Frotzler², Ms Anne Katrin Brust², Ms Cornelia Ribeil³, Mr Yorck-Bernhard Kalke³, Ms Natacha León⁴, Ms Belén Gomez⁴, Ms Kersti Samuelsson⁵, Mr Wolfram Antepohl⁶, Ms Ulrika Holmström⁶, Mr Niklas Marklund⁶, Mr Thomas Glott⁷, Mr Arve Opheim⁷, Mr Jesus Benito⁸, Ms Narda Murillo⁸, Ms Janneke Nachtegaal⁹, Ms Willemijn Faber⁹, Professor Fin Biering-Sørensen¹

¹Clinic for Spinal Cord Injuries, Rigshospitalet, ²Swiss Paraplegic Centre (SPZ), ³SCI Centre Orthopedic Department Ulm University, ⁴Fundación lesionado Medular (FLM), ⁵Department of Rehabilitation Medicine University Hospital, ⁶Spinal Cord Rehabilitation Unit, Uppsala University Hospital, ⁷Sunnaas Rehabilitation Hospital, ⁸Institute Guttmann, Neurorehabilitation Hospital, ⁹Heliomare Rehabilitation Center

Objective: Assess changes in pain, spasticity, range of motion (ROM), independence, bowel- and bladder function, and quality of life (QoL) in people with Spinal Cord Injury (SCI) over an eight week gait-training program using the robotic exoskeleton Ekso GT from Ekso Bionics.

Methods: Fifty-two participants with traumatic or non-traumatic SCI were enrolled in a non-randomized, non-controlled multicenter study between nine European SCI centers. Outcomes were measured at baseline, midway and end and follow up four weeks after. Pain, bowel function and urinary function were assessed with the International SCI Basic Data Sets, independence with Spinal Cord Independence Measure (SCIM III), ROM with goniometry and spasticity with the Modified Asworth Scale.

Results: Median age was 35.9 (IQR=25) years, men N=36, female N=16, neurological level and severity of injury: C1-L2, AIS A-D. Time since injury (TSI) <1yr N=25, >1yr N=27. SCIM III increased significantly for TSI<1yr and TSI>1yr. Pain during the last week was reported by 48% of participants and 17% reported pain during training (median values). Pain during training was reported for the same location and type in the week prior to the training session. Spasticity decreased from pre to post training on the day of training. There was no significant difference over time in prevalence, type or intensity of pain, spasticity, ROM, bowel function, bladder function or QoL.

Conclusions: Significant increase of SCIM III over eight weeks of training. Significant decrease in spasticity following training, but no change over time. Low number of pain problems during training. Limitation: non-controlled study.
Poster Board Number: 201

Routine assessment of ability realization after SCI or cauda equina lesion and its improvement during rehabilitation

Dr Rotem Gur Pollack1, Liraz Yamini1, Dr Vadim Bluvshtein1,2, Dr Dianne Michaeli1, Dr Elena Aidinoff1,2, Prof Amiram Catz1,2

1Loewenstein Rehabilitation Hospital, 2Tel Aviv University

Biography:
Rotem Gur Pollack, PhD
Director of Spinal Rehabilitation Research Unit, Loewenstein Rehabilitation Hospital, Raanana, Israel

Education
2006-2010: Tel Aviv University, B.Sc., Life science faculty.
2010-2011: Haifa University, M.Sc., department of neurobiology.(summa cum laude)
2011-2015: Haifa University, Ph.D, department of neurobiology.

Introduction: The Spinal Cord Injury Ability Realization Measurement Index (SCI-ARMI) is now routinely used at Loewenstein Rehabilitation Hospital for assessment of rehabilitation outcome, following spinal cord injury (SCI) and cauda equina lesions. The present study examined the variability in SCI-ARMI scores and gain during the period when the instrument was being adopted and assimilated by the hospital staff.

Methods: SCI-ARMI scores of 354 SCI patients were retrospectively examined. The patients, 49% with tetraplegia, 68% AIS grade D, aged 56±16, 62% males, were admitted for at least 7 rehabilitation days, between 2013 and 2016. Scores were compared between years, using analyses of variance and co-variance.

Results: SCI-ARMI scores were 53.3-58.0 at admission and 72.5-76.8 at discharge. SCI-ARMI gain was 20.4±19.9, its mean values progressing throughout the assessment period, from year to year, from 14.4 to 23.5. The differences in discharge and gain values between the years were non-significant (p>0.05), even after controlling for admission SCI-ARMI.

Conclusion: SCI-ARMI values, which are presented here, were stable throughout the routine assessment period. The SCI-ARMI gain, however, tended to improve with time and with increased use of the instrument. Future assessments of SCI-ARMI gain values may detect potential improvements in the success of rehabilitation.
Sarcopenia and its relation with bone mineral density in spinal cord injury

**Dr. Yannis Dionyssiotis**¹, Dr. Grigorios Skarantavos², Associated Professor Nikolaos Papaioannou³, Emeritus Professor Georgios Lyritis³, Dr Christina-Anastasia Rapidi, Dr. Konstantina Petropoulou⁴, Professor Panayiotis Papagelopoulos²

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**Biography:**
Dr. Yannis Dionyssiotis is specialized in Physical Medicine and Rehabilitation. He holds a PhD in spinal cord injury induced Osteoporosis and Metabolic Bone Diseases; is the Head of Physical Medicine and Rehabilitation Department of European Interbalkan Medical Center in Thessaloniki, Greece. He also holds a senior European Board Certification in PRM (certified 1/2006, recertification 2/2016), Facharztanerkennung in Germany (PRM) and is registered Physician in the UK. http://publicationslist.org/y.dionyssiotis

**Introduction**
In spinal cord injury the relationship between reduced muscle mass (secondary sarcopenia) in lower limbs and bone mineral density is unclear. This study investigated this relationship using the current definitions of sarcopenia.

**Methods**
Thirty one paraplegic men, AIS A, T4-T12 neurological level of injury, mean age 39.23±15 years, duration of paralysis: 5.7±5 years, were compared with 33 similar controls. Whole body dual X-ray absorptiometry (NORLAND X-36,Wis.,USA) was used for estimation of regional (upper and lower limbs) and total body BMD (g), lean and fat tissue mass (kg), and percent. Sarcopenia was defined by low muscle mass (skeletal muscle index, SMI), as well as by the residual method as relative appendicular skeletal mass, RASM), respectively.

**Results**
We found a difference between paraplegic and controls in the rate of sarcopenia of our group according to sarcopenia definitions. Paraplegics had lower values on RASM (p <0.001), total BMD (p <0.001) and SMI (p <0.001) compared to controls. Individuals with sarcopenia (in both groups) have a lower total BMD score (p = 0.05) compared to no sarcopenic subjects.

**Conclusion**
There is no clear evidence if muscle impairment in SCI can be assessed with the current definitions of sarcopenia (assessment of muscle mass). The relationship between bone and muscle was consistent in able-bodied and predictably altered in those with spinal cord injury, a clinical disease affecting bone and muscle.
Poster Board Number: 256

Satisfaction of sexual life for men with SCI living with a regular partner

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Biography:
No Bio

Introduction
Spinal cord injury (SCI) has a significant impact on the sexual lives of men.

Aim
To report the quality of sexual life and satisfaction of men having regular partner(s) at home.

Methodology
Face to face interviews were conducted with a sexual therapist, using multiaxial problem-oriented system for sexual dysfunctions (Schover 1982), and the IIEF questionnaire. Whenever possible, female partners were also interviewed.
All patients had been previously followed in our neurourology clinic: all could achieve reliable erection through appropriate treatments, and most could ejaculate through Ferticare.

Results
There were 15 tetraplegic and 18 paraplegic adults (mean 38 years) with chronic lesions (mean 142 months).
Men with UMN lesions (n=29) presented high level of erectile function, sexual desire, and satisfaction on IIEF; 13 out of 14 men who ejaculated described orgasm, and subsequent relief of spasticity. Satisfaction of sexual was much poorer in men with LMN lesions (n=4). Women partners described high level of satisfaction, with coital orgasm.
Men described the need for longer foreplay activities and compensation by the sight, increased sexual satisfaction with caresses (even on parts of the body below the lesion), with partner’s orgasm, and ejaculation (coital or Ferticare). Frustation was high in men not able to ejaculate.

Discussion and Conclusion
All patients described the need for adaptation of their sexual lives. This is helped by appropriate management in laboratory setting to restore erection and ejaculation. Sexual counselling for men and partners is of paramount importance to help them through this adaptation process.
SATISFACTION WITH LIFE AMONG SCI INDIVIDUALS: THE ROLE OF GENDER, AGE AND MARITAL STATUS

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Introduction: Our aim was to determine in which extend satisfaction with life among SCI individuals is affected by gender, age and marital status.

Methods: We studied 164 individuals with SCI of any etiology who live in community. They were residents of urban, suburban and rural areas of Greece. Participants completed demographic questionnaires. Satisfaction With Life Scale (SWLS) was used for the assessment of the satisfaction with life of the sample. For the statistical analysis of the findings we used the t-test method regarding gender and marital status and the Pearson correlation coefficient regarding age.

Results: The participants appeared with no difference in SWLS regarding gender (\(p=0.521\)) and age (\(p=0.232\)). However we found a statistically significant difference between married and unmarried individuals (\(p=0.049\)). Specifically the married participants appeared with higher levels of satisfaction with life than the unmarried ones.

Conclusions: Living with a spouse implies higher satisfaction with life in this SCI population. On the other hand gender and age does not seem to play any role in satisfaction with life.
Scarf strangulation: an emerging transport related traumatic spinal cord injury in Bangladesh

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Title: Scarf strangulation: an emerging transport related traumatic spinal cord injury in Bangladesh
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Introduction: Road traffic accidents are a leading cause of traumatic spinal cord injury in Bangladesh. However, we have noticed a high incidence of a particular type of road traffic accident that is probably unique to our country and unfortunately only involves females. The cause of the accident is scarves. They are getting entangled in the motors of three wheeled auto rickshaws. This causes strangulation and cervical spinal cord injury. This case study is the first report of this serious problem.

Objective: To attain some initial data on the size of the problem of cervical spinal cord injury due to strangulation from scarves.

Methodology: We used a retrospective chart audit to identify all cervical spinal cord injuries due to strangulation from scarves in patients admitted to the Centre for the Rehabilitation of the Paralysed, Bangladesh between 2014 and 2017.

Result: 34 cases were identified. They were all females with a mean (SD) age of 25 years (8.4). The majority were students (58.8%). Most of the accidents occurred in urban area (56%) on battery powered three wheelers auto rickshaw (94%). On admission, 77% had AIS A complete injuries with vertebral fracture dislocations between C4 and C6.

Conclusion: Three wheeled auto rickshaws are very popular in rural and semi urban regions of Bangladesh. However, they pose a serious risk to young women wearing scarves. There is an urgent need for public education campaigns to prevent cervical spinal cord injuries from strangulation.
Poster Board Number: 167

SCI epidemiology, a changing landscape - a 2016 update of a decade long study

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Biography:
NO BIO

Introduction:
It is necessary to monitor closely the epidemiological characteristics of new-onset Spinal Cord Injury (SCI) patients - especially age, neurological level and degree of injury- in order to provide adequate models of care as well as sufficient resources.

Materials and methods:
Last year we presented at ISCOS epidemiological data of 663 patients admitted to our Spinal Unit between January 2003 and December 2012. Patients were divided in 3 groups according to the neurological level at admission on ASIA classification: cervical, thoracic and lumbosacral. Gender, age at the moment of lesion and AIS grade were recorded.
In order to monitor the change of epidemiological characteristics of SCI patients we decided to compare these data with that of patients admitted at our Spinal Unit in 2016.

Results:
We analysed data from 73 patients with new-onset SCI. Comparing data with the 2003-2012 decade, we observed a stable Para/Tetra ratio (1,52 vs 1,6) coupled with an increase of the percentage of motor incomplete (AIS grade C-D) lesions: 68% vs 56%. Motor incomplete lesions were particularly frequent among tetraplegic patients and patients with lumbosacral lesions: 69% and 80% of the total lesions, respectively. M/F ratio decreased substantially (1,6 vs 3) and we reported also a decrease of mean age at the moment of lesion: 58 vs 63 years.

Conclusions:
Our data suggest that epidemiological characteristics -even if the trend towards an older age of onset seems to slow down- are continuing to change and represent a challenge for all professionals working in this sector.
Poster Board Number: 204

SCIM and 4 year survival in 263 consecutive In-Patients

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Biography:
NO BIO

Introduction: The Long-term consequences of independence and different aspects of dependency after spinal cord injury are important to identify in order to offer sufficient neurorehabilitation.

Materials and Methods: 263 admitted SCI patients (F: 80; M: 183; age at examination: Mean ±SD: 52.5±17.7; range: 16-83) underwent Spinal Cord Independence Measure (SCIM version xx) between May 2010 and January 2013.

Results: 40 patients died during observation-period from May 2010- April 2017. Death was significantly correlated with age (KW, p<0.0004), but not gender (p>0.66). Urinary independence influenced mortality (SCIM quest. 6) (Cox Regression, Hazard Ratio 2.27 (CI95% 1.37; 3.77, p<0.001). SCIM subscores for mobility impacted 4-year mortality (questions 9-17, 3 groups: low, modest and high risk, KW, p<0.013). However, selfcare (questions 1, 2a, 2b, 3a, 3b, 4, groups 1= 0-6, 2= 7-13, and 3= 14-21, KW, P=0.44) and bowel functioning and toilet independence scores (questions 7-8, p>0.13) did not.

Conclusion: Consecutive spinal cord injured in-patients with urinary catheter a demeure had a raised mortality hazard Ratio of 2.27. Other SCIM factors were not associated with raised 4-year mortality.
SCIPA Switch-On – A randomised controlled trial investigating the efficacy and safety of exercise early after spinal cord injury.

**Professor Mary Galea¹**, Dr Maya Panisset¹, Dr Doa El Ansary¹, Professor Sarah Dunlop², Associate Professor Ruth Marshall³, Dr Jillian Clark³, Professor Leonid Churilov⁴

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**Biography:**
Professor Mary Galea is Professorial Fellow in the Department of Medicine (Royal Melbourne Hospital), University of Melbourne and was previously Foundation Professor of Clinical Physiotherapy based at Austin Health. As a physiotherapist and neuroscientist, her research program includes both laboratory-based and clinical projects with the overall theme of control of voluntary movement by the brain, and factors that promote recovery following nervous system damage. She was the principal investigator on a large multi-site program of research, SCIPA (Spinal Cord Injury and Physical Activity), investigating the effects of exercise after spinal cord injury from acute care to the community.

**Introduction:** Substantial skeletal muscle atrophy after spinal cord injury (SCI) carries significant repercussions for functional recovery and longer-term health. Here, we compared the efficacy, safety and feasibility of functional electrical stimulation-assisted cycling (FESC) and passive cycling (PC) to attenuate muscle atrophy after acute SCI.

**Methods:** Twenty-four people at four weeks post-SCI (C2-T12, AIS A-C) were recruited from 4 spinal units in Australia and New Zealand, and randomised to FESC or PC (4 sessions per week, 1-hour maximum per session, over 12 weeks) in addition to usual care. Primary outcome measure was mean maximum cross-sectional area (CSA) of thigh and calf muscles (MRI), and secondary outcome measures comprised body composition (DEXA), anthropometry, quality of life, and adverse events.

**Results:** Nineteen participants completed the 12-week trial and 21 were included in the primary analysis. The mean (SD) thigh CSA for FESC (n=10) and PC participants (n=11) at 12 weeks was 102.09 (29.21) and 103.26 (11.13) respectively with an adjusted mean between group difference of 1.3 (95% CI: -18.4 to 20.9). No significant between group difference was found for any other tissue, anthropometric parameter, or behavioural variable, or adverse events. Six participants experienced thigh hypertrophy (FESC = 3, Passive = 3). Atrophy was attenuated (< 30%) in 15 cases (FESC = 7, Passive = 8).

**Conclusions:** Both cycle ergometry regimens examined were safe, feasible, and well-tolerated early after SCI. No conclusions regarding efficacy can be drawn from our data. Further investigation of both modalities early after SCI is required.
Screening to recruitment ratios – can our experience inform the recruitment calculations for your next study?

**Dr B. Catharine Craven**, A Brown, K.E. Campbell, K Hayes, J.M. Swaine, M.C. Stacey, AUSCAN Pressure Ulcer Risk Scale Study Group

**Biography:**

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Introduction: Recruiting a sufficient number of eligible and willing participants to meet sample size requirements for statistically significant results continually challenges researchers. While sample size calculations are routine, less often considered is the screening to recruitment ratio (S:R) – the ratio of the number of candidates screened to the number recruited to achieve the desired sample size.

Methods: To describe the S:R ratio for the Toronto site, a part of the AusCAN Pressure Ulcer Risk Scale Study Group. We prospectively collected the reasons for screening failures and report the associated S:R for subacute versus chronic wheelchair users.

Results: At a tertiary SCI rehabilitation program in Canada, of 405 individuals pre-screened, 197 (48.6%) were excluded for failing to meet inclusion criteria or meeting exclusion criteria. The inclusion criteria not met were: non-wheelchair primary mobility; insufficient SCI duration; inappropriate SCI etiology; insufficient English competency and age (outside study range). Reasons for exclusion in descending order of frequency were: existing pressure ulcer; SCI due to cancer; prior surgical closure of a pressure ulcer; history of grade 3 or 4 pressure ulcer; and SCI due to spina bifida. Sixty-eight individuals refused further follow up, 90 were lost to follow up (death, relocation, invalid contacts) and 26 eligible candidates declined consent. Finally, 24 individuals consented to participation. The resulting S:R was 17:1, much higher than anticipated based on study design.

Conclusions: Failing to consider S:R ratios at study commencement and during implementation can lead to time and cost overruns and under accrual of participants at study sites.
Seating systems in spinal cord injury (SCI) patients – choosing criteria

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Introduction
Sitting on a wheelchair significantly affects the quality of life in SCI individuals. Currently, there is a large selection of cushions in the Czech Republic. SCI patients are equipped with wheelchair and cushions during discharge from rehabilitation departments. At this point there is no significant experience with cushion selection. The insurance company covers a new cushion every three years. During this period the SCI patient can use his experience to opt for a different type, if needed. The goal of the study was to explore selection criteria, functionality and satisfaction with cushions in SCI patients.

Patients and methods
A questionnaire was created for SCI individuals over 5 years after injury. The main focus was on the type of the cushion, subjective scaling of benefits and disadvantages, functionality in prevention of complications from extended sitting, opportunity to use mobility potential, sufficient deformity corrections and support of correct sitting on a wheelchair, effect on propulsion in movement etc.

Results
Preliminary results show preference for combined, air flotation, viscoelastic fluid, silicon, foam and honeycomb cushions, in descending order. The reasons for switching cushions are limits in self-catheterization, limits in mobility indoors and outdoors, inadequate skin protection and other health complications in descending order.

Conclusion
The choice of cushion is not depended only on a pressure mapping assessment, but also on testing of different types of cushions during ADL activities. Subjective responses should be taken into account. Regular consultations, monitoring and supervision of specialists is an integral part in this process.
Secondary Health Conditions and Rehabilitation Goals during Transition from Paediatric to Adult Care in Adolescents with Spina Bifida.

**Background:** Adolescents with Spina Bifida (SB) need specialised care to address their health problems and rehabilitation goals.

**Objective:** Description of secondary health conditions (SHC) and rehabilitation goals of adolescents with SB at first visit in our transition program.

**Method:** Descriptive observational study in persons with SB at first visit in the transition program during 2015-2016. SHC were measured with the Spinal Cord Injury Secondary Conditions Scale.

**Results:** Twenty-three adolescents were admitted to our transition program: 17 females; mean age 18 years (Range 14-25); Level of SB: 15 >L2 (Th 4-L2), 7 L3-L5 and one < S1; 17 with Arnold-Chiari malformation; 15 Shunt; mean SCIM III score 40 (Range 30-70), 18 impaired cognitive functioning; Level of education: 12 in regular education, 5 in institute for children with special needs, 1 working and 5 no daily structure. All persons reported bladder dysfunction and bowel dysfunction, 14 reported recurrent urinary tract infections (UTI), 18 contractures of the lower extremities, 15 sexual dysfunction (including 8 of 17 females dysmenorrhoea).

**Main rehabilitation goals were:** 1. Prevention of SHC's, especially UTI, 2. Planning of education and work, 3. Education on sexual function and 4. Improvement of independency in activities of daily living.

**Conclusion:** At time of transition to adult care various SHC existed. Besides prevention of SHC, adolescents formulated rehabilitation goals mainly on participation level. Since cognition is to be one of the most important determinates for participation, testing of cognition should be performed in all patients with SB to optimize integration.
Self-reported complications, functional goals and perceived beneficial activities in community dwelling individuals with Spinal Cord Injury in Sweden.

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\textit{Biography:}

NO BIO

Needs and priorities of people with acquired (ASCI) and congenital spinal cord injury (CSCI) may vary based on age, years since injury (YSI) and level/type of lesion. Systematic monitoring of these aspects is important to inform the design of effective services. This study aimed to explore self-reported physical and psychological complications, functional goals, and perceived activities that could improve quality of life (QoL) in community dwelling individuals with SCI in Sweden.

Cross-sectional study that used an online survey. 203 individuals with ASCI (Tetraplegia complete-incomplete: 15%-14%; Paraplegia complete-incomplete: 29%-32%) and CSCI (9.3%) responded. Overall, pain was the most commonly reported unbearable physical complications, with neurogenic pain more prevalent the shorter the YSI and musculoskeletal pain the longer the YSI. Unbearable bowel and bladder complications tended to be more frequent as the YSI increased. Feeling socially isolated and stressed were the most commonly reported unbearable psychological complications across all YSI sub-groups.

Trips to sunny places and regular physical training were reported to be more likely to improve QoL, while practicing elite sports and ski trips were not. For people with ASCI, some goals were reported as less important the longer the YSI (wheelchair skills, walking), while other retained their importance throughout YSI (improve strength and condition). Dressing was an important goal for individuals <5 YSI and for those >20 YSI, but not for those 5-20 YSI.

These findings could inform the focus of community services and healthcare expenditure that could potentially help people with SCI reduce the impact of their disability.
Serum albumin predicts long-term neurological outcomes after acute spinal cord injury

Miss Bobo Tong, Dr Catherine Jutzel, Dr Jacquelyn Cragg, Dr Lukas Grassner, Dr Jan Schwab, Dr Steve Casha, Dr Fred Geisler, Dr John Kramer

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Background. There is a need to identify reliable biomarkers of spinal cord injury recovery for clinical practice and clinical trials. Our objective was therefore to correlate serum albumin levels with spinal cord injury neurological outcomes.

Methods. This was a longitudinal cohort study of 591 adult patients with traumatic spinal cord injury who participated in the multi-centre Sygen clinical trial (secondary analysis). Their injury severities ranged from ASIA A to D and included both cervical and thoracic injuries. Serum albumin concentrations were obtained as part of routine blood chemistry analysis, at trial entry (24 to 72 hours), 1, 2, and 4 weeks after injury. The primary outcomes were ‘marked recovery’ and lower extremity motor scores, derived from the International Standards for the Neurological Classification of Spinal Cord Injury. Data were analyzed with multivariable logistic and linear regression to adjust for potential confounders.

Results. Serum albumin was significantly associated with spinal cord injury neurological outcomes. Higher serum albumin concentrations at 1, 2, and 4 weeks were associated with higher 52-week lower extremity motor score (Beta=2.2 [95% CI 0.56, 3.8]; Beta=2.7 [95% CI 0.99, 4.4]; Beta=4.8 [95% CI 2.7, 6.9], respectively). Similarly, the odds of achieving ‘marked neurological recovery’ was greater for individuals with higher serum albumin concentrations.

Conclusions. In spinal cord injury, serum albumin is an independent marker of long-term neurological outcomes. Serum albumin could serve as a feasible biomarker for prognosis at the time of injury and stratification in clinical trials.
Severe sleep-related breathing disorders are rare in patients with spinal cord injury

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1998-2004 – Sackler School of Medicine, Tel Aviv University, Tel-aviv, Israel
2013-2017: Residency, Physical Medicine and Rehabilitation (PM&R), LRH Raanana
2013-2016: Postgraduate Med. School, PM&R, Tel-Aviv University, Tel-Aviv

Introduction: Sleep-disordered breathing (SDB) is common among patients with spinal cord injury (SCI), but its severity varies. The present study evaluated the severity of breathing abnormalities during sleep, after SCI, and its relationship with patient characteristics and sleep quality.

Methods: Oxygen desaturation was measured overnight in 41 SCI patients aged 52±18, 19 with tetraplegia, one month after admission to rehabilitation. The oxygen desaturation index (ODI) was calculated, as a measure of breathing disorder severity. Logistic regression was used to identify risk factors for SDB (ODI >5) in relation to age, gender, injury level, AIS grade, VAS score (pain), and BMI. Linear regression was used to identify factors related to SDB severity and its correlation with age, BMI, the Pittsburgh Sleep Quality Assessment (PSQI) and the Karolinska Sleepiness Scale (KSS).

Results: SDB (ODI >5) was found in 19 patients (46%). In 13 (32%), the breathing disorder was mild (ODI 5-15), in 5 (12%) it was moderate (ODI 15-30), and only in one (2.4%) it was severe (ODI > 30). Only BMI was found to be a risk factor for breathing disorder (p=0.01). The SDB severity (ODI value) was found to be related (r2=0.54; p≤0.01) to age, BMI and PSQI score, but not to the VAS or KSS score.

Conclusion: Although SDB is prevalent in SCI patients, severe disorders are rare, and they are related to age, BMI, and impaired quality of sleep, but not to pain and daytime sleepiness.
Spinal cord injured patients with sacral and sub-sacral lesions usually present with detrusor hypo/acontractility with concomitant weak or normal urethral sphincter function. More often patients are instructed to perform clean intermittent self-catheterization (CIC).

We retrospectically collected all cases of ischial-urethral fistulas in neurogenic patients performing CIC referring to our Institution. The diagnosis was made by the plastic surgeon after the development of a skin pressure ulcer in the ischial region, not responsive to conservative topical treatment and requiring surgical toilette.

We account 8 cases during the last 2 years. All patients were male, performing CIC without difficulties for more than 5 years and without evidence of any urethral pathology. Mean age was 55 years. One patient had diabetes and 2 patients were obese.

The 2 youngest patients were initially treated with primary surgical urethral reconstruction with buccal mucosal graft, with good results. Two patients were treated with new generation urethral stents (Uventa); one was removed after 6 months with complete closure of the fistula and absence of stenosis, the other is still in place with only partial reduction of the fistula with filiform appearance. For the 4 older patients we placed a permanent sovrapubic catheter, excluding the urethra.

One etiologic hypothesis is that the ischiatic decubitus is the origin of the disease, that consequently spreads to a chronically inflamed urethra. Another hypothesis is that it originates from a false passage with urinal stasis and subsequent infection of the injured urethra, and subsequent spread of the inflammatory process towards the ischial region.
Poster Board Number: 47

Sleep quality and daytime sleepiness improve in SCI inpatients after one month of rehabilitation

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1980 -1986: Ural State Medical University, Sverdlovsk State Medical Institute, Russia  
2003-2008: Residency, Physical Medicine and Rehabilitation (PM&R), LRH Raanana  
2003-2006: Postgraduate Med. School, PM&R, Tel-Aviv University, Tel-Aviv

Introduction: Sleep disturbances are common among patients with spinal cord injury (SCI). This study examined the influence of rehabilitation hospitalization on sleep quality and daytime sleepiness following SCI.

Methods: Fifty-seven SCI patients (24 with tetraplegia, age 52±17) completed two sleep questionnaires, at admission to rehabilitation and one month later. These were the Karolinska Sleepiness Scale (KSS), a subjective measure of the patient’s experience of daytime sleepiness, and The Pittsburgh Sleep Quality Assessment (PSQI), a subjective assessment of adult sleep quality. Scores range between 1-10 (alert to very sleepy) for KSS, and between 0-27 (good to bad sleep) for PSQI.

Results: Sleep quality was abnormal (PSQI>5) in 61% of patients. PSQI score was 9±4.9 at admission, attesting to sleep quality inferior to that in the general population but better than reported for SCI patients. Daytime sleepiness (KSS>6) was abnormal in 21% of the participants. KSS score was 4.9±2.4 at admission, which is similar to scores reported for the general population. After one month in rehabilitation, the PSQI score was 7±4.5 and the KSS score was 4±2.4, showing a significant change from admission, (p=0.004 for PSQI, and p=0.002 for KSS). Patients who reported PSQI>5 were more likely to suffer from pain (p=0.04).

Conclusion: Subjective assessment of sleep quality and daytime sleepiness showed significant improvement in SCI patients after one month of inpatient rehabilitation.
Smart Rehabilitation Care (SRC) System in Spinal Cord Injury: Extending Patient Centered Rehabilitation to Rural Areas- From Promise to Reality

Miss Nishu Tyagi¹, Dr. Chitra Kataria¹
¹Indian Spinal Injuries Centre

Biography:
First Indian to won ‘Inga-Britt Lindstrom Grant Award’ in 2013. Introduced telerehabilitation in India using common technologies especially for neglected and rural disabled in 2014. Awarded gold medal, fellowship, two silver medals continuously. Published four papers, two chapters in the book titled ‘Research Publication and Ethics. Presented more than 12 papers in National & International Conferences. Awarded ‘Smart City-Jan Award’ for ‘Excellence in Medical Field’. Presently supervising TeleHealth Unit of ISIC and rehabilitated more than 2000 patients. Her dream is to expand the R&D of Rehabilitation in India by creating new ideas, collaboration with good team work for community benefit.

Introduction: Post discharge complications can be prevented if proper preventive and rehabilitative measures are undertaken timely.

Objective: To evaluate the feasibility & acceptance of SRC System as an Outreach Rehabilitation Model.

Methodology: 82 SCI individuals participated in pre-education session. At 3 weeks of Post discharge, Spinal Outreach Service Health Questionnaire (SOS-HQ) was administered. Through SRC System, participants received the intervention-link in their phones/computers through which customized exercises were provided twice a week for 8 weeks in the form of YouTube, like strengthening and stretching of upper/lower limb/trunk, bed mobility training, balance training, hand therapy, breathing retraining program, core strengthening and caregiver training videos in Hindi & English language. Video based home modifications suggested. Educational videos/ Reminder on bedsores prevention and hygiene care provided during every 10 days. Re-assessment on SOS-HQ and feedback on utilizing SRC System was taken.

Results: On SOS-HQ 10% reported problem of mainly spasms and body pain. 75% individuals completely agreed on SRC system as an alternative follow-up care, good means of therapeutic guidance from distance, preventing complications and saving expenses. 63.15% completely agreed that all areas of functional independence were considered, 42.63% agreed that SRC technology could be accessible through whatsapp also. 82% completely agreed to use SRC in their post discharge follow-up care. Admission percentage of individuals reduced from 20% to 8% and post discharge complications reduced from 35% to 10%.

Conclusion: SRC system could be used as an alternative outreach rehabilitation model for continuity of care with potential time and cost-savings.
SpeediCath Flex Evaluation study

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Coloplast A/S

Biography:
NO BIO

Aim:
This study evaluated the new SpeediCath® Flex (SCF); a soft catheter with a flexible tip and a dry-sleeve to support easy and clean insertion. The tip is designed to facilitate difficult insertions. The study aimed at two user groups: I) Nelaton sleeve users with presumably normal urethral anatomy, and II) Tiemann users with different difficult urethral anatomies.

Method:
Included participants used the SCF catheter for up to one week and completed a questionnaire evaluating SCF and their current device.
The primary endpoints were: ‘success rate’ and ‘ease of navigation during insertion’.
The secondary endpoints were: ‘Easy handling during insertion’ and ‘Gentle insertion’.

Results:
The insertion success rate was 100% for users in group I (N=58). The great majority rated SCF easy to navigate, easy to handle, and gentle to insert. The estimated odds ratio favored SCF compared to the user’s own device regarding ‘easy navigation’ and ‘gentle insertion’.
Although user in group II (N=95) all had difficult urethral anatomies: benign prostate hyperplasia, strictures, etc, the success rate was still 86%. More than half rated SCF easy to navigate, easy to handle and gentle to insert. Handling difficulties were partly caused by the sleeve technology, unfamiliar to this user group.

Conclusion
The data suggests that SCF can be used by individuals with normal urethral anatomy and individuals with difficult urethral anatomies. The flexible tip catheter may be beneficial in conditions where a standard catheter is problematic to insert.
Poster Board Number: 32

Spinal cord injury and digestive disorders: Remodelling of the enteric nervous system and digestive functional consequences in a rat model.

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Biography:
NO BIO

Introduction: Digestive disorders, in patients with Spinal Cord Injury (SCI), are due to dysfunction of the extrinsic autonomic nervous system, probably entangled with dysfunction of the Enteric (intrinsic) Nervous System (ENS). We wanted to characterize remodeling of the ENS in a rat model with SCI on T8.

Methods: Samples of proximal and distal colons of 5 SCI rats and 5 control rats were first compared in experiments of ex vivo colonic motility. SCI rats were receiving antibiotics to prevent urinary tract infection, so the ex vivo experiments were repeated on a group of non-SCI rats receiving the same antibiotic therapy. Then immunohistochemical experiments (using biomarkers: Hu, neuronal NO synthase, choline acetyl-transferase) allowed us to identify neuronal populations in the myenteric plexus. Finally, dosages of acetylcholine and acetylcholinesterase activity in the samples were carried out.

Results: In experiments of ex vivo motility, there was a decrease in contractile response to bethanechol in the proximal colon of SCI rats and a slight decrease in cholinergic component during electrical stimulation. Antibiotic treatment had no impact on the ex vivo colonic motility. By immunohistochemistry, we observed that the proportion of nitrergic neurons was lower in the proximal colon of SCI rats. Finally, the acetylcholine and acetylcholinesterase activity assays showed a decrease in the proximal colon of SCI rats.

Conclusion: This pilot study demonstrates remodeling of the ENS, especially in proximal colon, and associated functional consequences after SCI. We need to continue investigations to validate these results on a larger number of animals.
Poster Board Number: 223

Spinal cord injury primary care: needs assessment from multiple perspectives

Dr James Milligan\textsuperscript{1,2}, Ms. Loretta M. Hillier\textsuperscript{1}, Dr. Craig Bauman\textsuperscript{1}, Ms. Lindsay Donaldson\textsuperscript{1}, Dr. Joe Lee\textsuperscript{1,2}
\textsuperscript{1}Centre For Family Medicine Family Health Team, \textsuperscript{2}Department of Family Medicine, McMaster University

Biography:
Dr. Lee is a family physician and Chair and Lead Physician for the Centre for Family Medicine Family Health Team, Kitchener, Ontario, Canada, Associate Clinical Professor, Department of Family Medicine, McMaster University, Hamilton, Ontario, Canada, Adjunct Professor Department of Family Medicine, Western University, London, Ontario, Canada and, Assistant Professor (Adjunct), School of Pharmacy, the University of Waterloo, Waterloo, Ontario, Canada.

Background: Despite having high healthcare needs persons with spinal cord injury (SCI) receive suboptimal primary care. This study gathered multiple perspectives on the primary care for persons with SCI as related to care gaps and needs.

Method: Surveys were completed by consumers (N=14) and 12 primary care providers (PCP) who referred persons with SCI to the Centre for Family Medicine mobility clinic. Interviews were completed with an expert panel representing rehabilitation specialists and community service providers (N=8). Questions were asked related to care gaps and barriers and needs for care improvements.

Results: Across all respondent groups similar barriers and gaps in care were identified. A high proportion (>50\%) of consumers and PCPs reported low frequencies (“never” or “hardly ever”) of thorough examinations performed on an examination table, being weighed, or skin examinations in the absence of complaints and identified lack of time and specialized equipment as significant barriers to care. Consumers identified needs for care improvements related to bone health, bladder and bowel issues and chronic pain. PCPs reported the need for greater: consumer self-management, access to specialists for consultation, specialized primary care services for SCI, and access to SCI-related practice guidelines and education. Expert panel participants validated survey results and identified gaps in access to community programs and home care, geographic inequities, and limited integration and continuity of care across health sectors.

Conclusions: Care gaps and needs were identified that can inform the development of recommendations and initiatives to improve primary care for persons with SCI.
Poster Board Number: 3

Spontaneous thoracic spinal epidural haematoma (triggered by weight lifting), with good outcome after surgical decompression and neurorehabilitation - case presentation

Dr Aurelian Anghelescu¹ ², Dr Alin Raşină³
¹Teaching Emergency Hospital “Bagdasar-Arseni”, ²”Carol Davila” University of Medicine and Pharmacy

Biography:
Asst. Prof. Aurelian Anghelescu, MD, PhD, Senior consultant in neurology & neurorehabilitation.
Founding Member (2007) and Prime Vice-President of the Romanian Society for Neurorehabilitation (RoSNeRa) - affiliated to WFNR.
Founding Member and Prime Vice-President of the Romanian Spinal Cord Society (RoSCoS) - affiliated to ISCoS) and ESCIF.
Member of ISCoS (since 2000), WFNR (since 2008), Euroacademia Multidisciplinaria Neurotraumatologica (EMN, since 2014), and in many Romanian Scientific societies.
He participated at the educational project “eleanSCI.org”.
Coordinator of the Romanian team in 5 international and 4 national research projects, co-author at 2 patent certificates, 9 books, and over 60 published papers.

BACKGROUND: Spinal epidural hematoma (SEH) is a rare clinical finding that can occur following trauma or spontaneously (SSEH), with possible spinal cord compression and threatening consequences. Its estimated incidence is one per million inhabitants, representing 0.3%-0.9% of the spinal epidural space-occupying lesions.
SEH is usually associated with bleeding disorders: thromboprophylaxis (anticoagulation or antiplatelet therapy), coagulopathy (hemophilia, autoimmune diseases), arteriovenous spinal malformations, lumbar puncture or trauma, neoplasm, pregnancy, haemodialysis, or rarely is idiopathic / spontaneous (SSEH).
The paraclinical diagnosis is performed with magnetic resonance imaging (MRI). SSEH has usually a surgical solution; conservative management is reserved for mild cases.
Intravenous pressure changes and bleeding of the epidural venous plexus, during prolonged Valsalva maneuver, associated with strenuous, repeated effort acting as a trigger factor (weight lifting, sit-ups exercises, during breath-hold diving, swimming, following trumpet or intense piano playing, even after an abrupt sneezing), represent the underlying pathophysiological mechanism.

CASE REPORT: Sudden severe back pain and rapidly progressing Th5 incomplete AIS-C paraplegia and urinary retention, developed in a 61 y.o. professional sportsman, after an usual weight lifting training. His personal history consisted in type 2 diabetes mellitus, obesity, arterial hypertension (irbesartan, rilmenidina), simvastatine, 75 mg aspirin daily.
MRI showed a blood collection in the antero-spinal epidural space, with significant compression from Th3-6.
The patient was operated and subsequently transferred to Rehabilitation. His outcome was excellent: no motor deficit at discharge, but only mild paresthesia, and subtle micturition problems.

CONCLUSION: Early diagnosis, prompt surgery and rehabilitation improved the neurological and functional outcome.
Poster Board Number: 61

Study of muscle activation during in-water gait of SCI patients using surface EMG

Dr Federica Rossi\textsuperscript{2}, Dr Tatiana Bianconi\textsuperscript{1}, Dr Alessandra Leo\textsuperscript{1}, Dr Esteban E. Pavan\textsuperscript{3}, Dr Carlo Alberto Frigo\textsuperscript{3}, Dr Marianna Asaro\textsuperscript{3}, Dr Michele Zarbo\textsuperscript{1}, Dr Adriana Cassinis\textsuperscript{1}, Dr Michele Spinelli\textsuperscript{1}

\textsuperscript{1}ASST Grande Ospedale Metropolitano Niguarda, \textsuperscript{2}Università degli Studi di Milano, \textsuperscript{3}Politecnico di Milano MBMC Lab – DEIB

\textbf{Biography:}

\textit{NO BIO}

Objective: compare muscle activation during in- and out-of-water gait of SCI patients to understand the influence of the aquatic ambient on the rehabilitation programme.

Methods: 20 healthy subjects and 20 SCI patients were enrolled. All patients had retained walking ability (AIS C and D, lesion level C4-L2, age 18-70 years) and could ambulate independently for a minimum of 5m with or without walking aids. We analysed, with a surface 8 channel wireless EMG, the following muscles of the right leg: rectus femoris, vastus medialis, vastus lateralis, gluteus maximus, gluteus medius, biceps femoris, tibialis anterior, gastrocnemius medialis.

Results: in both healthy and affected subjects in water the walking speed decreases whereas the duration of gait cycle increases. Furthermore, in SCI patients we found out an increase of the swing phase. Comparing in- and out-of-water results for SCI subjects the maximum muscle activation peak in water occurred before than on dry land; at the opposite, in healthy subjects we registered that the maximum muscle activation peak occurred earlier out of the pool.

Conclusions: the in-water gait cycle is much more similar between SCI and healthy subjects than the out-of-water one. These results suggest that aquatic ambient could positively influence muscle recruitment in SCI patient. Moreover, these data give us the opportunity to design water-based exercises that can enrich the tailored rehabilitation programme for every patient.
Swallowing Dysfunction in Old Aged Cervical Spinal Cord Injury Compared to Normal Population

Professor Kang Hee Cho
Chungnam National University / Hospital

Biography:
Kang Hee Cho, M.D., Ph.D.
Professor, Department of Rehabilitation Medicine
Director of Daejeon-Chungcheng Regional Rehabilitation Center
Chungnam National University Hospital

Introduction: To investigate the characteristics of swallowing dysfunction in old aged patients with cervical spinal cord injury (CSCI) compared to normal populations.

Methods: A total 25 cervical SCI patients with age over 60 years underwent videofluoroscopic swallowing study (VFSS) with porridge, plain yogurt, rice, 2.5ml and 5ml of water, fiberoptic endoscopic evaluation of swallowing (FEES). The patients were divided into 2 groups according to the score of the American Speech-Language-Hearing Association National Outcome Measurement System (ASHA NOMS) (Diet restriction (DR) group; score below 5, Non DR (NDR) group; score above 6). Evaluation measurements included: modified penetration aspiration scale (mPAS), videofluoroscopic dysphagia scale (VDS), and masticating numbers. A total 30 normal populations with age over 60 years underwent same evaluation to compare swallowing function in each patients group. Statistic analysis was carried out by a calculation of a non-parametric correlation.

Results: There were no significant differences in the presence of the tracheostomy tube, history of the surgery, the trauma, the American Spinal Injury Association classification, and total sum of the motor grade of either upper or lower extremities among 3 groups. In NDR group, all evaluation parameters showed no differences compared to normal populations. However, all of the mPAS, masticating numbers, and some subscale of the VDS showed significant differences in DR group compared to normal populations.

Conclusion: We can conclude that the patients with CSCI who need diet restriction have swallowing dysfunction in all type of foods, especially in the pharyngeal phase.
Poster Board Number: 233

Synchronized Functional Electrical Stimulation During Robot-Assisted Gait Training To Improve Gait Function In Patients With Neurological Disorders. A Literature Review.

Mr Markus Rieger¹
1BGU Murnau

Biography:
NO BIO

Background: Growing evidence indicates that early and intensive training after a stroke or spinal cord injury (SCI) results in better outcome regarding motor re-learning and neurological recovery, that leads to a growing importance in the rehabilitation of patients suffering from lesions of the central nervous system.

Purpose: After successful implementation of functional electrical stimulation (FES) and treadmill training with partial bodyweight support (BWSTT) for gait training in routine practice, robot assisted gait training (RAGT) has become more important due to unique advantages in daily practice. FES and BWSTT have been successfully combined within one single therapy session. The purpose of this literature review is to summarize the possibilities of synchronization, its feasibility and the effects of previous attempts to synchronize FES and RAGT.

Methods: A systematic literature search has been performed. 10 studies have been analysed for this review (3 randomized control trials, 2 case reports, 5 feasibility studies).

Results: The synchronization is technically feasible. Significant improvements of quantitative gait parameters over time showed in all groups as well as increased step length and normalized joint angles of the knee and ankle joint. Significant group differences revealed only for knee flexion. The method is technically complicated and complex in clinical application, which needs to be further investigated.

Conclusion: An easier technical implementation and improved user friendliness could lead to a successful clinical application. The combination therapy is a promising method, but the effects need to be studied in additional clinical trials.
Systematic Monitoring of Wounds/Pressure Ulcers in a SCI-Rehabilitation Centre – the Starting Point of Detecting and Preventing patients at risk.

**Mrs Randi Steensgaard**, Mrs Stine Bonne, Mrs Susanne Doessing, Mr Helge Kasch

*Spinal Cord Injury Centre Of Western Denmark, Institute of Clinical Medicine, Aarhus University*

**Biography:**
"NO BIO"

**Introduction**

Prolonged hospital admission and other serious complications including infection, pain, and spasticity are amongst the consequences of Wounds and pressure ulcers (PU). This commonly encountered complication to a spinal cord injury (SCI) is costly and highly affects health and well-being.

**Method**

A new initiative, SCI- Specialized Wound Attention Team (SCI-SWAT), systematically monitored, observed and provided care for and treatment of the wounds/PU at The Spinal Cord Injury Centre of Western Denmark.

With all cases registered, we studied how the wounds/PU related to severity of SCI (AIS), BMI, age, and gender, cause of injury and location of the wound/PU. Furthermore, we compared the characteristics of SCI patients with wounds/PU to the patients without wounds/PU.

**Results**

Over a 1 year inclusion-period SCI-SWAT identified 26 in-hospital SCI patients (F=10; M=16, in SCI database F= 425; M=1017, X2.NS) with wounds/PU from a total of 190 admitted patients (13,7%). Age = 55.5 ± 17.7

Wound/PU were more frequent in non-traumatic SCI patients, X2-test, p<0.04.

**Conclusion**

During 12 months 13.7% of in-patients encountered wounds/PU. Age, and gender did not differ from other hospitalized SCI patients, however, more often non-traumatic SCI was related to wounds/PU. A SCI-SWAT was relevant in a highly specialized centre to systematically identify patients with wounds/PU and to monitor and target the treatment.
Poster Board Number: 113


Professor Wolfram Tetzlaff, PhD Ward Pluget, BSc Nicole Janzen, MD Jie Liu, BSc Adrienne Behrens, BSc Elizabeth Raffaele, PhD Oscar Seira, BSc Yuan Jiang, MD Jason Cheung, MD Wenchun Wang, MD Hui Jiang, MD, PhD Behnia Lashkari, BSc Peggy Assinck, PhD Leanne Ramer, MSc, PhD Lowell McPhail

1 University Of British Columbia - ICORD, International Collaboration on Repair Discoveries

Biography: NO BIO

A significant number of FDA approved drugs have demonstrated efficacy in preclinical spinal cord injury (SCI). These studies predominantly used thoracic models and treated within one hour after injury. However, most human injuries occur at cervical levels (>65%), and such short windows of intervention used in animal studies are difficult to translate in human trials. We therefore created a team of research staff to assess the effects on functional recovery of the most promising FDA approved drugs when these are administered 3 hours after a cervical spinal cord hemi-contusion injury with the goal of finding robust treatments that could be taken forward into clinical trials.

In 5 experiments, we tested 9 different FDA approved drugs (riluzole, valproic acid, fluoxetine, metformin, inosine, rosuvastatin, acetyl-l-carnitine, glibenclamide, tamoxifen) that had been previously reported to improve functional recovery in SCI lab models.

None of the 9 treatments improved recovery compared to control groups in either a distal limb fine motor task (Montoya staircase: retrieval of food pellets from a staircase, or fruit-loop eating score), nor a proximal limb motor task (cylinder rearing task). We also did not observe any sparing of residual spinal cord tissue for the 6 treatments so far analyzed.

However, mRNA expression changes in injured spinal cord tissue indicate appropriate changes in gene expression early after injury indicating the drugs are biologically active at the injury site.

As in previous replication studies, establishing robustness in preclinical models is challenging and possible reasons will be discussed.

Support: Rick Hansen Foundation BICP
The ‘RESCOM-Study’ Protocol - Inspiratory muscle strength and RESpiratory COMplications after spinal cord injury: a multicenter, prospective cohort study

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1Clinical Trial Unit, Swiss Paraplegic Center, 2Institute for Breathing and Sleep, Austin Health, 3Swiss Paraplegic Research, 4Centre for Spinal Injuries, Trauma Hospital, 5Rehabilitationszentrum Häring, AUVA, 6REHAB, 7Heliomare Rehabilitation, 8Clinique romande de réadaptation, 9Rijndam Rehabilitation Institute, 10Erasmus MC, University Medical Center, 11Balgrist University Hospital, 12Rehabilitationsklinik Tobelbad, AUVA

Biography:
Gabi Mueller is working in the area of SCI since 2001. From 2002 to 2003 she worked for the department of sports medicine at the Swiss Paraplegic Centre Nottwil. From 2004-2008 she was a PhD student at the Radboud University Nijmegen, the Netherlands in the group of Prof. Maria Hopman. From 2008 to 2009 she worked as Project leader ‘Cardio Vascular Pulmonary Health’ at Swiss Paraplegic Research, Nottwil, Switzerland. Since 2010 she works as a senior scientist at the Clinical Trial Unit of the Swiss Paraplegic Centre in Nottwil, Switzerland.

Background:
A spinal cord injury (SCI) often leads to paralysis of the respiratory muscles, which causes a decrease in lung capacity and the ability to cough. With reduced cough capacity, the risk for pneumonia is increased. Pneumonia is still among the leading causes of death and one of the main complications after SCI. Initial evidence suggests that inspiratory muscle strength may predict pneumonia.

Aims:
To evaluate inspiratory muscle strength as a predictor of incident pneumonia in individuals with SCI. Additionally, to evaluate personal- and lesion characteristics, lifestyle and treatment parameters as potential additional predictors of incident pneumonia. The impact of pneumonia on quality of life and mortality will also be assessed.

Methods:
Longitudinal, multi-centric cohort study (10 SCI rehabilitation centers in five countries). During inpatient rehabilitation of acute SCI patients, up to four measurement time-points will be used to assess relationships between predictors and pneumonia over time. Measurements: in- and expiratory muscle strength, lung and cough function, questionnaires: ISCoS core data-set, ISCoS pulmonary function data set, ISCoS quality of life questionnaire, dysphagia questionnaire and the doses of respiratory muscle training, physical exercise and therapies. Pneumonia, medication/vaccination and other medical complications will be assessed from patient’s medical records. Overall, 625 patients will be included in this study over 2.5 years (October 2016 - March 2019). All data will be entered into a web-based, secure study database (secuTrial®) by the study nurse of each participating center. The study is funded by Wings for Life (main funding source) and the Swiss Paraplegic Foundation.
The 7 year outcomes from a dedicated, emergency SCI unit after the 2010 Haiti Earthquake: From Disaster to Hope

**Miss Sibille Buehlmann**, Dr Saqib Noor, Miss Fiona Stephenson, Miss M Magloire, Dr P E Toussaint, Mr Carwyn Hill


**Biography:**
No Bio

Introduction: In 2010, a devastating earthquake struck Haiti, causing an estimated 100,000 deaths and many more seriously injured. The local healthcare infrastructure was largely destroyed and despite the vast numbers of aid organisations offering emergency aid, very few were equipped or able to care for the spinal cord injury (SCI) survivors. We follow up the outcomes of 20 SCI ex-patients treated at a makeshift, emergency SCI unit at ‘L’Hopital Convention Baptiste d’Haiti’.

Methodology: Prospectively collected data at the time of admission to the unit was used to determine baseline patient parameters including demographics, time of admission from earthquake to the unit, mechanism of injury, ASIA (American Spinal Injury Association) Impairment Scale scoring, proposed surgical and medical management as well as already established complications on arrival. Seven years from the earthquake, ex-patients are contacted and outcome scores measured, including CHART SF, SCIM, WISCII II and PHQ-9, addressing patient's quality of life, psychological state, and level of current disability.

Conclusion: This study displays an unprecedented 7 year follow up of spinal cord injured patients in a low income country, addressing the difficulties in past and present surgical, medical, psychological and social care. The positive outcomes from a dedicated spinal injuries unit within a disaster zone, despite extremely limited resources has demonstrated the benefit of an organised approach to these injuries in similar catastrophes. We recommend policies to promote an early establishment of centralised, coordinated care for SCI patients in natural disasters.
The Case for a Nursing Certification in Spinal Cord Dysfunction

Mrs Catharine Farnan-Kennedy¹
¹Thomas Jefferson University Hospital, ²Thomas Jefferson University Hospital

Biography:
Mrs. Catharine Farnan-Kennedy, MS, CRNN, ONC, CBIS has been a rehabilitation nurse at Jefferson Hospital in Philadelphia for 33 years.

The Case for Nursing Certification in Spinal Cord Dysfunction

Specialty certification is not new for nurses. There are over 50 specialties which nurses can be certified. Certification designates a specific body of knowledge has been achieved. It raises the bar in maintaining professional specialty standards and current evidence based practice. This poster will present the need for spinal cord dysfunction certification.
The choice of surgical approach for deep pressure ulcers treatment in Spinal Unit of Florence: a twenty-year study.

Dr Davide Casavola, Dr Giacomo Lucchesi, Dr Gabriele Righi, Dr Erez James Cohen, Dr Giulio Del Popolo

Introduction: Pressure ulcers (PUs) represent one of the main complications for spinal cord injury (SCI). 50%-80% of patients with spinal cord injury develop PUs after discharge. In this study we report our results using a myocutaneous flap in the surgical approach of typical PUs (ischium, sacrum, trocanter) in a large cohort of SCI patients.

Method: From 1996 to 2016 we treated 296 patients that presented PUs at stages III-IV in a single or double localization. The rate M:F was 4:1. Mean age was 48 years (19-78). 77% of patients were paraplegics, 23% were tetraplegics. 30% of patients presented with more than one PU, 46% presented ischial ulcer, 39% sacral ulcer, 13% trochanteric ulcer, 1% heel ulcer, and 1% malleolar ulcer. The surgery consisted in a deep excision of the ulcer and, if necessary, the underlying bony prominence was gently shaved to remove exposed and osteomyelitic bone. After that the flap was created, placed and sutured into position. We used myocutaneous flap of gluteus maximus for the ischial PU, unilateral fasciomyocutaneous flap for sacral PU and myocutaneous flap of tensor fascia lata for trochanteric PU.

Result: In our procedure we prefer myocutaneous flap to fasciocutaneous flap because seems to give better results. In fact our results showed that only a low rate of patients, 35 out of 296 (11.8%), needed a new surgical approach for PUs recurrence.

Conclusions: Based on our data, the myocutaneous flaps represent an efficacy and safe treatment with low rate of recurrences and low need of further surgery.
The Development of Self-Management Scale Items for the Adherence of Spinal Cord Injury Patients to Treatment

**Miss Sooin Hyun¹, Miss Gwangsook Kim², MR Jicheol Shin³, Miss Yerin Kim¹**

¹Yonsei University Health System, Department and Research Institute of Rehabilitation Medicine, ²Yonsei University College of Nursing, ³Yonsei University College of Medicine, Department and Research Institute of Rehabilitation Medicine

**Biography:**
No bio

Spinal cord injury patients' adherence and self management to their treatment can become an important indicator that can produce positive results of the treatment. This study was conducted as a methodological study to develop self-management scale items for spinal cord injury patients.

A primary set of 121 preliminary items were produced through literature review and in-depth interviews with the patients and interviews with experts. A pilot study was conducted on 15 spinal cord injury patients, and the internal consistency of the group of items was confirmed at Cronbach’s α= .833. Through pilot study, the items were modified and reduced to 34 items, and were organized in a self-reporting 4-likert scales. The survey involved 68 spinal cord injury patients. First, the items whose inter-item correlation coefficient between items was 0.3 or below were removed. The refined 31 items showed a high level of internal consistency with Cronbach’s α= .905. A factor analysis was performed using the principle component analysis for the 31 items. then five factors whose eigenvalue was 1.0 or above were extracted, and then analyzed using orthogonal rotations. The results of the analysis showed that five out of the 31 items had factor loadings of below ± 0.30, which indicates low contribution to the scale. Therefore, a final set of 26 items were determined and their reliability was confirmed with Cronbach’s α = .899.

While the reliability of the developed 26 items was high, these items should be additionally verified by future studies involving larger numbers of patients.
**Poster Board Number: 84**


**Miss Dearbhla Burke**, Dr. Olive Lennon, Dr. Maeve Nolan, Dr. Eimear Smith, Ms Fiona Maye, Ms Sadb Ní Ghiolláin, Mr. John Lynch, Ms Sheena Cheyne, Ms Lorna O'Connor, Ms Liz Maume, Ms Sorcha Barry, Dr. Brona Fullen

1 UCD School of Public Health, Physiotherapy and Sports Science, University College Dublin, 2 The Spinal Cord System of Care Team, The National Rehabilitation Hospital, 3 UCD Centre for Translational Pain Research, University College Dublin

**Biography:**
Dearbhla is qualified physiotherapist from University College Dublin and is undertaking a PhD in the area of spinal cord injury pain. She has a particular interest in the prevalence and non-pharmacological management of chronic pain after spinal cord injury. 

**To date she has completed a national prevalence study on pain post injury in Ireland, an international systematic review on the prevalence of neuropathic pain after injury and has been principal investigator piloting a multi-disciplinary pain management programme both in a rehabilitation centre and online.**

**Introduction:** Chronic pain is common after spinal cord injury (SCI) and dedicated SCI cognitive behavioural therapy pain management programmes (CBT-PMPs) are optimal. Low availability of CBT-PMPs in general, and promising efficacy of internet based CBT-PMPs warrants further investigation in SCI.

**Aims:** To develop an internet-delivered CBT-PMP (SPIRE).

**Methods:** Ethical approval was received. A tested CBT-PMP for SCI was adapted to SPIRE, comprising six online modules, two of which were reviewed and feedback was obtained from key stakeholders i) clinicians and researchers via email/telephone and ii) adults with SCI pain using semi-structured interviews by telephone/ focus groups with a battery of open-ended questions and completion of a system usability scale (SUS). Interviews were analysed thematically.

**Results:** Specialists in SCI (n=2), chronic pain (n=2) and e-learning provided feedback on SPIRE by email (n=6) and telephone (n=1). Feedback was positive and areas identified for improvement included i) production quality ii) printed supportive material and iii) further explanation of pain mechanisms.

Nine adults with SCI (C5-14, 56% complete) and pain reviewed SPIRE; three had completed a CBT-PMP. Interviews took place by phone (n=4) or in focus groups (n=2 and n=3). Overall feedback was positive. Three major key themes emerged surrounding i) content, ii) technical aspects and iii) improvements (individuality of user and a helpline). Five participants completed the SUS with the mean score of 86 (sd 17) indicating excellent usability.

**Conclusions:** This study collated feedback on a prototype internet-delivered CBT-PMP, from key stakeholders, to inform the final development phase.
The Effects of Anodal Transcutaneous Spinal Direct Current Stimulation on Chronic Neuropathic Pain after Spinal Cord Injury: A Pilot Study

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¹Daejeon St. mary’s Hospital, ²Seoul National University Hospital

Biography:
NO BIO

Introduction: Transcutaneous spinal direct current stimulation (tsDCS) is a neuromodulatory tool which could be in managing refractory chronic neuropathic pain (NP). As tsDCS-induced aftereffects depend on the electrodes montages, we evaluate the potential of tsDCS with unusual electrode montage to relieve chronic NP in individuals of chronic spinal cord injury (SCI)

Methods: A single-blind crossover design was used to investigate the effects of single sessions of both anodal and sham tsDCS (2 mA, 20 min) on NP in a group of 8 chronic complete motor cervical SCI volunteers. In this study, the active electrode was over the spinal process of the tenth thoracic vertebra and the reference was placed over top of the head. Pre- to post-tsDCS intervention changes in pain intensity (numeric rating scale, 0-10) were assessed before and after tsDCS session (immediately post-stimulation, and at 1 and 2 hours after stimulation).

Results: Mean pain intensity at baseline, immediately post-stimulation, at 1 and 2 hours after stimulation were respectively 5.9±1.3, 4.6±2.3, 4.8±2.0 and 4.6±2.1 for anodal tsDCS versus 5.6±1.4, 4.8±2.0, 4.4±2.5 and 4.8±2.6 for sham tsDCS. There was no significant pain intensity reduction from baseline to post-treatment assessment under both anodal tsDCS group (p=.47) and sham tsDCS group (p=.47). Furthermore, no significant difference was found between treatment groups at each assessment (p=.71, .96, .62 and .59, respectively).

Conclusions: This study result suggests that anodal tsDCS with the montage used in this study is not more effective than sham tsDCS for reducing pain intensity in individuals with chronic cervical SCI.
Poster Board Number: 134

The EXO-H2 Robotic Exoeskeleton For Gait Rehabilitation After Spinal Cord Injury: Preliminary Clinical Findings

**MD, PhD Angel Gil-Agudo¹**, Eng PhD Antonio J. del-Ama¹, MD PhD Mónica Alcobendas-Maestro¹, MSc OT Vicente Lozano-Berroño², MD PhD Jesús Benito-Penalva³, MSc PT Saleky García-Gómez³, MD PhD Elisa López-Dolado⁴

¹National Hospital For Paraplegics, ²Institut Guttman Foundation

**Biography:**
He obtained PhD degree in 2009 with a doctoral thesis about manual wheelchair propulsion ergonomics in SCI patients. He has been working as Coordinator of Biomechanics Department in National Hospital for Paraplegics (Toledo, Spain) since 2005. He is the Director of Physical Medicine and Rehabilitation Department of this hospital since 2015. He has been involved in several research European projects related to new technologies applied in Neurorehabilitation. Current research focuses on systems based on virtual reality and the development of robotics and exoeskeletons. He collaborates as a peer reviewer in several impact factor reviews as Spinal Cord.

**INTRODUCTION**
Recent technological developments in powered robotics exoskeletons are being introducing as adjunctive tools for rehabilitation to accelerate functional recovery. We present a clinical experience with a novel lower limb robotic exoskeleton, Exo-H2, for gait rehabilitation in spinal cord injury (SCI) patients. The main objective of this study was to evaluate the safety and the clinical feasibility of the exoskeleton.

**METHODS**
Exo-H2 has six actuated joints and performs trajectory control of exoskeleton joints following a healthy kinematic pattern extracted from a normative database. The Exo-H2 was evaluated in patients with subacute incomplete SCI patients across 4 weeks of training per individual. Clinical and functional outcome measures were assessed before and after the treatment. Descriptive statistics were applied.

**RESULTS**
Three patients with subacute incomplete SCI completed the study. No adverse events occurred. Each patient completed 20 sessions. Walking time per session were around 30 minutes. Time from injury ranged from 3 to 5 months. All patients improved their walking ability considering before and after measurements as reflected by 10MWT (48.33s+-16.5 vs 41.33s+-8.5), 6MWT (67.00m+-38.00 vs 77.33m+-35.50), TUG (39.33s+-2.51 vs 30.00s+-5.00) and WISCI-II (7.33+-5.13 vs 11.00+-6.24).

**CONCLUSIONS**
The Exo-H2 system enables intensive training of gait in patients with impaired gait function after SCI. The system is safe and robust when used as part of an inpatient rehabilitation program. Promising functional results in gait scales were obtained. Future studies are needed to assess the efficacy of this therapy.

This work was financed by Institute of Health Carlos III and co-financed by FEDER (PI15/01437)
The experience of living with Cauda Equina Syndrome: A phenomenological study

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¹National Rehabilitation Hospital, ²Trinity College

Biography:
NO BIO

Background: Cauda Equina Syndrome (CES) is a relatively rare spinal cord injury which can have devastating, long-lasting symptoms including neurogenic bowel and bladder, sexual dysfunction, lower limb weakness, and neuropathic pain. To date the psychological impact of CES has not been a focus of published research.

Aim: To investigate the experience of living with Cauda Equina Syndrome among individuals living with the syndrome for 2-5yrs.

Method: Semi-structured interviews were conducted with 10 individuals with a diagnosis of Cauda Equina Syndrome recruited from the National Rehabilitation Hospital in Ireland. Interviews were transcribed and analysed using Interpretative Phenomenological Analysis (IPA).

Results: Common themes identified by participants included a) A life ruled by symptoms, b) Acceptance versus determination, c) Loss of control, d) Distrust of the medical field, and e) ‘I am who I always was’.

Conclusions: Participants accounts reflect the long-lasting impact of CES on lifestyle, self appraisal and participation. Considerable continuity of self, and previous patterns of reaction to stressful events, emerges as a key factor in adjustment. Participants reported significant concern about the lack of knowledge among medical professionals (e.g. general practitioners, emergency department nurses) and the general public about CES. Psychological, problem-solving and coping skills interventions, seeking to enhance resilience, while taking existing coping skills into account, is required both during and post rehabilitation. Greater awareness among healthcare staff, combined with psychological support may improve prognosis, quality of life and subjective experiences of treatment for people grappling with the reality of CES.
The impact of spinal cord injury on the quality of life of primary family caregivers: A literature review

Mr John Lynch¹, Dr Roisin Cahalan²
¹National Rehabilitation Hospital, Dublin, ²University of Limerick

Biography:
John Lynch graduated as a physiotherapist from the University of Dublin, Trinity College in 2006. John commenced working in the National Rehabilitation Hospital, Dublin (NRH) in 2007 going on to specialise in the management of spinal cord injuries. In 2016, John completed a Post-Graduate Certificate in 'Posture, Seating and Wheelchair Mobility Across the Life Course' from the University of Limerick. John works as the Clinical Specialist Physiotherapist in spinal cord injury in the NRH, with a particular interest in self-management, patient/family education and seating.

INTRODUCTION: The impact of caregiving on the health of family members has been documented for a variety of conditions. The aim of this poster is to provide a detailed review of the literature regarding the impact of spinal cord injury (SCI) on the quality of life of family members who have become the primary caregiver and to highlight potential interventions available.

METHODS: Appropriate databases were searched for relevant peer-reviewed studies. Twenty-five studies (four qualitative and twenty-one quantitative) were identified which investigated the role which family members play in caring for people with SCI and the impact it has on their quality of life.

RESULTS: Depression, anxiety, physical symptoms and reduced satisfaction with life in primary family caregivers of patients with SCI were commonly reported across the literature. Isolation, loss of identity and role changes were also regularly reported as negative outcomes of caregiving for someone with an SCI. A range of interventions (including family training, problem-solving training and support groups) have been shown to have benefits for family caregiver quality of life (QOL).

CONCLUSION: SCI impacts significantly on the QOL of family caregivers, with major implications for physical, mental and social aspects of caregiver health. This review highlights that these important issues are problematic internationally and may persist over several decades. The need for focused interventions to support family caregivers of spinal cord injured persons, with particular emphasis on increasing patient/family education and access to support groups, is recommended.
The importance of the anal exam

Dr Marca Alexander1,2,3, Dr. Ralph Marino4, Dr. Michael Kennelly5
1BVAMC, 2University of Alabama at Birmingham School of Medicine, 3Spalding Rehabilitation Hospital, 4Jefferson Medical College, 5Carolinas Rehabilitation Hospital

Currently, the International Standards for the Neurologic Classification of Spinal Cord Injury (ISNCSCI) defines incomplete SCI based upon the presence of deep anal pressure (DAP), sensation at S45 or voluntary anal contraction. Prior to the mid 1990’s injury completeness was based on preservation of motor or sensory function more than three levels below the injury and since this time the definition of incomplete injury and trainings regarding the ISNCSCI have repeatedly changed. Recent analyses have reported a greater percentage of patients with AIS A injuries are converting to AIS B than previously. Concomitantly, clinical trials have demonstrated conversions to AIS B with only retention of DAP but no progression to the recovery of functional motor use. There is concern that the description of the test for sensation of DAP has resulted in rectal wall stimulation and reports of sensation that are not somatosensory mediated and not transmitted via the spinal cord. Additionally for those that convert to AIS B with only preservation of sensation of DAP we need to document the impact of this change on quality of life.

This workshop will explore issues regarding the anal examination, the definition of incomplete, classification and neurologic recovery. Accuracy of the examination, the utility of the bulbocavernous reflex and implications for assessment and recovery of autonomic and motor function will be reviewed as well the association of anal sensation in terms of quality of life. A group discussion will address future changes. What research is necessary? Is there a better way to do the examination? Should level and degree of SCI provide guidance as to what parts of the exam are necessary?

Presenters include Ralph Marino, former chair of ISNCSCI, Marca Alexander well-known researcher in sexual response and Michael Kennelly urologist.

Workshop topics
* History of the Anal Neurologic Testing
* Examination Pitfalls-what is DAP measuring?
* Quality of Life and DAP
* The bulbocavernous reflex and prognostication of recovery of function
* The need to documenting anal function as part of good bladder, bowel and sexual care
* What the data shows about recovery and alternatives to the anal exam
* Group Discussion
The incidence and cost of SCI resulting from road crashes in Victoria, Australia

Dr Sara Liu1, Professor Michael Fitzharris2
1Monash University Accident Research Centre, 2Monash University Accident Research Centre

Biography:
Dr Sara Liu is a registered clinical psychologist in Victoria (Australia), who has worked in road safety and injury prevention since 2008. Dr Liu has particular interest in the impacts of trauma and injury on mental health and identifying appropriate treatment interventions. Dr Liu has conducted a significant amount of research within the compensation system setting with a focus on service provision and goal-setting for those seriously injured. With a strong policy and intervention focus, establishing and using data systems to identify priority areas and evaluation treatments that work is a key research interest.

Background: Road crashes represent a leading cause of traumatic spinal cord injury (tSCI) in highly motorised countries. However, despite advances in road safety knowledge, tSCI continues to occur. The aim is to understand the incidence and sub-types of tSCI among different road user types, the types of crashes in which SCI occurs, and to document the cost of providing lifetime care for a no-fault government insurer.

Method: Retrospective analysis of the 2000-2015 Victorian Transport Accident Commission (TAC) compensation claims data (Australia). The dataset contains details of 23,289 persons injured in road crashes and hospitalised, and includes compensation data linked to Police and Hospital data (ICD 9 codes). Lifetime care costs were determined by actuaries.

Results: 266 road users sustained a tSCI (69% male, age: 39 yrs; 31% female, age: 45 yrs), with drivers representing (45%), followed by passengers, motorcyclists (23%), pedestrians (7.9%), and cyclists (7.1%). Relative to all hospitalisations, the incidence of tSCI was 1.06%, 0.83%, 3.06%, 0.64% and 1.60% for these road user groups respectively. The total lifetime care cost was estimated to be $AU 427.25 million (mean: $AU 1.67 million). Differences were evident in tSCI across road user type, with 5.5% overall sustaining a C1-C4 complete injury, 7.5% sustaining a C1-C4 central cord tSCI, and 9.4% with T1-T6 complete SCI. Run-off-road high speed impacts were common.

Discussion: Identifying crash types and the cost of tSCI is important to ensure appropriate prioritisation of road safety measures. In discussing this, recommendations for future data capture are made.
Poster Board Number: 111

The influence of leisure-time physical activity on secondary health conditions and quality of life in people with spinal cord injury

Miss Mokgadi Mashola¹, Professor Joyce Mothabeng¹
¹University Of Pretoria

Biography:
Miss Mashola is an early career researcher with a physiotherapy masters degree in the field of spinal cord injury.

Introduction:
Physical activity is important for promoting health and health lifestyles for both the able-bodied and disabled population. There is a dearth of literature on the physical activity levels; secondary health conditions (SHCs) and quality of life (QOL) in people with spinal cord injury (PWSCI) in South Africa. The purpose of this study is to determine how participation in leisure-time physical activity (LTPA) influences SHCs and QOL in PWSCI in South Africa. The study contributes to filling the literature gap and informing rehabilitation practice.

Methods:
The study was quantitative, using a correlational survey. Thirty six PWSCI discharged from a private rehabilitation facility in Pretoria, South Africa constituted the sample of convenience. Data was collected using the Leisure Time Physical Activity scale (LTPA-SCI), the Spinal Cord Injury Secondary Conditions Scale (SCI-SCS) and the WHO Quality of Life Assessment scale (WHOQOL-BREF). Data was analysed using descriptive and inferential statistics on the SPSS 23 program.

Results:
Twenty-five percent of PWSCI participated in heavy intensity LTPA while 42% did not participate in LTPA at all. Participation in LTPA was found to be associated with SHCs (r = 0.332, p < 0.05), physical health QOL (r = -0.387, p < 0.05) and overall QOL (r = 0.454, p < 0.01).

Conclusion:
Poor participation in LTPA increases the risk of SHC and negatively impacts QOL. Specific education on LTPA participation is imperative in order to minimize the development of SHCs and subsequently improve QOL.
The management of spasticity with Botulinum Toxin-A in SCI patients; Is it a good choice for the patients' treatment goals?

**Professor, MD Belgin Erhan**, MD Kevser Gümüşsu, MD Gul Tugba Bulut, Ass.Prof. Ebru Yılmaz Yalçınkaya

1 GOP Taksim Training and Research Hospital PMR Clinic, 2 Istanbul Aydın University, Faculty of Health Sciences

**Biography:**

Prof. Erhan received her MD degree and completed her residency at Istanbul University. In 1993 she worked as a visiting resident at West Los Angeles VA Medical Center as a part of the University of California Los Angeles (UCLA) Multicampus PMR Residency Programme. In 2010 she received the European Board Diploma for Trainer in PMR.

Her areas of expertise are the management of spinal cord injury and spasticity. She is a nationally recognized trainer on botulinum toxin injections, spasticity management and spinal cord injury rehabilitation. She is the president of the Spasticity Study Group of Turkish Society of PMR.

**Introduction:** The purpose of this study is to determine the effects of botulinum toxin-A (BoNT-A) injections on patients' goal achievement in SCI patients with spasticity.

**Methods:** Sixteen SCI patients who had BoNT-A injections for the management of spasticity during the last 6 months were enrolled. The files of the patients were evaluated. Demographic characteristics, times since injury, level and severity of injury, concomitant symptoms, other combining treatment modalities, injected spastic muscles, the uppermost goals of the patients expected from the BoNT-A treatment were recorded. Four weeks after injections patients were asked about the achievement of their treatment goals on a 5-point scale (-2:worse, -1:poor, 0:no difference, 1:good and 2:very good). Descriptive statistics were performed.

**Results:** There were 10 men, 6 women patients who had spasticity severity grade ≥2 evaluated by Modified Ashworth Scale, with a mean age of 40.27 ±14.7 years. The median times since injury was 5 years. Of the 11 paraplegic and 5 tetraplegic patients, 5 of them had motor complete lesions. The most common injected muscles were hip adductors and gastrocnenmus –soleus group. The uppermost goals were personal hygiene, dressing and positioning. The reports of the patients for their goal achievement were as follows; 37.5 % very good, 37.5 % good, 18.8% no difference and 6.3% poor.

**Conclusion:** In the management of spasticity, treatment goals should be realistic and achievable. According to our results the effect of BoNT-A treatment on goal achievement in SCI spasticity is satisfactory.
Musgrave Park Hospital is the regional spinal rehabilitation unit for Northern Ireland. We regularly welcome Student Nurses from a range of Universities, and we pride ourselves with providing excellent teaching opportunities in a caring and compassionate environment.

Through consultation with students, fellow mentors and practice education facilitators, it was identified that there was a deficiency in our induction; with a lack of a comprehensive student pack. We researched and critically analysed other induction packs available in other regional units to examine if they had the same ethos of what we wanted to achieve with our induction pack.

We formed focus groups looking for current feedback asking for areas of ward focused learning opportunities available. Staff members were asked to categorise and prioritise areas of learning. Students provided feedback through questionnaires at the end of placements. The student university portfolio was studied to ensure that the level of learning expectation was achieved.

The outcome produced a level specific induction booklet that is sectioned into weekly goals with 6 or 14 (management) weekly learning areas with weekly question providing mentors opportunities to reinforce learning.

The pack provides basic information, which the student needs to further research providing essential knowledge enhancement of both SCIU and nursing.

Each student will provide feedback following the completion of their placement, which will provide valuable information to keep the induction pack current and relevant to student learning, while helping the nursing staff develop a pack that has the potential to grow and improve over time.
The Progression of Neuropathic Pain After Acute Spinal Cord Injury: Implications for Clinical Trials

Ms Freda Warner\textsuperscript{1,2}, Dr. Jacquelyn Cragg\textsuperscript{2}, Dr. Catherine Jutzeler\textsuperscript{1,2}, Dr. Nanna Finnerup\textsuperscript{3}, Dr. Armin Curt\textsuperscript{4,5}, Dr. John Kramer\textsuperscript{1,2}, EMSCI Sites\textsuperscript{5}

\textsuperscript{1}School of Kinesiology, University of British Columbia, \textsuperscript{2}International Collaboration on Repair Discoveries (ICORD), University of British Columbia, \textsuperscript{3}Danish Pain Research Centre, Department of Clinical Medicine, Aarhus University, \textsuperscript{4}Spinal Cord Injury Center, University Hospital Balgrist, University of Zurich, \textsuperscript{5}European Multi-centre Study about Spinal Cord Injury (EMSCI) Study Group, University Hospital Balgrist

Biography:
NO BIO

Introduction: The emergence of neuropathic pain after a spinal cord injury (SCI) can occur early and persist for a lifetime. Cell-based therapies in SCI have increased in popularity, often with the goal of promoting axonal growth. Among chief concerns is that promoting growth and repair in the central nervous system may inadvertently result in the onset of neuropathic pain symptoms. We propose to provide a large-scale analysis of longitudinal data describing acute neuropathic pain progression after SCI to inform future clinical trials.

Methods: We detailed acute neuropathic pain progression (overall, at-level, and below-level) after SCI using data from the European Multicenter Study about Spinal Cord Injury (EMSCI). We also examined characteristic associated with neuropathic pain using logistic regression.

Results: Using a large cohort (n=539) we were able to identify limitations in the current analysis of neuropathic pain in clinical trials, and provide detailed estimates of neuropathic pain progression after acute SCI. Differences in timing and associations between at- and below-level neuropathic pain were observed.

Conclusions: Overall, this study provides a comprehensive look at how acute NP (including at-level and below-level), progresses after SCI. Furthermore, we have identified potential associations with the acute development of NP while highlighting the potential importance of time-varying associations. This information is vital to the assessment of the risk and benefit of acute therapies targeting neuroprotection or regeneration after SCI.
The SCI & U Story: Participatory Design of an Online Self-Management Tool for Spinal Cord Injured Users

Professor Susan Jaglal\textsuperscript{1,2}, Dr. Sonya Allin\textsuperscript{1}, Mr. John Shepherd\textsuperscript{1}, Dr. Sarah Munce\textsuperscript{2}, Professor Jennifer Tomasone\textsuperscript{3}, Dr. Gary Linassi\textsuperscript{4}, Dr. Dalton Wolfe\textsuperscript{5}  
\textsuperscript{1}University Of Toronto, \textsuperscript{2}Toronto Rehabilitation Institute-University Health Network, \textsuperscript{3}Queen's University, \textsuperscript{4}University of Saskatchewan, \textsuperscript{5}Lawson Health Research Institute

Biography:
Dr. Jaglal is the Vice-Chair Research and Professor in the Department of Physical Therapy at the University of Toronto. She holds the Toronto Rehabilitation Institute Chair at the University of Toronto where she is Associate Academic Director of Research and also a Senior Scientist at the Institute for Clinical Evaluative Sciences. She is a Fellow of the Canadian Academy of Health Sciences. She is a health services researcher who is interested in health care utilization, appropriateness of care, self-management and knowledge transfer for traumatic and non-traumatic SCI populations. She holds a PhD in Epidemiology from the University of Toronto.

Introduction: This study details a Participatory Design (PD) process for an internet-mediated self-management intervention for users with spinal cord injury (SCI) (called SCI & U) and presents initial design and development products resulting from this process.

Methods: Users have been involved in the development process as co-designers, co-developers and key informants; the latter formed the product advisory group. They were recruited from geographically distributed consumer advocacy groups. During 10 group meetings between August 2015-May 2016, co-designers and key informants engaged in a typical PD process: exploration, discovery and prototyping. Meetings were recorded and transcribed and analyzed using thematic analysis.

Results: Participants included 7 researchers and 9 persons with SCI from 4 Canadian provinces. Group members with SCI reported using the internet to access self-management information, yet few had experience with interactive tools to promote community dialogue, like forums or resource databases review sites. Review by participants of such tools elicited concerns related to credibility and volume of online information. To mitigate these concerns, the group collectively proposed and designed systems to filter and promote “credible” information: 1) community-based ratings and reviews; 2) access to online ‘peer navigators’; and 3) group conversations or chats via voice over Internet Protocol (VoIP). A working prototype is currently available at http://www.sci-and-u.ca.

Conclusions: A PD process engaging users as co-designers, co-developers and informants can be used to identify key considerations related to the organization and presentation of online self-management information for the SCI community.
Poster Board Number: 247

The Spinal Urology Multi-Disciplinary Team Meeting at the Duke of Cornwall Spinal Treatment Centre: What does it review?

Dr Jonathan Mamo\(^1\), Dr Chalil P Vinod\(^1\), Mr Surendra Bandi\(^1\), Dr Nicholas Mamo\(^1\), Dr Reshan Jayasinghe\(^1\), Dr Aram Mashoof Fard\(^4\)

\(^1\)Salisbury Spinal Injury Centre

Biography: NO BIO

Introduction: Multi-disciplinary team (MDT) meetings are becoming more widespread in medical practice despite being common practice in spinal injury and rehabilitation. Few specialities have regular MDT meetings and the benefit has been shown to be substantial in all departments that have regular MDT sessions.

Objectives: To review the variety of patients discussed in the MDT and whether we are using the availability of such a service optimally.

Method: A review of the cases discussed over the previous six months was conducted in the joint spina-urological MDT. A data collection sheet was devised to record; total number of cases discussed; video-urodynamics (VUDs) procedures discussed; cases discussed for review of any recent radiological intervention; in-patient queries discussed; and out-patient queries discussed.

Results: A total of 320 cases were discussed over six months in 18 sessions. An average of 17.8 cases was discussed in each session, of which 12.4 were discussion of video-urodynamics. A total of 39 cases (2.17 per session) were discussed with regards to assessment or discussion of a radiological study. A total of 22 cases (1.22 per session) were queries pertaining to care of in-patients within the spinal injury centre, and 35 cases (1.94 per session) were queries for individuals seen as out-patients in the clinic setting.

Conclusion: The spinal urology MDT is important in the management of neuropathic patients. A separate allocated ward-round to ensure timely and appropriate management of in-patients is advised.
The survival status of people with spinal cord afflictions admitted to a South African public sector academic hospital

Ms Elma Burger¹, Prof Laetita Rispel¹
¹School of Public Health, Faculty of Health Sciences, University of the Witwatersrand,

Biography:
Qualified Occupational Therapist. Worked at Dr George Mukhari, Hastings (England), Western Deep Level and Chris Hani Baragwanath Hospitals. Currently DD specialised services Gauteng Health Department and Msc student at the University of the Witwatersrand.
Member of the Southern African Spinal Cord Association and services on the Education committee for the International Spinal Cord Organisation as the representative for Africa. Launched the African Spinal Cord Injury Network was launched in Gaborone in the beginning of November 2015

Background: South Africa is grappling with a complex, quadruple burden of disease. This study was conducted to determine the status of patients with spinal cord afflictions that was treated in a South African public sector academic hospital.

Study design: This was a cross-sectional study, consisting of a five-year retrospective record review for the period 1 January 2008 until 31 December 2012, and follow-up of surviving patients.

Objective: To determine the status of patients with spinal cord afflictions

Setting: Public sector academic hospital in the Gauteng Province of South Africa.

Methods: A descriptive study was done, based on a retrospective record review of all patients admitted to the selected hospital between January 2008 and December 2012 and follow up of patients. STATISTICA was used to analyse the data.

Results: A total of 264 records were reviewed, 52% (137) were due to non-traumatic spinal cord afflictions (NTSCA) and 42% (110) were due to traumatic spinal cord afflictions (TSCA) with 7.1% undefined. The majority of patients admitted during the period were male (66.3%). The mean age of patients was 39.2 (standard deviation = 15.3). The leading cause of TSCA was road traffic accidents (RTA) 65.4% and for NTSCA was tuberculosis (36.3%). Sixty seven (25%) of admitted patients had passed away. Of the remaining 197 patients, there was a loss of follow-up (69%), only 19 patients were visited at their homes.

Conclusion: NTSCA constituted 52% of SCA. The prevention of road traffic, violence-related injuries and tuberculosis is a public health and policy priority.
The woman who forgot how to walk

Dr Suzanne Maguire

The Spinal Cord Injuries Unit, Musgrave Park Hospital Belfast

Biography:
Dr Suzanne Maguire MB, MD, FRCP appointed Consultant in Rehabilitation Medicine in August 2000 with Belfast Health and Social Care Trust at the Spinal Cord Injuries Unit. Musgrave Park Hospital Belfast a regional in-patient and out-patient facility. In 2005 appointed as Consultant with the Acquired Brain Injury Rehabilitation Team Southern Health and Social Care Trust one day per week.

Previous appointments
President of The Irish Association of Rehabilitation Medicine 2002-2003, Northern Ireland representative for BASCIS 2000-present.
Honorary lecturer University of Ulster; Sports Medicine Diploma, Neurosciences course, Neuro-rehabilitation course.
Educational Supervisor for Rehabilitation Medicine 2003-2011, Training Programme Director Rehabilitation Medicine 2012-present.

This case report describes the complex situation of a 67yr retired civil servant presenting with new onset falls and urinary incontinence. Having been diagnosed with lumbar stenosis she underwent surgical decompression however failed to make the expected progress within the acute setting. Following transfer for SCI (spinal cord Injury) rehabilitation she was found to have significantly impaired cognition especially short-term memory MOCA 19/30 ACE-R 66/100, almost complete absence of new learning, intractable incontinence and ataxia. A review of all investigations including CT of brain revealed normal pressure hydrocephalus. She was re-imaged and referred urgently for high volume LP. She demonstrated almost immediate improvements in motor function and was referred for a VP shunt. This was done within 2 weeks and she completed her rehab programme and was discharged home walking independently fully continent with almost complete resolution of her cognitive dysfunction. While normal pressure hydrocephalus is reported as a relatively common finding in older patients this is our first experience of a patient presenting with it in conjunction with a spinal condition requiring rehab and demonstrates the importance of MDT working in fully assessing patients.
Therapeutic Effect and Safety of Botulinum Toxin A for the Treatment of Upper Limb Spasticity in Cervical Spinal Cord Injury

RN Kyung Ah Yoo, Professor Kang Hee Cho

Chungnam National University / Hospital

Biography:
Kang Hee Cho, M.D., Ph.D.
Professor, Department of Rehabilitation Medicine
Director of Daejeon-Chungchong Regional Rehabilitation Center
Chungnam National University Hospital

Introduction: Spinal cord injury patients have muscle weakness, spasticity, sensory disorders, and have the upper extremity dysfunction such as decreased limb coordination. In this study, we administered the botulinum toxin type A (NABOTAR) for treatment of upper limb spasticity, and investigate the efficacy and safety.

Methods: Ten patients with cervical spinal cord injury whose duration from onset was at least 6 weeks ago, age over 19 years old, and who have upper limb spasticity are selected. Spasticity was measured by MAS (Modified Ashworth Scale) in the wrist flexors, elbow flexors, finger flexors, and thumb flexors. Inclusion criteria was the presence of the spasticity, which was over 1+ grade, in the wrist flexors with the spasticity in at least one of the other muscles. We evaluated the MAS, disability assessment scale (DAS) and global assessment scale (GAS) at before injection, 4, 8, 12, 24 weeks after injection for the investigation of the efficacy.

Results: There was markedly improvement in upper limb spasticity as much as 1 grade until this time. Although this result is from interim report, we expect that there will be significant improvement of the degree of spasticity, and accompanied by improvement of the upper limb functions.

Conclusion: In upper limb spasticity in patients with cervical spinal cord injury, the administration of the NABOTAR can be used as an effective and safe therapy. This study is the officially first research on botulinum toxin injection for upper limb spasticity in cervical spinal cord injury.
To assess clinical priorities of spinal cord injured individuals using questionnaire

**Miss Sonal Khurana**, Ms. Manisha goyal, Dr. Chitra Kataria, Dr. H.S Chhabra

1Indian Spinal Injuries Centre, 2Indian Spinal Injuries Centre, 3Indian Spinal Injuries Centre, 4Indian Spinal Injuries Centre

**Biography:**
Sonal Khurana is working as senior physiotherapist and assistive technology analyst at indian spinal injuries. She has awarded gold medal for academic excellence.

She is also performing role of medical record auditor, manual handling trainer and fly-care project trainer for indigo airlines officials. Additionally, she has been appointed as faculty for special education foundation course with rehabilitation council of India and paramati care.

She has been continuously involved in various researches and contributed in International journals.

*Also certified as alternative medicine therapist and WHO Wheelchair Service Trainer. She is also member of international Societies such as ISWP, IAP and DCPTOT.*

One of the primary goals of treatment for any condition is to maximize patient satisfaction and quality of life. It has been demonstrated that the success of treatment is to some extent related to the patient’s expectation of the outcome. This may be in part, because of the finding that satisfied patients are more likely to be compliant with instructions and participate in rehabilitation programs, thereby maximizing recovery. Conversely, patients may have unrealistic expectations of outcome and this may lead to lower satisfaction with the results of treatment and poor outcomes.

**Objectives:**
To determine areas of functional recovery the SCI population should be addressed in order to have positive effect on their quality of life in near future.
To compare patient’s expectations, between:
Level of injury i.e. paraplegics and tetraplegics,
Gender specific,
Post injury duration.

**Method and material:**
Single centered study: Indian Spinal Injuries Center
100 spinal cord injured clients recruited,
Duration: 6 months
Survey questionnaire distributed via email, telephonic interview and direct interaction with candidate. The survey questions was designed to determine which areas of functional recovery are most important to the SCI community.

**Significance:**
According to outcome of study we can define more realistic approach in rehabilitation. It is important to stress that the ultimate goal is and should be to “cure” paralysis, and to emphasize that treatments leading to incremental (partial) functional recovery does not take away from that goal but rather may offer a more practical and efficient path towards it.
Training Outcome of International standards to document remaining autonomic function after spinal cord injury (ISAFSCI): Baseline knowledge and post-training result

Dr Huayi Xing¹, Dr Nan Liu¹, Professor Mouwang Zhou¹, Professor Andrei Krassioukov², Professor Fin Biering-Sørensen³

¹Peking University Third Hospital, ²International Collaboration on Repair Discoveries (ICORD), Department of Medicine, University of British Columbia, ³Clinic for Spinal Cord Injuries, Rigshospitalet, University of Copenhagen

Biography:
Dr. Huayi Xing is resident at the Department of Rehabilitation Medicine, Peking University Third Hospital, Beijing, China. She was trained at ICORD, University of British Columbia, Canada in 2014. Her research interest is related to autonomic function following spinal cord injury and medical training in the field of spinal cord injury.

Introduction:
To investigate the baseline knowledge of the concept of autonomic functions and specifically the International standards to document remaining autonomic function after spinal cord injury (ISAFSCI) and to examine the learning outcomes and retention of knowledge on ISAFSCI among medical students

Methods:
37 medical students attended the training session. Before training, a questionnaire including 24 concepts was administrated to the students to investigate their baseline knowledge. Then students were divided into 2 groups. One group had a one-hour self-study (N=19), while the other group received a one-hour lecture based learning (LBL) about the ISAFSCI (N=18). After self-study/LBL, all students were examined by a 15-question test paper on the knowledge of ISAFSCI.

Results:
Before training, students were familiar with only 8 out of the 24 concepts within the questionnaire (demonstrating baseline knowledge rate beyond 50%). After training, all questions within the test paper except the one regarding hypohydrosis were answered with an excellent outcome (defined as an post-training accuracy rate of not less than 80%) with the lowest rate as 83.3% in LBL group. However, in self-study group, only 5 out of the 15 questions acquired an excellent outcome.

Conclusion:
The baseline knowledge of the concepts related to autonomic function and ISAFSCI is relatively poor in medical students. The training outcome of LBL is better than self-study. Therefore, utilization of formal lecture or presentation is recommended to improve the effectiveness when teaching the ISAFSCI to medical students.
Trends in changes of spinal cord injured patients spectrum from physiotherapist’s point of view

Miss Zuzana Hlinkova¹, Mrs Kristyna Sediva¹, Ms Veronika Michalkova¹, Mrs Barbora Nova¹, Mr Jiri Kriz¹

¹Spinal Cord Unit Prague, Czech Republic

Introduction: In Czech Republic we observe changes of spinal cord injured patients spectrum within last years. Average age increases, causes distribution changes, we see more comorbidities and complications, which limit rehabilitation. The question is, if and how we can change our physiotherapy to better fit our patients needs.

Methods: We evaluated 756 patients records from years 2004-2016 in the retrospective study. We observed average age, lesion cause, level of injury, AIS score and associated complications. We compared their changes during these years and we discussed variations in physiotherapy program.

Results: We found decrease of a traumatic lesions and increase of a non-traumatic ones since 2010. A number of patients with incomplete lesion AIS D grew up from 14,3% in 2004 to 48,4% in 2016 together with decrease AIS A patients from 52,4% in 2004 to 28,1% in 2016. Average patients age also increased from 40 to 50 years since 2010. We see higher incidence of comorbidities and physiotherapy limits related with them. As patients age grows up we see higher importance of cardiovascular training. Higher incidence of AIS D patients brings more gait training into physiotherapy. Gait has higher chance becomes the main locomotion mean. Physiotherapists strictly correct a quality of movement stereotypes and overloading prevention of weight-bearing joints for maximal effectiveness and usability of locomotion.

Conclusion: The aim of therapy is maximal self-sufficient patient. Now we feel a need to review our current physiotherapy program to better fit our patients needs.
Poster Board Number: 173

Tumors of the Lower Urinary Tract in Individuals with Spinal Cord Injury

Dr Chloe Slocum

Harvard Medical School, Harvard T. H. Chan School of Public Health, Spaulding Rehabilitation Hospital, VA Boston Healthcare System

Biography:
Chloe Slocum MD, MPH is a 2016-2017 Commonwealth Fund Mongan Fellow at Harvard Medical School and Harvard T.H. Chan School of Public Health and a Spinal Cord Injury Physician at Spaulding Rehabilitation Hospital in Boston, Massachusetts.

Introduction: Tumors of the lower urinary tract, most notably squamous cell carcinoma of the bladder, have been found to occur at substantially higher rates in individuals with spinal cord injury (SCI). Studies have used various methods to estimate the prevalence of bladder cancer in particular for individuals with SCI, which has been associated with higher grade at presentation, predominance of squamous cell type, and long-term use of indwelling catheters for bladder management.


Results: Bladder cancer remains an important cause of morbidity and mortality in individuals with SCI, although estimated prevalence varies. Prostate cancer and urethral cancers are also causes of morbidity and mortality in men with SCI but are less extensively described in published literature. Recent population-based analyses have helped more closely estimate mortality ratios due to bladder cancer in SCI and demonstrated substantial differences in mortality from bladder cancer among populations with SCI. Several different guidelines exist for monitoring urological health in SCI.

Conclusions: Maintaining urological health is paramount following SCI. Further clinical investigations and population-based studies can help more rigorously define the phenotype of bladder cancer among individuals with SCI, characterize risk factors, aid in the development of standardized clinical guidelines, and estimate the burden of other tumors of the lower urinary tract.
Value for money has been receiving increasing attention as health care funders struggle with restraining expanding health care budgets. New health care technologies are now scrutinized for cost-effectiveness in addition to clinical effectiveness. It is important that clinical researchers, clinicians, administrators and decision-makers have a firm understanding of the terminology, methods and interpretation of economic analyses. The aim of this workshop is to equip attendees with the knowledge and hands-on experience to review, understand and critique of economic analyses for spinal cord injury interventions.

The information presented will be introductory (no pre-requisites). This workshop will be of interest to clinical scientists, clinicians, administrators and decision-makers and students. The goal of this workshop is to familiarize attendees to economic analyses and to facilitate the incorporation of economic outcomes in future clinical studies in the spinal cord injured population.

Attendees will understand the purpose of health economics, how health technology assessments fit in health economics, what the different types of economic analyses presented in literature are and who the stakeholders are for the different types of analyses. Attendees will be exposed to the methods used in economic analysis, the common ways results are presented in economic analyses and will learn how to critically evaluate economic outcomes.

This will be an interactive workshop that sets out to answer the following questions:

What is the field of health economics?
Why do health economic analysis?
What are the different types of economic analysis?
What are some methods used to conduct economic analyses?
How do I interpret the results of health economic analyses?

Each question will be a separate module that will include large group teaching, small group breakout activity (where appropriate) and a question and answer session. Discussion is encouraged throughout the workshop with additional time at the end for summary discussion and questions.
Urethral injury and associated complications in individuals following SCI

Dr Matthias Walter¹, Ian Ruiz-Romero¹, Dr. Andrei Krassioukov¹
¹International Collaboration On Repair Discoveries (ICORD), Faculty of Medicine, University Of British Columbia

Biography:
for bio see other abstract submission

Introduction
Bladder dysfunction is among the highest of priorities for individuals with spinal cord injury (SCI). Despite clean intermittent catheterization (CIC)'s widespread use, urinary tract infections (UTI) still occur. Moreover, what characteristics of catheters to cause urethral damage is unknown. This is critical as urethral damage resulting from CIC can lead to urethral strictures and UTI, which furthermore can lead to potentially life-threatening elevation in blood pressure known as autonomic dysreflexia. The aim of the study is to establish the incidence of urethral injuries and related complications in individuals with SCI using CIC.

Methods
In this retrospective cross-sectional study, desired information (demographics, character of underlying SCI, urethral injury related to CIC, and history of UTI) was collected using a questionnaire.

Results
116 individuals (including 13 females) with chronic SCI completed the questionnaire. 97 (84%) individuals performed CIC. Within this group, urethral injuries were found in 28% (27/97), i.e. self-catheterization (78%, 21/27) or performed by others (22%, 6/27). Of those, 5 participants (19%) had to convert from CIC to other methods of bladder emptying.
UTI during the last 12 months was present in >60% (59/97). The frequency of UTI during this time was once (41%), twice (32%), thrice (9%), or more (18%).
A history of orchitis (23%, 20/87), epididymitis (9%, 8/87) and prostatitis (2%, 2/87) was present in 28% (24/87) of males using CIC.

Conclusion
Our findings reveal a high incidence of urethral injuries and associated complications in individuals performing CIC following SCI. Both are underrepresented in the current literature.
Poster Board Number: 188

Urinary tract infections in spinal cord injury patients undergoing first rehabilitation in Switzerland: occurrence and risk factors

MA Collene Anderson¹,², PhD Jonvieve D Chamberlain¹, MD Xavier Jordan³, Prof., MD Thomas M Kessler⁴, MD Eugenia Luca³, MD Sandra Möhr⁵, Prof., MD Jürgen Panne⁶, Assoc. Prof., MD Martin Schubert⁴, PhD Martin WG Brinkhof¹,²

¹Swiss Paraplegic Research, ²University of Lucerne, Department of Health Sciences and Health Policy, ³Clinique Romande de Réadaptation, ⁴Balgrist University Hospital, ⁵REHAB Basel, ⁶Swiss Paraplegic Center

Biography:
NO BIO

Introduction: Urinary tract infections (UTIs) are accountable for major morbidity and costly schedule deferrals during the initial rehabilitation of spinal cord injury (SCI) patients. We investigated 1) the incidence rate of UTIs (UTI-IR) and 2) the relationship between bladder emptying methods and UTI-IR.

Methods: Data on UTIs were collected from 257 patients by the multicenter Swiss Spinal Cord Injury (SwiSCI) Cohort Study. Information on demographic and lesion characteristics and also time-updated assessments of functional independence (SCIM III scores) and bladder emptying method was used to derive adjusted IR ratios for UTI-IR using mixed-effects negative binomial regression.

Results: Median (IQR) age at injury was 56 (42-69) years, 66% were male, and 55% experienced a traumatic SCI. 60% had AIS D lesions, 27% were paraplegic AIS A-C, and 13% were tetraplegic AIS A-C. Median length of stay was 123 (65-195) days. Overall UTI-IR (95% CI) was 0.61 (0.53-0.70) per 100 person-days, with crude associations to lesion severity, functional independence, and bladder emptying method. In adjusted analysis, bladder emptying method emerged as the single determining factor for UTIs, with the UTI-IR being 5 to 6 times higher for patients using catheters compared to those who void spontaneously (UTI-IR ratios: indwelling catheter 5.5 (2.3-13.2), assisted intermittent catheterization (IC) 5.7 (2.5-13.5), self-IC 5.4 (2.4-11.9).

Conclusion: Variation in UTI-IR, which is intrinsically related to SCI characteristics and functional independence, appears to be fully explained by the bladder emptying method used during specialized SCI rehabilitation in Switzerland.
Poster Board Number: 53

Use of antibiotic and incidence of antibiotic associated diarrhoea in spinal injured patients: a follow up study.

Dr Samford Wong, Dr Simone Tiberti, MR Mofid Saif
1National Spinal Injury Centre, 2City, University of London, 3University College London

Biography:
NO BIO

Objectives: Little is known about the use of antibiotics and the extent of AAD in patients with spinal cord injuries (SCI). The aim of this follow up study was to (1) record the use of antibiotics; (2) establish the incidence of AAD and; (3) assess if any seasonal variation on antibiotic use and incidence of AAD.

Methods: A retrospective audit was conducted in a UK SCI centre during October 2014 to October 2016 with additional dates representing four different seasons. Data was collected by trained researcher from individual patient notes using a standardised questionnaire. We define AAD as 2 or more watery stools type 5, 6 or 7 (Bristol stool scale) over 24 hours.

Results: Four-hundred-and-twenty-two adults (mean age: 55.5 years, 30.4% female) with SCI (58.5% tetraplegia; 43.7% complete SCI) were included. Of 94 (22.3%) patients on antibiotics, the top three indications for antibiotics were urinary-tract infections, pressure ulcers and skin-infection. Twenty-five of 94 (26.6%) developed AAD. No statistical difference was observed on number of antibiotics, severity of SCI, use of proton-pump inhibitor and H2 blocker and use of laxatives in both groups. AAD was more common in the summer season when compared to spring, autumn and winter. (55.5%, 18.2%, 19.4%, 30.44%, p=0.03).

Conclusion: This survey found AAD is common in SCI patients and maybe a risk factor for poorer outcome and increased hospital cost. A follow up study include additional dates representing different seasons in different SCI centres is underway to establish the incidence and risk factors for AAD.
Use of botulinumtoxinA for simultaneous multiple indications in neurological patients

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¹ASST Grande Ospedale Metropolitano Niguarda

Biography:
NO BIO

Objective: this is a preliminary retrospective cohort study to determine the occurrence of all adverse events after the simultaneous treatment with botulinum toxin A for multiple indications, with at least a urologic one for injection.

A substantial number of patients may have multiple indications for botulinumtoxinA injection. The treatment for certain conditions may be delayed due to the cumulative dose limitation within a three months interval, based on FDA trials. This delay may significantly impair a patient’s function, rehabilitation programme and, at least, the quality of life; because of this sometimes it is very difficult to stratify the priority of treatment. All our patients needed, at the same time, a bladder and musculoskeletal treatment with botulinmtoxinA.

Methods: 4 traumatic SCI, 2 vascular SCI, 1 Arnold-Chiari malformation, 1 infant cerebral palsy. Range of age between 14 and 53y. All patients are affected by neurogenic bladder sphincter dysfunction (NBSD) non-responder to antimuscarinic therapy. Toxin forms: 3 patients abobotulinumtoxinA, dosage range 950-1500 U; 5 patients onabotulinumtoxinA, dosage range 300-400 U. Treatment site: 3 patients bladder sphincter and lower limb; 5 patients detrusor muscle and upper and lower limb.

Results: we registered in only one case (abobotulinumtoxinA 950 U) as adverse event the development of a temporary hand weakness, that already occurred after a previous treatment with botulinumtoxinA.

Conclusions: these data support the evidence of the possibility to perform – in very selected patients – a simultaneous treatment of overactive bladder and limb spasticity with botulinumtoxinA.
Use of immersive virtual reality can stimulate recovery after spinal cord injury: case study on feasibility, effectiveness and patient experience

Mrs Shiva Jamwal¹, Mrs Georgina Gardner
¹Royal Buckinghamshire Hospital

Biography:
NO BIO

Virtual reality (VR) augmented training represents an innovative approach for patients with spinal cord injury (SCI). Past studies show that using VR in therapy can help enable early intervention and increase rehabilitation dose. But does VR elicit similar results in the later stages?

This single case study aimed to determine the feasibility and effectiveness of VR (MindMotionPRO) in upper-limb rehabilitation post SCI. MindMotionPRO provides an immersive environment for performing goal-oriented movements, thus allowing intensive and motivating training. The study also explored patient experience and engagement level.

79-year-old (C4 incomplete tetraplegia, 18 months’ post SCI) with non-functional upper-limbs, and restricted range of movement (ROM) used the MindMotionPRO for 3 months (30 minute sessions 4 times per week) alongside conventional therapy. We evaluated motor gains (active ROM and muscle strength), functional gains, fatigue levels (VAS), system usage, and quantitative motion data analysis.

Improvements were recorded bilaterally in key muscle group strength (by one grade on Oxford scale for shoulder and elbow muscles) and active ROM (15 degrees increase in shoulder abduction and elbow extension). These changes translated into functional gains (Rivermead motor assessment arm subset score 5 from 3; FIM /FAM feeding score 3 from 0); lower levels of fatigue, and enhanced engagement, with intensive participation. Quantitative data analysis showed improved accuracy during reach and grasp exercises.

This study highlighted a possible role of VR in upper extremity motor rehabilitation post SCI. Meaningful functional gains were documented in daily activities (e.g. writing, feeding, turning pages, and manipulation of the power wheelchair switch).
User perceptions of a robotic gait device in a community gym setting.

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¹University College Dublin

Biography:
Dr Olive Lennon is an assistant professor at University College Dublin, School of Public health, Physiotherapy and Sports Science. With over 20 years clinical experience in Ireland and the US broadly in the field of neuro-rehabilitation in sub-acute and chronic populations in primary and community care sectors, her research interests include neuropathic pain in stroke and SCI, aerobic fitness testing and exercise prescription in individuals with physical disability and the use of robotics in rehabilitation. She was awarded a Health Research Board Fellowship in 2007 and holds an MSc(Health Informatics), and PG diplomas in Statistics and Health Services Management.

Background
Robotic walking devices are gaining popularity in the rehabilitation of neurological conditions. These devices have been shown to have physical, social and psychological benefits. No study to date has attempted to gain an insight into the perspectives of device users in SCI; or the use of these devices in a community setting.

Objective
This qualitative research study aims to explore the perspectives of non-ambulatory individuals using robotic walking device in a gym-based community setting.

Methods
In-depth semi-structured interviews were conducted with four non-ambulatory adults with spinal cord injury living in the community. Interviews were audio-recorded and transcribed verbatim. Inductive thematic analysis was used to code and establish common themes and subthemes.

Results
Four primary themes emerged addressing “the psychological adjustments around using exoskeletons with respect to disability”; “perceived physical, social and psychological benefits of using an exoskeleton” “the influence of external environments” and “a wellness model for health”. A fully integrated gym setting was found to provide a positive and encouraging space to utilise the device. In addition, both the ability to set training goals and the positive attitude of robotic trainers were deemed to be important factors.

Conclusions
This exploratory study provides detailed perspectives of non-ambulatory individuals with SCI on utilising an exoskeleton walking device in a community setting. It suggests that gym-based robotic devices impact positively on the users lives and enhance their perceived well-being and sense of community integration. Enabling access to similar, adequately resourced facilities should be prioritised for those with longstanding SCI disability.
Video-Urodynamic related UTIs – A study of 878 patients

Miss Sharon Wood¹, Mrs Elizabeth Bambury¹, Mr Mohamed Helal¹, Mr Rizwan Hamid¹, Mr Frank Lee¹, Mr Julian Shah¹
¹Dept of Neuro-Urology. London Spinal Cord Injury Centre, Royal National Orthopaedic Hospital

Biography:
Clinical Lead and Consultant in Neuro-Urology at the Spinal Cord Injury Centre.
Consultant Urologist at University College London Hospital.
Member of the ICS Urodynamic Standardisation Committee.

Extensive experience and speciality of reconstructive bladder surgery, male and female incontinence and neuro-urology

Studies report that the incidence of UTI post VCMG in the general population is between 1-30%. In patients with spinal cord injury it has been reported as 8%. The use of prophylactic antibiotics is controversial with no definitive recommendations for its use with VCMG.

A prospective audit of the incidence of UTI in patients who underwent VCMG in our institution was conducted over 2½ yrs.

878 patients were included.

The objective of the audit was to determine an overall rate of UTI that could be attributable to the VCMG study. A second objective was to identify whether there was a correlation between the type of bladder management and the risk of UTI post VCMG.

All patients had a dipstix urinalysis done pre-VCMG. If the patient was asymptomatic the VCMG was conducted irrespective of the urinalysis result. All positive urinalysis to leucocytes and nitrites had a urine culture performed. One week post VCMG the patients were contacted and asked if they developed a UTI within 48hrs after their VCMG study according to the definition i.e. symptomatic requiring antibiotics.

Results

<table>
<thead>
<tr>
<th>Type</th>
<th>Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISC</td>
<td>5.31%</td>
</tr>
<tr>
<td>ISC + Voids</td>
<td>7.14%</td>
</tr>
<tr>
<td>SPC</td>
<td>3.95%</td>
</tr>
<tr>
<td>Voiding</td>
<td>3.24%</td>
</tr>
<tr>
<td>IDUC</td>
<td>0%</td>
</tr>
<tr>
<td>Reflex voiding</td>
<td>18.18%</td>
</tr>
<tr>
<td>Strain voiding</td>
<td>25%</td>
</tr>
<tr>
<td>Incontinent/pads</td>
<td>0%</td>
</tr>
</tbody>
</table>

The overall incidence of UTI post VCMG was 4.44%

The highest incidence of UTI was in the strain voiding group (25%, 4 patients) and in reflex voiding (18 %, 11 patients). The IDUC group showed a 0% incidence of UTI (66 patients).
Virtual reality training to improve gait stability in patients with chronic incomplete spinal cord injury: useful or useless?

Miss Rosanne Van Dijsseldonk¹, Dr Marije Vos-van de Hulst¹, Miss Lysanne de Jong¹, Dr Noël Keijsers¹

¹Sint Maartenskliniek

Biography:
NO BIO

Many subjects with incomplete spinal cord injury (iSCI) have disturbed gait and balance, which impacts daily functioning. Furthermore, walking speed is low. With conventional therapy, subjects are limited in training their gait stability, because of fear of falling. With virtual reality training on the GRAIL (Gait-Realtime-Analysis-Interactive-Lab), patients can perform many repetitions of challenging tasks in a safe environment. The objective was to examine the effect of 6-weeks GRAIL-training on walking speed and gait stability in iSCI patients.

So far, ten patients with a chronic (>6 months) iSCI (AIS C or D) participated. Patients performed a two-minute-walk-test on the GRAIL, during the first, second and last (12th) training. Primary outcome was walking speed. Step length, step width and gait stability (Dynamic Stability Margin (DSM) [Van Meulen, 2016]) were secondary outcomes. The effect of GRAIL-training on outcome parameters was tested by Friedman and Wilcoxon post-hoc tests.

Friedman-test revealed significant differences in walking speed (X²(2,18)=14.6, p=0.001). Walking speed was larger during the last training (0.92m/s) compared to the first training sessions (0.68m/s and 0.71m/s). Significant differences were found for step length (X²(2,18)=14.8, p<0.001), step width (X²(2,18)=9.6, p=0.008) and DSM (X²(2,18)=8.6, p=0.014). Post-hoc showed significant improvements in step length and DSM at the last training compared to the first two training sessions. Median step width was significantly smaller in the last compared to the first training.

GRAIL-training improved walking speed and gait stability in patients with iSCI. Future research should focus on the effect compared to conventional treatment and the endurance of this effect.
Poster Board Number: 214

What is the use of smart technology in patients with Degenerative Cervical Myelopathy?

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¹Department of Academic Neurosurgery, Addenbrooke's Hospital, University Of Cambridge, ²Toronto Rehabilitation Institute

Biography:
Oliver Mowforth is a clinical medical student at the University of Cambridge. Oliver researches Degenerative Cervical Myelopathy under the supervision of Dr Benjamin Davies and Dr Mark Kotter.

Background
Degenerative Cervical Myelopathy (DCM) is a common and progressive condition. Treatment is currently limited to surgery, but the timing of this is not without controversy. New international guidelines advise urgent surgery for moderate to severe or progressive disease and close surveillance for mild disease, and all patients long-term. This close follow up will put substantial burden on health services. Moreover, short clinic assessments risk misrepresenting disease severity.

Smart technology, through its inbuilt sensors or completion of qualitative assessment, could provide a welcome telemedicine opportunity. However, given the older demographic of DCM, is this currently feasible?

Aim
To investigate the usage of smart technology in patients with DCM

Methods
Google Analytics from the patient section of Myelopathy.org, a DCM charity, were analysed over a one year period.

Results
In 15,761 sessions, 43.1% of users accessed the website using desktop computer, 40.0% mobile and 16.9% tablet. Of the mobile users, 96.4% utilised a touchscreen device, 57.6% iOS and 39.7% Android. Apple and Samsung were the most popular devices, utilised by 57.6% and 21.4% of visitors, respectively. Overall, visitor age was representative of DCM trials. Older visitors were less likely to use smart technology; only 19.8% of mobile users were 55 or older, compared to 36.3% of overall users.

Conclusions
Smart technology is commonly used by DCM patients. Any such telemedicine technology would have to be iOS and Android compatible.
When Kids Fly: Teenage SCIs from Off Road Vehicles

Miss Patricia Antcliff\textsuperscript{1}, Dr. Herndon Murray\textsuperscript{1}, Mrs. Emma Harrington\textsuperscript{1}, Mrs. Linda Smith\textsuperscript{1}

\textsuperscript{1}Shepherd Center

\textbf{Biography:}

Orthopedic Surgeon, Shepherd Center, Atlanta GA, Member of ISCOS Prevention Committee

Introduction: Injury prevention is an integral part of Shepherd Center’s Mission. In 2016, we reviewed 10 years of adolescent SCIs. Motorized off road vehicle (ORV) injuries were the 4th leading cause. Terminology for these vehicles varies widely as do the rules and regulations surrounding ridership and training. Our aim was to standardize categories for off-road vehicles, and to review these injuries.

Methods: Admissions data of 498 individuals from 2005-2015 was reviewed, including all patients aged 10-19 years old admitted with a SCI.

Results: The ORV injuries included 3 groups: All terrain vehicles (ATV), Dirt bikes, and Motor cross bikes. Twenty-eight patients were identified. Fourteen were due to ATV accidents, 7 were from dirt bikes, and 7 from motorcross racing. Eighteen were age 16 or older, but 10 were too young to have formal licenses to drive. Of the 10 too young to legally drive, 7 were injured on ATVs, 2 on dirt bikes and one in a motorcross race.

We found that regulations and education are lacking for motorized off road vehicles. In Georgia, our only law pertaining to safety states that ATVs cannot be driven on private land.

Main Points:
\begin{itemize}
  \item ORV accidents are our 4th leading cause of SCI in teenagers.
  \item Standardize nomenclature for motorized off-road vehicles.
  \item Unsupervised off road vehicle use by untrained drivers appears to be unreasonable and unsafe.
  \item There is a clear need to discuss legislation enforcing age and training restrictions to prevent catastrophic SCIs in teenagers.
\end{itemize}
Which antibiotic is recommended as the first line prophylaxis to be used with urodynamics in Spinal Cord Injury (SCI)?

Dr Aram Mashoof Fard, Dr Chalil Vinod, Dr Surendra Bandi

Salisbury NHS Foundation Trust

Biography:
Aram Mashoof Fard, MSc, MD, MRCP
Dr Aram Mashoof Fard currently serves as a consultant in spinal Cord Injuries and Rehabilitation Medicine at the Duke of Cornwall Spinal Treatment Centre (DCSTC) in Salisbury, which covers southwest and southeast of England. Her special interest is Respiratory Management of patients with Spinal Cord Injury. She serves as the clinical lead of the centre in this area. She also serves as a recognised Educational Supervisor in Wessex Deanery, in England, and supports the specialty trainees in Rehabilitation Medicine attending the DOCSTC.

Background: There is a wide variation in practice surrounding the selection, use and timing of antibiotic prophylaxis for urodynamics.

Aim: The aim of this literature review is to answer this question: What is the recommended first line prophylactic antibiotic to be used with urodynamic in patients with SCI?

Method: The MEDLINE, Embase and Cochrane Library databases were searched using appropriate search terms and Medical Subject Headings. The reference lists of the included articles were also reviewed.

Result: In a descriptive study of large neurogenic population all patients (n=626), both SCI (530 patients) and non-SCI, referred for urodynamics were given a prophylactic dose of gentamicin prior to the procedure. The incidence of post-study UTI was reported as <1%.

Double-blind randomised control study in USA chose ciprofloxacin (500mg twice a day, 2 days prior to the UDS) versus placebo in patients with SCI. Despite the trend for a lower rate of symptomatic UTI, statistical analysis did not demonstrate a significant difference.

No trial is available that has addressed comparing one antibiotic versus another, one dose of antibiotics versus another dose, one duration of antibiotic use versus another duration, one route of administration of antibiotics versus another or antibiotics versus other treatments.

Amikacin can be an antibiotic of choice to prevent post-investigation UTI.

Conclusion: This review shows a lack of good quality studies and the need for robustly conducted and sufficiently powered randomised controlled trials studying the choice, dose, route of administration and duration of antimicrobial prophylaxis.
Who what why where when: education and training needs for the management of the neurogenic bowel for spinal cord injuries

Mrs Eva Wallace¹, Ms Liz Croxon¹, Dr Eimear Smith¹, Ms Liz Maume¹
¹National Rehabilitation Hospital

Introduction:
Difficulties arise when an individual with a spinal cord injury (SCI) requires appropriate bowel care support outside a specialist spinal cord injury facility. There is often ambiguity about the procedures and training required. The acquisition of appropriate theoretical and clinical skills and knowledge is a key element that underpins neurogenic bowel management education. This training should be provided in an appropriate manner in order to foster a culture of learning, focusing on identifying key enablers and barriers to this education.

Aim:
To promote an innovative comprehensive and flexible educational programme, for all health care workers involved in the management of the neurogenic bowel for the SCI population.

Objective of workshop:
Following this workshop the delegate will have a tool kit of knowledge to:
• Design a curriculum
• Deliver a course taking into account the different adult learning styles
• Display the various modalities of neurogenic bowel dysfunction
• Value the theoretical and practical assessment process
• Discuss evaluation methods

Methodology:
The facilitator must have the academic knowledge to deliver the curriculum, and be cognisant of the latest changes in procedures, regulations or policies. Practical experiential learning opportunities will be used to enable the participants to explore the difficulties encountered by planning a course. The curriculum design should contain a blend of educational strategies which will include course content.

Conclusion:
Bowel care is a complex process. Education regarding neurogenic bowel dysfunction for SCI individuals should always be dealt with in a scientific and sensitive manner. With this in mind, a dynamic well planned evidence based training program is essential. Bowel programme training is necessary as part of our continuous professional development. The workshop will cover the ‘what why when where’ of setting up a bowel training programme for health care providers.
Introduction
One of the frequently asked questions during first consultation with SCI patients is their potential to ambulate in future.
A study (Waltors et al 1994) has shown that SCI patients with Lower Extremities Motor Score (LEMS) ≥30 achieved reciprocal gait pattern with or without stick/crutches.

Objectives
To assess whether SCI patients whose LEMS ≥ 30 achieved upright ambulation on discharge.
To identify associated factors that negatively impact on upright ambulation

Method
Retrospective review of data (AIS and SCIM) and case records.
Study criteria
All new SCI patients who were admitted to the centre over 3 years period (2013-2016) were included. Patients with incomplete AIS/SCIM assessment were excluded.

Results
138 new SCI patients were admitted. 106 patient met inclusion criteria. 60 patients had LEMS≥30 at discharge. 19 of them (31.6%) did not achieve upright ambulation.
Out of these 19 patients, 14 patients were associated with at least one or more preexisting medical conditions and 5 patients had central cord syndrome/chronic myelopathy. Their mean age is greater than that of ambulatory patients (68.4 years vs 47.4 years, P<0.0001). Their average length of hospital stay is longer (93.1 vs 60.3 days, P=0.004).

Conclusion
Not all patients with LEMS ≥30 or AIS-D achieved upright ambulation at the time of discharge. Their mean age is greater than ambulatory patients. They had one or more pre-existing co-morbidities (Odd Ratio=35.5). These factors should be considered in formulating realistic rehabilitation goals and thus reduce length of inpatient stay, and in arranging appropriate care inputs for discharge into community.
Women’s experience of sexuality after spinal cord injury

Mrs Helen Thrussell¹,², Dr Maureen Coggrave², Dr Allison Graham¹, Dr Angela Gall³, Ms Michelle Donald¹,³, Dr Richa Kulshrestha⁴, Ms Tracey Geddis¹
¹National Spinal Injuries Centre, Stoke Mandeville Hospital, ²Bucks New University, ³London Spinal Cord Injury Centre, Royal National Orthopaedic Hospital, ⁴Midland Centre for Spinal Injuries

Biography:
Helen Thrussell is an Advanced Practitioner Occupational Therapist based at the National Spinal Injuries Centre, Stoke Mandeville Hospital, UK. She has experience in spinal cord injury in-patient rehabilitation (adult and paediatric) and out-patient services. She also has a Masters degree in Advancing Spinal Cord Rehabilitation and Management.

Introduction
Research exploring female sexuality following spinal cord injury (SCI) and cauda equina syndrome (CES) is scanty and focused on pathophysiology. This study investigated women’s lived experience, needs and perceptions around sexuality after SCI.

Method
This multicentre phenomenological study recruited from 3 UK SCI centres, ensuring tetraplegia, paraplegia and CES representation. A maximum sample of 30 was planned, depending on data saturation. Semi-structured interviews explored individual’s experiences around sexuality following SCI. Interviews were recorded and transcribed for thematic analysis.

Results
Twenty seven interviews were completed. Seven themes emerged; attitudes and definitions, relationship with partner, physical implications, practical considerations, psychological implications, support and education, and menstruation. A need for increased information and support following injury emerged as a unifying explanatory concept across all themes. The desire for permission and acceptance, both to discuss and to engage in sexual activity, was raised frequently. The women expressed needing more proactive informative healthcare approaches; preparing expectations and approving sexual recommencement post injury. Societal recognition of their intimacy needs and acknowledgement of their ability to maintain a “normal” sexual relationship despite disability was sought. Loss of spontaneity and orgasm are frustrations, with bladder and bowel management, positioning, fatigue, pain and autonomic dysreflexia identified as barriers. Many expressed negative self-esteem and body image and concerns over disappointing partners.

Conclusion
Women with SCI would benefit from an open, informative healthcare approach, providing the permission they require to express, discuss and problem solve their sexuality needs during rehabilitation and beyond.
Capturing the SCI patient voice: Understanding the impact of spasticity severity on the burden of SCI patients in the UK

Mr Abdallah Abouihia, Mr Manish Desai, Ms Alessandra Gentili, Dr Shanti Thavaneswaran

Introduction:
Aim was to utilize results from a nation-wide online survey (previously reported, ISCOS 2015) to assess the impact of spasticity severity on SCI patients’ health-related quality of life (HRQoL).

Methods:
Data collected from 162 UK adults reporting SCI-related spasticity was categorized into six spasticity profiles (severities) using a matrix of spasticity frequency and severity. Correlation analysis using Spearman Rank methods were performed between spasticity profile and HRQoL measures (SF-36, EQ-5D-5L and Patient Reported Impact of Spasticity (PRISM)).

Results:
Increasing spasticity severity was strongly positively correlated to patient-reported pain score (p<0.001), Bodily Pain domain of SF-36 (p<0.001) and Pain/Discomfort domain of EQ-5D-5L (p<0.001). Increasing spasticity severity was also strongly associated with worsening of scores in SF-36 domains of Role Emotional, Social Functioning, Vitality and Mental Component Score (p<0.05). Moderate associations with increasing spasticity severity were observed for decreasing EQ-5D-5L total score and Self-Care, Usual Activities and Anxiety/Depression domains (p<0.05). The PRISM reported strong positive correlations with increasing spasticity severity in all its domains (p<0.001), except Positive Impact of Spasticity.

Conclusions:
Strong clinical associations between spasticity severity and pain are supported through statistical correlations between pain scores and HRQoL measures. The SF-36 appears to demonstrate more sensitivity to spasticity compared to the EQ-5D-5L in the SCI population with the PRISM demonstrating appropriateness as a spasticity-specific HRQoL instrument. Further research should examine the impact of earlier changes to spasticity treatment protocols including early targeted drug delivery interventions to effect improvements in clinical outcomes, HRQoL, societal participation and reduction and prevention of complications.
Epidural stimulation combined with trans-spinal DC polarization results in long-lasting increased axonal excitability

Dr Ingela Hammar¹
¹Sahlgrenska Academy Göteborg University

Biography:
MD 1994
PhD 2001
Senior lecturer in physiology

Background: Epidural stimulation is limited by low stimulus intensities tolerated by patients. The present study aimed to examine whether the excitability of myelinated afferent fibres stimulated within the dorsal columns might be increased by combining epidural stimulation with brief episodes of epidural direct current (DC) polarization.

Method: Epidural tungsten electrodes were positioned in contact with the dura mater within the L1-L3 segments in deeply anaesthetized adult rats. Nerve volleys were evoked by epidural stimuli before, during, and after cathodal DC polarization (0.8-1.0 µA). The excitability of dorsal column fibres was monitored by recording antidromic compound action potentials in peripheral hindlimb nerves. Areas of evoked nerve volleys were used as a measure of the number of excited fibres.

Results: DC polarization resulted in a highly potent increase in the number of epidurally activated fibres. The increased excitability appeared within seconds and remained elevated during post-polarization periods lasting over an hour. The mean increase in the volley area measured after 10 minutes exceeded 400% irrespective of whether evoked following DC application for 15-30 s (411±97%; n=10), 1 min (733±251%; n=23), 2 or 5 min (502±94 %).

Conclusion: Brief periods of trans-spinal DC polarization preceding epidural stimulation may be used towards improving the clinical outcome and contribute to more effective pain control and return of motor functions after spinal injuries.

* Submitted manuscript Long-lasting increase in axonal excitability following epidurally applied DC. Jankowska E, Kaczmarek D, Bolzoni F, Hammar I.
Horner’s syndrome due to cervical myelomalacia: a case report.

Dr. Elien Apers¹, Dr. Nathalie Draulans¹, Dr. Carlotte Kiekens¹
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Biography:
NO BIO

Background: Horner’s syndrome is an uncommon condition that is characterized by unilateral miosis, partial ptosis and anhidrosis. It is caused by disruption of the oculosympathetic pathway. Cervical myelomalacia is a rare cause of Horner’s syndrome.

Case description: A 22-year-old male patient, tetraplegia C3 AIS D, with a history of cervical spinal cord contusion level C3 up to C5-C6 due to polytrauma was admitted for multidisciplinary rehabilitation. Early during rehabilitation anisocoria with miosis of the right pupil was noted, without additional acute symptoms. CT of the brain showed no abnormalities. Doppler ultrasound and CT angiography of the neck showed no signs of carotid stenosis or dissection. Radiography of the chest showed no signs of a tumor in the upper chest. Our diagnosis was Horner’s syndrome due to cervical myelopathy because of disruption of the descending oculosympathetic pathway.

Discussion: In case of acute clinical presentation suggestive of Horner’s syndrome, initial imaging evaluation should include CT of the head and neck with CT angiography to exclude life-threatening lesions. If initial imaging is negative, complete imaging of the oculosympathetic pathway is recommended using MR, extending from the hypothalamus up to level T2, and MR angiography of the neck. When confronted with spinal cord lesion, we emphasize that not only the sensory and motor pathways of the spinal cord can be disrupted. One must also pay attention to different types of autonomic nervous system damage.
International Standards Committee Update

Dr William Waring, Dr Ruddiger Rupp
Medical College of Wisconsin

International Standards Committee Update – New and Discussed Changes for the International Standards.
This Course will be the first of a series of International Standards Updates that will be offered over the next year at the principal SCI annual meetings. Presentations will include updates on recommended changes and the ongoing discussions of other changes.

1. Recommended changes (pending approval by ASIA and ISCoS) Dr William Waring
   a. Delete $5^*$ = (normal) active movement, full ROM against gravity and sufficient resistance to be considered normal if identified inhibiting factors (i.e. pain, disuse) were not present
   b. Continue NT = not testable (i.e. due to immobilization, severe pain such that the patient cannot be graded, amputation of limb, or contracture of > 50% of the normal ROM)
      i. add directions that NT can be used for the sensory exam and any NT score must have a comment to describe it
   c. Use * for any non SCI motor or sensory deficits. Record the motor or sensory grade with the *
      ii. Any grade with a * must have a comment to describe it

AREAS OF ONGOING REVIEW/DISCUSSION:

2. ASIA Impairment Scale – Standards Committee Member TBD
3. Taxonomy for non-SCI motor/sensory deficits and the impact on classification algorithm – Standards Committee Member TBD
4. Non key muscle education – – Standards Committee Member TBD
5. Developing a brief SCI screening exam – – Standards Committee Member TBD
6. C5 and L2 motor level determination – – Standards Committee Member TBD
7. International Standards Research Sub-committee – Standards Committee Member TBD
8. Update on ISNCSCI Digital Algorithms – Standards Committee Member TBD
Polyuria after Spinal Cord Injury - Characteristics and Associations

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Biography:
Dr Adela Tow is a Senior Consultant rehabilitation physician at the Department of Rehabilitation Medicine, Tan Tock Seng Hospital, Singapore. After obtaining membership in internal medicine from the Royal college of Physicians UK, she continued with a fellowship in Physical Medicine and Rehabilitation at the Baylor College of Medicine, USA. Dr Tow is actively involved teaching, research and clinical care especially of spinal cord injury individuals.

Introduction:
Polyuria post spinal cord injury (SCI) is a common problem especially in those with cervical SCI. It has been associated with postural hypotension, postulated to be associated with loss of vascular tone below the injury, obstructive sleep apnoea, nephrogenic diabetes insidipus and lack of diurnal variation of Anti Diuretic Hormone (ADH).

Methods:
We describe a series of five patients with polyuria, characteristics and associated comorbidities.

Results:
All were male patients with neurological level of injury ranging from C2 to C5. Four were Asia Impairment Scale (AIS) A and one AIS D on the ISNCSCI. Urine volumes ranged from of 2.4 – 6.1 L/day, despite no excess fluid intake. They did not have fluid overload states nor were they on diuretics. Four had significant postural hypotension and two had severe obstructive sleep apnoea. Except for one patient who had hyponatraemia (122 mmol/L), biochemical evaluation was not suggestive of diabetes mellitus, other solute diuresis or diabetes insipidus nor significant electrolyte imbalance.

Conclusion:
Polyuria is relatively common and associated with risk factors and co-morbidities. Further studies to investigate the relationship with coeptin levels, a surrogate marker of ADH, are planned. Accurate and prompt identification, consideration of differentials and proper management may reduce its severity and effects.
Possible Factors That Could Affect The Functional Outcome In Patients With Chronic Spinal Cord Injury.

Professor Safak Sahir KARAMEHMETOGLU, MD Necdet Catalbas, MD Funda Hepsen Ertekin, Prof. Dr. Ilhan Karacan, Prof. dr. Halil koyuncu

1Nobel Physical Medicine And Rehabilitation Center, 2Istanbul University Cerrahpaşa Medical Faculty Physical Medicine and Rehabilitation Department, 3Bağcılar State Hospital Physical Medicine and Rehabilitation Department

Biography:
Prof. Şafak Sahir KARAMEHMETOĞLU MD. was born in Rize, Turkey in 1956. After graduating from Galatasaray high school, he attended İstanbul University Medical School and graduated in 1982. Specialisation in 1990: İstanbul University, Cerrahpaşa Medical Faculty, Department of PHYSICAL MEDICINE and REHABILITATION. He continued his academical career as Assistant Professor, Associate Professor, and Professor at the same Department (1990-2016). He became the medical director of Cerrahpaşa University Hospital (2009-2013) then Vice-Rector at İstanbul University (2013-2016). He retired and has been working since May 2016 in Nobel Medical Center. Prof. Karamemhtoğlu speaks English and French fluently.

Introduction: The aim of this study was to analyze the factors that could influence the functional outcome of chronic spinal cord injured patients (CSCIP). Methods: In this study we included 40 CSCIP who were previously rehabilitated in different facilities. In order to evaluate functional status we used Functional Independence Measure (FIM) scale. Results: The male/female ratio was 6/1. The mean age was 36 at the time of SCI. At the time of SCI, 70 % of all patients were under the age of forty. The major causes of SCI were falls (42.5 %), car accidents (35 %), gunshot (12.5 %), being struck by an object (5 %), diving accident (5 %). Fourteen patients (35 %) were tetraplegic and 102 (65 %) paraplegic. In tetraplegic patients the commonest level was C6, in paraplegics L1. The mean time since SCI was 4.9 years. The mean score of FIM was 88.9 at admission and 96.8 at discharge (p<0.0001). The analysis of this increase in FIM score showed an inverse correlation between the functional improvement and the FIM score at admission. Multiple linear regression analysis indicated that the FIM score at admission was an important predictor of the functional improvement. However, age, gender, SCI duration, SCI cause and SCI level were not significant predictors. CSCIP with low scores of FIM at admission improved better than those with higher scores. Conclusion: We concluded that CSCIP could improve in their functional status even years after sci. Gender, age, level, cause did not adversely affect this improvement.
Navina® Smart – a new option for transanal irrigation in treatment-refractory neurogenic bowel dysfunction

Professor Anton Emmanuel¹, Dr Valentina Passananti¹, Dr Amanda Raeburn¹, Dr Jonas Gripenland², RN Malin Nordin², Professor Claes Hultling²

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A severely limiting consequence of spinal cord injury (SCI) is constipation and faecal incontinence, termed neurogenic bowel dysfunction (NBD). Transanal irrigation (TAI) is established as a key therapy when conservative bowel care measures fail. However, upto 50% of patients are unable to tolerate TAI.

We aimed to investigate safety, treatment adherence, patient satisfaction and perception of Navina™ Smart, a novel TAI therapy.

Twenty-eight NBD patients (17 female, mean age 52 (24-73), 19 SCI) currently practicing TAI were recruited. Patients were trained to use Navina (featuring automated balloon inflation and water pump), and followed up at week 1 and 2 by telephone and at week 4 in person with a Patient Reported Outcome questionnaire. Safety of the Navina™ Smart system was assessed by questioning and self-report.

There were no adverse events linked to the use of Navina™ Smart. Nineteen patients (68%) completed 4 weeks of TAI per protocol (PP). Fourteen (74% PP and 50% intention-to-treat, ITT) reported a desire to continue with TAI using Navina™ and 12 (63%PP, 14/28 of ITT) reported complete or adequate satisfaction with therapy. Seventeen (89%PP, 61%ITT) found preparation of the Navina™ system easy or very easy.

From this first clinical study of Navina™ Smart System we identified no safety concerns, and that handling was easy for the majority of patients. The device was well accepted and effective in three-quarter of patients that continued for 4 weeks. This is especially relevant in a patient group, as included here, who were dissatisfied with their existing TAI treatment.