Introduction: A spinal cord injury (SCI) is a severe condition causing changes in almost all aspects of life. Accordingly, studies have shown lower quality of life, poor social participation, and higher levels of psychological morbidities among individuals with SCI compared to the general population. There is, however, a considerable share who adjusts well to their new life circumstances. The degree to which a person finds acceptance of the injury has been associated with favorable adjustment. However, much of its importance relies on theory rather than systematic empirical evidence. The issue within this research field is that acceptance is often subsumed into the construct of coping. This results in a rather unfocused research field. It also makes it difficult for the research field to move in a united direction to solve its methodological and conceptual limitations. The present study aims to address these challenges by providing a systematic review of the evidence of acceptance’s relationship with psychosocial adjustment outcomes.

Methods: Systematic searches were conducted in five online databases. Quantitative empirical studies investigating the association between acceptance and psychosocial adjustment in an adult population of spinal cord injured persons were included. Data was synthesized qualitatively.

Results: Higher degrees of acceptance were related to greater quality of life, well-being, life satisfaction, social adjustment, positive psychological growth, and with lower levels of depression, anxiety, and PTSD. Acceptance was not related to pain adjustment and neither relationship satisfaction nor sexual adjustment had been investigated. The findings indicated the presence of mediators and moderators, and that time since injury had an impact on the associations.

Conclusions: Individuals with a higher degree of acceptance showed a more favorable adjustment process following a SCI. Furthermore, acceptance might function as a catalyst initiating a process of favorable adjustment while not maintaining the same direct influence as time goes on.
Improving Clinical Care through use of the Sacral Autonomic Standards

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Poster Presentation Day 1, September 13, 2018

Outline

Presenters will discuss use of the sacral autonomic standards for version 2 and the proposed version 3. In this interactive workshop participants will be educated in performance of the standards and their clinical and prognostic value. Three common clinical cases will be discussed by each presenter to explain how code the standards with respect to bladder, bowel and sexual function. The course will end with the audience having three cases to test themselves on and the presenters will discuss the correct responses and prognostic concerns.

Intro: Alexander-5 min
De-15 min

Physical and Neurologic Examination and Bladder Function

Sacral function,

The autonomic standards with regards to lower urinary tract function will be reviewed. Indications for urology referral based on mechanism of injury, physical exam, and specific signs. Reasons for urodynamics, key components and what happens during a urodynamic study will be discussed from the patient standpoint and basic interpretations will be made of tracings. Common cases will be reviewed regarding lower urinary tract function.

Slocum-15 min

Neurologic Function and Retention of Voluntary Bowel Function

Literature relating neurological exam and bowel function will be reviewed. Pathophysiology of the distal bowel and surrogate metrics (sensory and motor) of autonomic control of the distal bowel will be reviewed. Attention will be dedicated to “red flags” that require further evaluation both acutely and months or years after SCI initial injury. Common cases will be reviewed regarding bowel function.

Previnaire-15 min

Reflex Responses and Fertility Concerns

The bulbocavernosus reflex (BCR) is useful to test integrity of the sacral reflex arc. The BCR helps distinguish upper motor neuron (UMN) lesions from lower motor neuron (LMN) lesions, which has important prognostic and therapeutic implications for bowel, bladder, and sexual function. With regard to the sexual function, men with LMN lesions (absent BCR) are poor responders to penile vibratory stimulation for ejaculation and phosphodiesterase inhibitors for erectile dysfunction.

The dartos reflex (DR) is a somato-autonomic reflex that depends on the T11-L2 sympathetic segment. Stimuli such as local cold will produce unilateral elevation of the testis with vermicular contraction of the scrotal skin and penile retraction. A recent study showed that patients with a lesion of the T11-L2 and absent DR were more prone to retrograde or absent ejaculation and loss of psychogenic erection. Common cases will be reviewed regarding reflexes.

Alexander-15 min

Using the neurologic exam to maximize sexual pleasure

The ISNCSCI exam and sacral reflex testing can be used to determine the potential for psychogenic and reflex arousal and orgasm after SCI. Furthermore, the autonomic standards and determining a person’s actual versus projected sexual responses can help determine the need for treatment. Common cases will be reviewed regarding arousal and orgasm.
Educational Cases
30 min.
To summarize the course, three additional cases will be presented for the audience to test their knowledge of the sacral autonomic standards. Subsequently, the presenters will discuss scoring of the cases and how this information can help determine prognosis for recovery of bladder, bowel and sexual function after SCI.
Electrical Stimulation for treating pressure ulcers: A Cochrane Systematic Review

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Poster Presentation Day 2, September 14, 2018

Introduction: Pressure ulcers (PU) are a disabling consequence of immobility. There is an initial evidence to suggest that ES is therapeutic. This is based on small number of non-Cochrane reviews and clinical guidelines; however, it is not clear whether these recommendations are justified because the reviews and studies that they are based upon have methodological limitations. Therefore we undertook this systematic review to determine the effectiveness of ES for the treatment of PU and to know quality of the evidence that underpins any recommendation for ES.

Methods: Randomised controlled trials were included with no restrictions with respect to language, date of publication or study setting. In May 2017, a thorough search was conducted as per the Cochrane standards. Two review authors independently selected trials for inclusion, extracted data, and assessed risk of bias. There were 4 primary and 4 secondary outcomes of interest (e.g. proportion of PU healed, time to complete healing of PU and adverse events). Meta-analyses were conducted and the quality of the evidence for the main outcomes was assessed using GRADE.

Results: We identified 166 records from the electronic searches. Of these, 17 studies with 932 PU (772 participants) met the inclusion criteria. ES may slightly increase the proportion of PU healed when compared to control (RR 1.84, 95% CI 1.26 to 2.68). The evidence was downgraded to low quality. It is uncertain whether ES decreases the time to complete healing of PU when compared to control (HR 1.06, 95% CI 0.47 to 2.41). The evidence was downgraded to very low quality. It is uncertain whether ES has associated adverse events when compared to control.

Conclusions: ES may slightly increase the proportion of PU healed (low-quality evidence) but its effect on time to complete healing is uncertain (very low-quality evidence), compared to no ES.
A useful process of translation and validation of the ISCoS international Quality of Life and Activity & Participation basic data sets into Swedish

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Poster Presentation Day 1, September 13, 2018

INTRODUCTION:
Since 2012 the International Spinal Cord Society (ISCoS) has developed data sets that will facilitate consistent collection and reporting of areas affecting a person with a Spinal Cord Injury (SCI). None of the datasets have previously been translated into Swedish. The objective was to describe the process of translating and validating the ISCoS basic data sets, Quality of Life (QoL) and Activity & Participation (A&P) into Swedish.

METHODS:
Based on the ISCoS recommendations for translating the data sets, a process in finally six steps was used. An expert group of professionals and persons with SCI were assembled to scrutinize the first translations but also for content validation related to the understanding and clarity of the items and cultural adaptation, during two consensus meetings.

RESULTS:
The translations were time consuming, especially the A&P data set. However we found a few steps that can be improved to minimize the time of the consensus group meeting.
The main concerns emerging from the content validation related to the understanding and clarity of some of the basic data sets items.

CONCLUSIONS:
By describing the process of translating and validating this basic data set, as well as adding a few steps, we might be able to facilitate further translations of ISCoS data sets in non-English speaking countries, a work that is crucial to enable national and international comparisons between different SCI units. The QoL and the A&P basic data set can be feasible in the Swedish context. The Swedish version will be available for healthcare professionals to use for quality monitoring and for research.
Effect of applying Functional Electrical Stimulation current on the Bladder to control Urinary Infection in Thoracolumbar SCI Patients

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Poster Presentation Day 2, September 14, 2018

Introduction and Aims:
The rate of prevalence of Spinal Cord Injuries is almost 40 individuals in one million in society per year. Urinary infection is one of secondary effects of Spinal Cord Injuries due to dysfunction of sacral plexus and disability of adequate drainage of the bladder. Based on clinical experiences by strengthening of the bladder’s muscle and improvement in power of muscle contraction in some patients with Functional Electrical Stimulation, the amount of residuary inside of the bladder decreases and suitable place for microorganisms’ growth is eradicated, so it can lead to reduce the rate of infection.

Methods and Materials:
10 patients with Thoracolumbar SCI with average age of 42 years old (4 ladies and 6 men) that had been passed around 6 to 10 months of their injuries participated in this semi-experimental study were randomized into two control and intervention groups. According to physicians’ description both groups’ Antibiotics were suspended for one month and during each 10 days susceptibility with Antibiogram was checked and results were recorded. No Electrotherapy determined treatment was performed in the control group other than simple TENS, but patients in intervention group were affected by Functional Electrical Stimulation current for 15 minutes per day for one month. All data were recorded in SPSS and were analyzed with Friedman test.

Results:
Infection levels during the days of study increased significantly (p=0.01) in the control group, while it was not significant in intervention group (p=0.36). In other words to be infected procedure in intervention group with Functional Electrical Stimulation significantly decreased

Discussion:
Achievements of this study confirmed the positive and considerable effect of Functional Electrical Stimulation to reduce the rate of infection in incomplete Thoracolumbar SCIs. It is recommended to repeat this process on more patients with different level of Spinal Cord Injuries.
Comparison the effect of Triangular IDC and Functional Faradic Stimulation in remedy of Gas& bowel incontinency in Incomplete SCIs with positive bulbocavernosus reflex by applying intra-anal and Sacral plexus stimulation

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Poster Presentation Day 1, September 13, 2018

Introduction and Aim: One of the most important problems of the SCI patients other than their movements’ difficulties is disability to control bowel and Gas which in terms of physical and mental conditions affect the patients’ active daily living. Due to sacral plexus weakness in transmission of the spinal impulses and also because of incomplete SCI by existing of Bulbocavernous reflex ,applying intra-Anal stimulation by intra-anal Electrode can be effective if this electrode stimulates the anal sphincter with IDC current(Triangular IDC).Our researches in some patients indicated that the ability of controlling gas and bowel can be better and optimal if the mentioned current be used for treatment, so this current regarding to good results in some same neurological disorders compared with Functional Faradic Stimulation was used in these cases.

Methods and Materials: 2 groups of SCI patients with thoracolumbar incomplete SCI were selected randomly ,each group included 5 SCI patients from both sex of male and female which suffered from bowel and gas incontinency, between the age of 19-55 years old with positive Bulbocavernous reflex. In group number 1, treatment was done with Triangular IDC with one intra-Anal electrode and one electrode located up to injury site and stimulation was applied for 15 minutes with IDC by these Characteristics ,Triangular IDC with Hold/Rest time respectively 300ms and rest time 700ms.In group Number 2 treatment was done by applying FES current same to first group's electrode positioning but different in applied current. Stimulation with FES was applied for 15 minutes by these characteristics,300 micro-s Pulse duration, 75 Hz Frequency and 10s Hold/Rest time .In both groups treatments were continued for 3 months 3 times a week.

Results: After 3 months results achieved from both methods indicated improvement in Anal Sphincter contraction in the first group which reflected the positive effect of Triangular IDC on gas and bowel incontinency. Patients in anal entrance sensation were feeling better and more aware of bowel drainage and setting the frequency of defecation. Needle and Finger tests were better than the second group.

Conclusion: This study showed applying Triangular IDC compared with Functional Faradic Stimulation in Incomplete SCIs suffering from gas and Bowel incontinency by presence of bulbocavernosus reflex with the same electrode positioning one electrode up to lesion site and another intra anal electrode achieved better functional results. So due to limitation in study samples it is recommended to repeat this study with a sufficient number of samples again.
Effects of Electrical Stimulation on Treatment of Pressure sores in Subjects with Spinal Cord Injuries :A Case Series Study

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Introduction: Unsatisfactory results of conventional medical treatment methods for pressure sores in patients with spinal cord injury (SCI) have instigated the use of non-medical treatments, such as electrotherapy. However, the risk of burning in exposure to direct current (Galvanic) and contradictory propositions on the best applicable electro therapeutic current during the method have prevented widespread application of electrotherapy. The purpose of this study was to show the effects of High-Voltage Pulsed current (HVPC) on the treatment of pressure sores resistant to routine medical treatment practice.

Materials and methods: The case series study involved the analysis of 8 SCI subjects with grade 3 and 4 pressure sores around the pelvic area. All the subjects received HVPC electrotherapy for 12 daily sessions, during which the negative electrode placed on the wound and the positive electrode was placed 20 cm distal to the negative electrode. The treatment time was kept at 20 minutes per treatment session. Single session was performed each day for 12 consecutive days. The wounds were photographed at day 1 before starting the treatment, on day 6, and finally, on day 12 after the treatment. The area of wound on each of these days was calculated with the help of the AutoCAD Software.

Results: The results obtained after 12 consecutive days of electrotherapy indicated that the wound size of the studied SCI subjects reduced by 56.87 percent of wound size (the wound surface) has been reduced.

Conclusion: The results confirmed positive effects of HVPC electrical stimulation for healing SCI associated pressure sores in patients resistant to the routine medical approaches of treatment. Moreover, HVPC application was found to accelerate the healing process in these subjects.

Keywords: Electrotherapy, Electrical Stimulation Current, High-Voltage Pulsed (HVPC), Pressure sore, Spinal Cord Injury, Wound Healing
Triple IDC Therapy (TIT) Method in Treatment and Rehabilitation of Incomplete Spinal Cord injuries

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Poster Presentation Day 1, September 13, 2018

Introduction: For many years due to wars and car accidents as well as work incidents, the rate of prevalence of Spinal Cord injuries was rising and we faced high percent of SCIs. For about 20 years all around the globe physiotherapists have worked to find effective method to solve these problem “Does Spinal cord repair itself”, “Is it possible to find a way to repair an injured spinal cord”, but there wasn’t definite and satisfying answers.

As a researcher who has worked for many years on SCI’s Rehabilitation I think an appropriate Electrotherapy can play an helpful role for Rehabilitation of SCIs. All Physiotherapists know Interrupted Direct Current, one of the most effective electrical currents which is used for nerves treatment after some microscopic surgeries and some neural system disorders. We all know about the effect of IDC on the nerve structure and its effectiveness on injured nerves. After some researches on this current I could reach to some results listed below:

1. We often forget to stimulate the spinal cord directly as well as forgetting to stimulate muscles under the injury site from the up level of the injury.
2. We also suffice to apply exercise therapy as Rehabilitation of SCIs

So I decided to use IDC directly on the spinal cord and named the method of myself as TIT ment “Triple IDC Therapy”.

Methods and materials: What is the TIT method as the main part of our project? This method consists three main part of electrode positioning from the skin surface:

1. Up to lesion to down to lesion.
2. Up to lesion to myotomes.
3. Direct to lesion to myotomes.

These three parts work simultaneously during a range of one and half ours to two ours and stimulate the Spinal Cord and myotomes. Patient has 4 electrodes on the Spinal Cord and two electrodes on the myotomes from the skin surface and each myotome is stimulated for five minutes until the last myotome up to down.

Stimulation protocol: Triangular IDC must be the main current, pulse duration needs to be between 50 to 70 ms and interval inter pulse must be 700 ms, it must be considered that intensity of current is better to be seen as a muscle weak beating contraction and overally the time of contractions varies regarding the level of injury. Physiotherapist must be noticed by increasing the thickness of the pads of the electrodes the risk of skin burning is decreased almost to zero. 8 incomplete patients randomly were selected into to groups which each group contains 2 men and 2 ladies. The first group was cured by TIT method and for the other one exercise therapy was only done three times a week for 6 months.

Results: Muscle anthropophy avoidance and active muscles contraction were appeared in the group which were cured by TIT method but no meaningful changes were seen in the other group.

Conclusion: Based on these achievements we noticed that applying TIT method for incomplete SCIs can hopefully helps to incomplete patients to be cured in comparison to traditional exercise therapy.
Background: The majority of patients with spinal cord injury (SCI) experience bladder related problems that may lead to failure in achieving the primary goal of bladder management: preserve the function of urinary tract, prevent infections with low-pressure urine storage and voiding. An evidence based bladder management program compatible with the patient/caregiver life style and preference and available resources can ensure quality of health services and enhance quality of life among the people with SCI.

Objectives:
To identify and engage professionals to promote evidence based practice in bladder management in SCI patient; to reflect on the results from the baseline audit; to undertake a follow-up audit in to assess compliance with evidence and identify strategies to sustain care

Methods: This project was conducted in the nursing department of a spinal rehabilitation center in Kavre, Nepal. Evidenced based 8 audit criteria were developed based on Joanna Briggs Institute (JBI) evidence summary. A baseline audit was conducted among 20 patients and/or their caregivers, and eight staff (nurses and paramedics) using the JBI Practical Application of Clinical Evidence software (PACES). It was followed by identification of barriers and development of strategies to improve the process. A follow up audit was conducted using the same criteria and same 8 staff, but other 20 different patients /caregivers.

Result: The baseline audit- audit criteria less than 50% achieved, indicating poor compliance with the current evidence. After the implementation of the strategies, which included staff training; modification of the existing documentation system and patient/caregiver education materials; revision of the existing protocol for bladder management; weekly audit of documents; assigned nurse educator, there was significant improvement in compliance in follow up audit.

Conclusion: Clinical audits can improve quality of healthcare especially in low and middle resource setting.

Keywords: neurogenic bladder, spinal cord injury, LMIC
Spinal Cord Injury: a shift in paradigm?

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Poster Presentation Day 2, September 14, 2018

Introduction: Historically, the incidence of traumatic (tSCI) was higher than non-traumatic spinal cord injury (nontSCI) and affected mainly young adults. However, this paradigm seems to be changing.

Methods: This study is a descriptive and retrospective study of 433 consecutive individuals admitted to first inpatient rehabilitation program, from January 2010 to December 2015. Neurological examination and SCI classification was conducted according to the ASIA criteria and the FIM scale was used to assess functional status.

Results: in this sample, there was a tendency for increasing the incidence of nontSCIs throughout this period (48% in 2010 to 68% in 2015). Of all patients, 66.7% had a nontSCI (n=289), 255 (58.9%) were male. In both, the more prevalent age group was 66-80 years old; however, in tSCI there was also a peak between 36-50 years old. The tSCI were more frequent in man (73%), while nontSCI present a male/female ratio 1:1. Thoracic was the injury level more frequent in nontSCI, while cervical was the most frequent in tSCI (47%), being AIS D the most frequent in nontSCI, and AIS A in tSCI. In nontSCI the most frequent etiology was degenerative (39%), followed by neoplastic. In tSCI the most frequent etiology were falls (58%), followed by traffic accidents (32%). There was a better FIM outcome in tSCI than in the nontSCI (p<0.05). There is no significate difference in FIM outcome concerning to age. In both groups, the average FIM gain after rehabilitation was higher when the admission was precocious.

Conclusions: it seems to be a shift in the paradigm of spinal lesions. With population growing older, degenerative disease was more prevalent. This data represents an expected tendency in western countries. However, the average FIM gain reveals that the earlier rehabilitation, the more relevant the functional gains, in spite of the etiology of the lesion.
Self-reported satisfaction with life, health and well-being: a pilot comparison between persons with non-traumatic and traumatic spinal cord injury.

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Poster Presentation Day 2, September 14, 2018

Introduction
Incidence of non-traumatic spinal cord injury (NTSCI) in Australia is higher than traumatic spinal cord injury (TSCI). The demographic profile and rehabilitation experiences are different between these groups, and there is minimal information known about the long term health and well-being outcomes, especially for the NTSCI cohort. This pilot study compared the self-reported satisfaction with life, self-reported health, and well-being, between people with NTSCI and TSCI.

Methods
Participants were recruited through online advertisements. The Satisfaction with Life Scale (SWLS), and the Short Form 36 Health Questionnaire (SF-36) were used to assess self-reported satisfaction with life, health and well-being. Data were analysed using descriptive statistics, correlations analysis and the Mann-Whitney U-test to investigate differences between groups.

Results
Of 43 surveys sent, 41 were completed and returned (NTSCI: n = 14; TSCI: n = 27). Total Satisfaction with Life was slightly lower for those with NTSCI (M = 15.9, SD = 6.8) compared to those with TSCI (M= 19, SD = 6.1), but there was no significant difference (p= 0.13). There were no significant differences on seven of the eight domain scores of the SF36. The TSCI group had a significantly lower score on the Physical Functioning domain (p = 0.18).

Conclusion
Apart from differences on the Physical Function domain of the SF36, people with NTSCI and TSCI have more in common than differences on the outcomes included in this pilot study. Further investigation to gain greater understanding of the commonalities and differences between these two groups, and other overall predictors of life satisfaction, and health and and well-being is warranted.
Understanding the factors that influence social and community participation as perceived by people with non-traumatic spinal cord injury.

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Poster Presentation Day 2, September 14, 2018

Introduction
The number of people with non-traumatic spinal cord injury is rising in developed countries such as Australia, Canada, the USA and Great Britain. People with non-traumatic spinal cord have different gender, injury and age related profiles compared to those with traumatically acquired spinal cord injury, therefore their lived experience is likely to be different. However, the specific issues and challenges that this group faces have not been well investigated.

Methods
Semi-structured in-depth interviews were conducted with seventeen adults with non-traumatic spinal cord injury. Interviews were audio-recorded, transcribed verbatim and analysed using thematic analysis.

Findings
The factors that influenced the social and community participation of people with non-traumatic spinal cord injury were grouped into three broad areas: person factors, factors in the physical and institutional environment, and factors in the social or cultural environment.

Conclusions
The findings from this study inform the understanding of health professionals, funders, service providers and policy makers regarding the social and community participation of people with non-traumatic spinal cord injury and how this can be facilitated. Assisting people with non-traumatic spinal cord injury to participate in meaningful social and community based activities is important to maximise their quality of life.
The development of a taxonomy for indexing clinical documents in the rehabilitation of individuals with spinal cord injury at the Swiss Paraplegic Centre Nottwil

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Introduction:
In the daily clinical routine, it is essential to be able to find specific information from work instructions, checklists and training documents. These are organized in quality management systems (QMS) or can be found in working files of individual occupational groups. In order to be able to retrieve information swiftly, a well-directed search function in the documentation system is required. Often different terms are used for the description of one specific information in clinical documents. The lack of a common, comprehensive technical language complicates the search for relevant documents and negatively affects the application of knowledge in clinical practice as well as the quality of care.

Methods:
A working group of the Swiss Paraplegic Centre (SPC) set the goal to develop a specific spinal cord injury (SCI) taxonomy. Descriptors were selected based on the ICF Core Set for SCI, technical terms from MESH, SCIRE, SCI REHAB, the nursing intervention catalogue (NIC) and the therapy intervention catalogue (TIC) as well as SPC-specific terms were used. The taxonomy was reviewed in consensus workshops.

Results:
The taxonomy is based on the categories of the ICF Core Sets for SCI and allows to index the QMS documents and working files. This supports the efficient application of documented knowledge in clinical practice and increases the search hits of relevant documents.

Conclusion:
After indexing our QMS documents, it is necessary to investigate whether an improvement in relevant search results has been achieved and whether the documented knowledge can be applied easier in daily clinical practice.
Use of mobile exoskeletons in clinical practice in central Europe

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Poster Presentation Day 2, September 14, 2018

Introduction:
Over the last five years exoskeletons were advertised more aggressively and brought into clinical use. A recent systematic review (Mehrholz et al 2017), concluded that no evidence based recommendation for the use of these devices in the treatment of spinal cord injury can be given. This study presents the results of a survey conducted among the members of the PT committee of DMGP, covering the majority of SCI centers in Germany, Switzerland and Austria.

Material and Methods:
A standardized survey of the clinical use of mobile exoskeletons was conducted among the members of the PT committee of DMGP in order to retrieve information about the number of patients treated in the individual SCI centers and the average number and duration of treatment sessions, as well as the actual setting of the treatment.

Results:
Out 16 SCI centers use exoskeletons in clinical practice, 9 supplied data. The response to the survey accumulated data of 83 patients. This type of therapy is mostly available for inpatients (77%). Individual centers treated an average of nine patients annually, an average of 16 (2 – 60) treatment sessions were completed. To perform the treatment, two therapists were necessary in most cases (80%). Patients included were clinically rated as AIS A in 27%, B 15%, C 45% and D 12% of the cases. Motor learning (51 cases), muscle tone (21) and improvements of quality of life (8) were the main indications given.

Discussion:
More and more clinical institutions employ mobile exoskeletons for the therapy of SCI patients. Various therapeutic concepts have been developed stratified according to the indication. Indications as well as technical possibilities are still limited resulting in an quite low number of qualified for this therapeutic modality.

Conclusion:
The Results of this study suggest that the therapeutic use of an exoskeleton is a decision based on the individual needs of the patient and can only be seen as an add-on to the regular clinical rehabilitation strategies.
Early Anti-inflammatory Pharmacotherapy Reduces Expression of Pro-Inflammatory Cytokines and Attenuates Atherosclerotic Disease in ApoE Knockout Mice with SCI

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Poster Presentation Day 1, September 13, 2018

Introduction: Chronic Spinal cord injury (SCI) in humans increases risks for and hastens development of atherosclerotic disease (AD). We examined whether SCI hastens inflammatory risks and rates of AD lesion formation in double ApolipoproteinE knockout mice (ApoE-/-), and whether Salsalate (NF-κB inhibitor) anti-inflammatory pharmacotherapy slows AD lesion formation.

Methods: 56 16-week old ApoE-/- mice underwent severe (65 kDyne) contusion SCI (T9), and were then randomized to 3 groups: SCI, SCI + Salsalate [120 mg/Kg/day i.p.] and SCI + Vehicle, and sacrificed at 20-, 24-, and 28-weeks of age. A surgical control group underwent laminectomy alone (sham). Whole blood was collected, centrifuged (5,000xg, 15 min), and the serum stored at -80C. Inflammatory cytokines (IL-1β, IL-6, and TNFα) were analyzed using a Mouse Cytokine Panel (32 analytes; EMD Millipore). Hearts and aortas were harvested intact, fixed, and prepared en face. The aortic tree was stained with oil-red-O for blinded histomorphometric calculation of AD lesion area.

Results: IL-1β, IL-6, and TNFα were significantly greater in SCI mice than sham at 20-, 24- and 28-weeks. SCI + Salsalate significantly reduced cytokine expression from SCI mice at all time-points. Aortic arch AD lesion area was significantly greater in SCI animals than sham controls at 24- and 28-weeks. Salsalate treatment significantly attenuated the increase of lesion area observed following SCI, although lesion area was still greater than controls at these time-points. (All p’s<0.05).

Conclusions: We provide first evidence in a pre-clinical model that SCI accelerates inflammatory risks and AD lesion formation, and that early anti-inflammatory treatment may attenuate the impact of SCI on AD progression.

Support: Supported by the Craig H. Neilsen Foundation, #340428.
A Descriptive Study on Adult Cervical SCIWORA Patients and Associated MRI findings in a Tertiary Hospital

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Poster Presentation Day 2, September 14, 2018

Introduction
Scientific interest in SCIWORA is growing, with most investigations focusing on the relationship of MRI findings with clinical outcome. Despite the increased routine use of MRI, even in low-resource settings, its role in disease management and predicting outcome remains unclear. Establishing baseline data on SCIWORA particular to the study hospital as a spinal cord injury regional center was considered an important first step for further research. The study aimed to describe the clinical features and MRI findings of cervical SCIWORA adult patients in a tertiary hospital.

Methods
A retrospective study was done via a database search for adult cervical SCIWORA patients from the period of June 1, 2014 to September 30, 2017. Chart review was utilized to extract clinical data and MRI findings. Findings from the MRI official printed reports were categorized under extraneural, intraneural or combined extra- and intraneural abnormalities using an MRI classification system. Descriptive analysis was presented using frequency distribution, mean and range and standard deviation.

Results
A total of 58 patients (57 males, 1 female) were included. AIS-C (55%) and AIS-D (59%) were the majority AIS scores on admission and discharge, respectively. Type IIc (81%) was the most common MRI type representing a combination of extra- and intraneural abnormalities, while cord edema (88%) and spinal stenosis (62%) were the most common intraneural and extraneural finding, respectively. AIS scores improvement was more prevalent for incomplete SCIs, particularly AIS-C; isolated extra- or intraneural MRI findings; and isolated cord edema or cord contusion.

Conclusion
The majority of the results have supported what previous investigations have described on the demographic and clinical characteristics, neurologic outcome and MRI findings of adult SCIWORA patients. Results have revealed a possible correlation between MRI findings and clinical outcome for SCIWORA warranting further research.
Not ‘if’, but ‘when’ and ‘how’: case studies on early intervention vocational rehabilitation and returning to work after spinal cord injury

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Introduction:
Early intervention vocational rehabilitation (EIVR) aims to preserve long-term career development after spinal cord injury by supporting an earlier re-entry into the workforce. Theoretically, EIVR capitalises on pre-existing skills and occupational bonds, while enhancing return-to-work motivation during primary rehabilitation. However, questions remain about the readiness of the participants to consider return-to-work and the most effective VR functions or services. This study aimed to explore the consumer’s perspective of EIVR and their work-related attitudes, and how these factors changed during the initial six months post-discharge from hospital.

Methods:
Three case studies from an EIVR program, utilising a longitudinal design to explore employment trajectories and changes in readiness over time. Data was collected at discharge, three months and six months post-discharge. Interpretive Phenomenological Analysis was used to explore the themes for each time point.

Results:
Attitudes at discharge were characterised by uncertainty, primarily relating to the physical capability and potential inaccessibility of the workplace. Motivation was high, and it was taken for granted by participants that employment would eventually occur. Over time, confidence and readiness increased in response to physical gains, and new career directions were identified.

Conclusions:
EIVR supports motivation and clarity during the initial stages of rehabilitation. Emotional readiness, physical confidence and vocational counselling/information are the three main components to RTW following recent discharge from the hospital.
Electrical stimulation in a clinical setting

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Poster Presentation Day 1, September 13, 2018

Learning objectives:

This workshop will focus on different forms and parameters of electrical stimulation that are being used based on the available scientific evidence.
1. The audience will gain knowledge about the benefits and drawbacks associated with the different forms and the stimulation parameters of electrical stimulation.
2. The audience will be able to distinguish between planning an aerobic FES and planning strength-training NMES sessions as well as other the main indication of less recognized forms of electrical stimulation (long pulse width stimulation (LPWS) and epidural stimulation).
3. The audience can use this information to plan sessions in the clinical practice based on specific goals determined for each individual with SCI according to their specific physical characteristics and limitations.

Outline of the workshop:

Vanesa Bochkezanian (45-minute presentation):

After a spinal cord injury (SCI) the voluntary activation of the muscles below the level of the lesion is reduced and this can reduce muscle force production, impair physical function and compromise physical health status. This presentation will start with a basic introduction on the use of electrical stimulation in the clinical practice including the different pulsed currents and time-dependent attributes for pulse currents and the main aims when changing any of these parameters. Recent findings on how these stimulation parameters need to be modulated differently in persons with SCI will be presented. The latest evidence about the effects of different parameters of NMES and FES to improve muscle force and mass, physical health, quality of life and reduce symptoms of spasticity in persons with SCI will also be presented. At the end of the presentation the audience will be invited to discuss the content, ask questions and provide feedback.

Ashraf S. Gorgey (45-minute presentation):

Different forms of electrical stimulation are currently used for muscle conditioning and restoration of locomotion in persons with SCI. The basic physiological and clinical principles of these forms are still obscured to the clinicians. This section of the workshop will primarily introduce these forms of electrical stimulation and their current applications including surface neuromuscular electrical stimulation (NMES) /functional electrical stimulation (FES), long pulse width stimulation (LPWS) and epidural stimulation. The workshop will focus on applications of NMES /FES and LPWS that have been widely used to restore muscle size, improve cardio-vascular metabolic health, decrease spasticity and improve quality of life after SCI. However, little is known about the stimulation parameters and how these can be manipulated to optimize performance in clinical practice. Moreover, clinicians are still uncertain about the accurate dosages to attain physical health benefits described in the current literature. This workshop will demonstrate our current knowledge using video movies performed at the clinic. Moreover, the workshop will summarize the existing
evidence on how stimulation parameters may influence muscle activation, evoked torque, fatigue and spasticity. The discussion will allow the opportunity to ask questions and provide feedback from the clinical practice experience. Guidance and supervision will be provided and discussions about different case studies will be prompted.
Intrathecal Baclofen Treatment (ITB) for Patients with Spinal Cord Injury (SCI) in Hungary

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Poster Presentation Day 2, September 14, 2018

Summary:
In Hungary the intrathecal pump device for drug administration became available in 1999 for patients with severe muscle spasticity for which other treatments were not effective. At the moment there are 21 patients under our continuous care including patients from other Centres in the country. The device should be changed every 6 years, 12 patients have required 1 change, 10 patients required 2 changes. In 5 cases we used “flex dose”, the others received continuous infusion. The aim of this publication is to summarise our results.

Methods:
Retrospective analysis between 1999 and 2018. The case mix was as follows: Gender: 17 male, 4 female; The age at the time of pump implantation: 26-66 years, average 41.5 years; Clinical symptoms: 11 paraplegia, 10 tetraplegia; Etiology of injury: 18 accident- further detailed 11 RTA (road traffic accident), 4 falls, 2 criminal, 1 sport, and 3 neurological disease – 1 tethered cord, 1 discus hernia, 1 Multiple Sclerosis; The level of plegia: C2: 1, C3: 1, C4: 2, C5: 2, C6: 1, C7: 3, T1: 1, T4: 3, T5: 1, T7: 2, T8: 2, T9: 2; ASIA IS: A -8, B – 9, C – 3, D – 1; the time between the injury and pump implantation: 2-15 years, average 2.5 years.
We evaluated the effectiveness of the treatment with the MAS and the FIM.

Results: In all cases ITB treatment decreased the severe spasticity; therefore it significantly improved both the overall care and the patient independence. The pre-implantation MAS decreased following implantation from 4.2 to 1.8 in average. The FIM scores increased from 73.6 to 90.0 in average, in tetraplegic cases the increase was +9.2, in paraplegic cases cases it was +20.0.

Conclusions: In our practice with appropriate patient selection intrathecal Baclofen treatment reduces spasticity effectively safely, and significantly improves the patient’s condition.
Social impacts of bowel and bladder dysfunction

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Poster Presentation Day 1, September 13, 2018

INTRODUCTION
Bowel and bladder dysfunction have been raised as priority secondary health conditions for improvement by people with spinal cord injury (SCI). The aim of this study was to describe the experiences of bowel and bladder dysfunction on social activities and relationships in people with SCI living in the community.

METHOD
This qualitative study was conducted with people living with SCI who experienced bowel and bladder dysfunction. Participants were recruited through the Australian Quadriplegic Association Victoria. Semi-structured interviews were undertaken with purposively selected participants to ensure representation of age, gender, SCI level, and compensation status. A thematic analysis was performed.

RESULTS
Twenty-two participants took part in the study. Bladder and bowel dysfunction impacted on relationships due to issues with intimacy, strain on partners, role changes for family and friends, and difficulty with visiting and travelling. A lack of understanding from friends about bladder and bowel dysfunction caused frustration, as this impairment was often responsible for variable attendance at social activities. Issues with the number, location, access, and cleanliness of bathrooms in public areas and in private residences, negatively affected social engagement. Social activities were moderated by illness, such as urinary tract infections, rigid and unreliable bowel routines, stress and anxiety about incontinence and managing in the public environment, and due to continuous changes in plans related to bowel and bladder issues. Social support and adaptation fostered participation in social activities.

CONCLUSION
Significant tension exists between managing bowel and bladder dysfunction and the desire of people with SCI to participate in social activities. Multiple intersecting factors negatively affected the social relationships and activities of people with SCI and bowel and bladder dysfunction, in particular health, psychological and emotional states, and the attitudinal, social and physical environment.
Keeping Clinical Practice Guidelines up to Date: Resource Cost and Reflections on the Process

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Poster Presentation Day 1, September 13, 2018

Introduction

Clinical Practice Guidelines (CPGs) are usually updated every two to three years, potentially resulting in recommendations being outdated. Furthermore, this updating can be resource-intensive. Screening smaller amounts of literature more regularly may overcome these limitations. This pilot study aimed to evaluate feasibility of a ‘living’ guideline process for the CanPainSCI Rehabilitation Clinical Practice Guideline for Management of Neuropathic Pain after Spinal Cord Injury, and estimate resource costs.

Methods

An interdisciplinary, Australian-Canadian project team was formed comprising CPG methodologists and CanPainSCI CPG developers. Recommendations pertaining to pharmacological interventions for managing neuropathic pain were the agreed focus. A working team identified new studies, extracted data and appraised study quality. An expert panel then determined the influence of new evidence on the CPG recommendations. This process was conducted twice to examine the relative resource costs of searching over two time periods: 21 months and 10 months. All team members’ time and hourly rate was recorded.

Results

Ten new studies were identified – four in the first search and six in the second. No guideline recommendations were modified based on these new studies. Resource cost and team experiences and reflections will be reported.

Conclusion

This is the first known study to quantify the resource cost of a living guideline process. Living guidelines may provide an alternative to traditional guideline updating. However, further research is needed to quantify the cost of traditional and more comprehensive living guideline updating.
The New Zealand (NZ) approach to pressure injury (PI) prevention and management in people with spinal cord injuries (SCI)

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Poster Presentation Day 1, September 13, 2018

Introduction

New Zealand introduced a comprehensive no-fault accident compensation corporation (ACC) in 1975. The objective was to separate liability from the needs of the injured person to obtain rapid access to treatment, rehabilitation, and compensation when needed. Injuries sustained from delivery of health care are covered by the ACC system, with specific caveats. These are called treatment injuries or consequential injuries.

Problem statement

PI’s are estimated to cost the ACC scheme about $NZD40 million per annum. The majority of this cost is linked with SCI clients.

As part of our national approach in May 2017 the Guiding Principles for Pressure Injury Prevention and Management in NZ was released. During development we identified the need to better understand PIs in SCI clients, and was the rationale for this research.

Methods:

We organised 3-day visits to five New Zealand regions. A semi-structured interview was developed to elicit information about a wide range of factors contributing to PIs in this population. 60 face to face interviews were held with SCI clients, their whānau/caregivers, health care providers, and relevant stakeholders. A thematic analysis was completed to inform New Zealand’s national approach in this population.

Findings

- PIs negatively impact serious injury clients through severe impairment, loss of function and independence.
- Previous work has explained the role of clinicians and carers in preventing PIs. This research identified the potential role clients can play in PI prevention and management.
- To support participation in PI prevention, SCI clients are likely to need help with health literacy, confidence, and advocacy.
- Health care professionals need consistent use of risk assessment to identify clients in most need of support, and the need for timely coordination of these supports.
Microscopic investigation of urine collected from patients with a recent spinal cord injury: a pilot study

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Poster Presentation Day 1, September 13, 2018

Introduction: Following spinal cord injury urinary bladder emptying is initially managed by an indwelling catheter (IDC). Current guidelines recommend early transfer to intermittent catheterization (IC), which has a lower risk of symptomatic urinary tract infection. In this study, the natural history of urine was monitored by microscopy in recently injured patients that were continually manage with an IDC or were transferred to IC.

Methods: Microscopy was used to investigate urine samples collected during a ~4-week period from recently injured patients. The patients were managed with IDCs throughout the observation period (n = 7) or transferred to IC during the observation period (n = 9).

Results: In the IDC group, 5 developed asymptomatic bacteriuria (n = 4) or candiduria (n = 1) that was associated with pyuria. One of the remaining 2 patients in the IDC group had no organisms or pyuria in their urine for most of the study period but developed a symptomatic UTI at the end of this period. In the IC group, 2 of 9 patients had bacteria (n = 1) or candida (n = 1) in urine collected from the IDC just prior to starting IC. During the period of IC, all the patients studied developed asymptomatic bacteriuria that was associated with a low level of pyuria (i.e. lower than that seen in patients using an IDC throughout the study period).

Conclusions: These findings suggest there are high levels of asymptomatic urine infections in patients managed with either IDC or IC, but that IC does reduce the level of inflammation that is associated with these infections. High levels of asymptomatic bacteriuria have also been reported in patients using IC in the community. Importantly there are reports that asymptomatic bacteriuria may protect against symptomatic UTI.

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Poster Presentation Day 2, September 14, 2018

Introduction
Appropriate and timely bladder management is key in reducing urinary tract infection (UTI) rate in spinal cord injury (SCI) patients. Patients with a spinal cord injury (SCI) are at increased risk of developing urinary tract infections (UTI) during their acute admission. This can extend length of stay and may cause interruption to rehabilitation. These delays and setbacks lower patient morale, disrupt rehabilitation, place increased demand on acute hospital bed capacity and increases overall costs. The aim of this study was to determine which method of bladder drainage was associated with the lowest incidence of UTI.

Methods
A retrospective file audit was completed of patients admitted to the Victorian Spinal Cord Service (VSCS) with a new SCI during 2012 – 2014. Data collected included patient demographics, SCI level, bladder management and diagnosis of UTI defined as bacteriuria (≥10² colony forming organisms/mL) with clinical signs of infection.

Results
143 patient files were audited. 36 (25%) were female, median age was 42 years. An indwelling urethral catheter (IUC) was the initial bladder management for all patients before appropriate alternative bladder management strategies were initiated. Median duration post SCI before trial of alternative bladder management was 58 days. 55 (38%) patients using IUC developed a UTI, at a rate of 8.7/1000 inpatient days. When the IUC was removed and alternative bladder management initiated, the UTI rate halved (4.4/1000 inpatient days). The respective UTI rate for these strategies was self-ISC (27%), voiding on sensation (6%), IUC reinsertion (38%), SPC (29%), and reflex voiding (25%).

Conclusion
Substitution of IUC with either ISC or SPC was associated with a reduction in UTI rate. This audit reinforces the importance of early IUC removal, to maintain bladder health, allow consideration of and initiate the most appropriate alternative bladder management in patients with a newly acquired SCI. These results have informed future research and improvement activities in Victoria, focussed on harm minimisation.
CLEAN INTERMITTENT CATHETERIZATION: A PERCEPTUAL ANALYSIS AMONG HEALTHCARE PROFESSIONALS

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Poster Presentation Day 2, September 14, 2018

INTRODUCTION We conducted a survey investigating the opinions of italian health practitioners (HP) about clean intermittent catheterization (CIC).

MATERIALS AND METHODS In 2017 80 HP of Uro-Rehabilitation Centres answered a computer assisted web interview. The questionnaire investigated the patients (pts) needing CIC, the choice criteria between indwelling catheter (IC) and CIC and training practices.

RESULTS All HP (average age 46 years, nurses 80%) answered the questionnaire. CIC is used in 66% of cases of urinary retention (UR), IC in 27% and CIC plus nocturnal IC in 7%. More than 45% of pts is over 56 years old (7% older than 76 years); the percentage of pts over 56 years old reaches 50% in urology units. Manual skills, appropriate cognitive functions, adequate anatomical and functional conditions are the main features that lead to CIC. The conditions that required CIC are iatrogenic/idiopathic UR in 32% of cases and neurogenic bladder in 68% - due to SCI (29%), multiple sclerosis (MS) (22%), peripheral lesions (9.5%) and spina bifida (7.4%) -. There are more pts needing CIC for iatrogenic/idiopathic UR in urology units (44%) than in rehabilitation centres (2%), where 81% of CIC is done for SCI. CIC training is performed by the nurse in 94% of centres. An average of 3.6 sessions of training of an average duration of 32 minutes are required for each pt. In urology units the average number of sessions is lower than in the rehabilitation centres (2.5 versus 5.9) and is balanced by the average length of a single session (36 versus 22 minutes).

CONCLUSIONS CIC is preferred to IC in most cases of UR (73%). The causes of UR and the age of pts needing CIC are increasing, probably due to life lengthening. Different causes of neurogenic bladder are becoming relevant apart from SCI, first of all MS and peripheral lesion.
Sexual life and motherhood will after spinal cord injury: our experience

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Poster Presentation Day 1, September 13, 2018

Introduction
Sexuality in persons with physical impairment due to spine cord injury (SCI) is affected by level of injury, complications caused by injury itself, psychological issues and cultural hedges.

Methods
90 women, hospitalised in our spinal cord unit between 2002 and 2013, age from 15 to 83 years, 45 in fertile age, 19 tetraplegic, 71 paraplegic, were informed about sexual life after SCI. After one year from SCI they filled a questionary about sexual behaviours, motherhood will and pregnancy.

Results
20 patients told that they kept their relationships with the same partner, 5 began a relationship with a new partner after a break up, 5 became widowers and they did not begin a new relationship, 6 women were already widowers before of the SCI. 45 told that they did not have sexual intercourses after SCI, 50 told hat they did not have sexual intercourses already before of the SCI. All of the women in fertile age told about motherhood will, they were also worried of pregnancy, birth and in raising children from a wheelchair. 3 women had a child after SCI.

Conclusion
Sexuality after SCI is neglected by women during hospitalisation, so troubles of sexuality emerge only if elicited. This experience helps to focus this theme in order to face sexuality and motherhood in women after SCI. Sexual life after SCI has to be managed in rehabilitation program.
Reactive stepping ability in individuals with incomplete spinal cord injury

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Poster Presentation Day 1, September 13, 2018

Background: Up to 75% of individuals with incomplete spinal cord injury (iSCI) experience ≥1 falls every year, often while walking.¹ One way to prevent a fall after losing one’s balance is to take a reactive step. Our objective was to compare reactive stepping ability of individuals with iSCI to sex- and age-matched able-bodied (AB) adults and young AB adults (18-35 years).

Methods: Thirty-eight individuals participated: 12 with iSCI (9F), 12 sex- and age-matched AB adults, and 14 young AB adults (7F). Participants donned a harness and adopted a forward lean with approximately 10% body weight support through a horizontal cable attached to a rigid structure at waist height. The cable was released unexpectedly to simulate a forward fall. Behavioral responses were observed (i.e. single step, multi-step, fall) and motor response timing of the stepping leg (i.e. foot-off, swing time, foot contact) was calculated from force plate signals and a load cell signal attached to the horizontal cable.

Results: The behavioral responses of the participants with iSCI were significantly different from that of AB participants (χ²=43.8, p<0.01); participants with iSCI showed fewer single steps and more multi-steps and falls. Average timing of foot-off (p=0.371), foot contact (p=0.191), and swing of the stepping leg (p=0.186), were not significantly different between groups.

Conclusion: Individuals with iSCI have reduced ability to take reactive steps compared to AB individuals, as demonstrated by the higher frequency of multi-steps and falls. These behavioral differences, however, are not attributed to motor response timing in the stepping leg.

¹Brotherton et al., 2007
Funding: Ontario Neurotrauma Foundation - Rick Hansen Institute
Never give up!- the spinoplastics motto

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Never give up! – The spinoplastics motto

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BACKGROUND
Charcot spinal arthropathy (CSA) is a serious complication of chronic spinal cord injury clients (SCI) associated with increased morbidity. Pressure injuries (PI's) are not uncommon in this setting of increased neurological loss. We report on the complex spinoplastics service management challenges of a client with CSA related PI’s.

CASE
Our patient, a 66-year-old female with a longstanding T4 sensory incomplete paraplegia for over 3 decades was diagnosed with a T11 CSA for which she underwent surgical stabilisation in an external hospital. Her post-operative state was complicated by a stage 4 sacral PI and thoracolumbar surgical wound dehiscence after which she was transferred to our service. Multiple unstable co-morbidities including osteomyelitis, obesity, diabetes mellitus, provoked thromboembolic phenomenon, malnutrition, lymphedema, anxiety, chronic bilateral shoulder pain, untreated osteoporosis, claustrophobia posed significant challenges in the management of her wounds and her ability to pressure relieve. In addition her bowel management required novel methods of management including flexiseal and transanal irrigation to prevent faecal contamination of wounds. She required a total of 310 days of spinoplastics service input including 275 days of inpatient stay with multiple debridements and gluteal flap surgery and navigating her complex social circumstances to achieve a successful outcome of healed wounds, improved self management and discharge status.

CONCLUSION
CSA in a patient with established SCI can be associated with high risk for PI. Rigorous bowel management, timing of surgical intervention when medically optimised and a specialised multidisciplinary spinoplastics service achieved a good outcome for our patient.

References
The telehealth journey

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The telehealth journey

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INTRODUCTION

The RNSH Spinal Cord Injury Unit commenced an augmentation of its current statewide service delivery and existing outpatient services through the model of Telehealth care. Telehealth model is aimed to be part of current readmission avoidance strategies for in-patient care including ventilator dependent quadriplegic patient annual reviews and complex client post discharge follow-up.

METHOD

Telehealth delivered through live audio-visual (AV) consultation at RNSH outpatient clinics commenced in Oct 2015. Rollout evolved from a single laptop and real time communication (webRTC) software to four AV stations. We report on the journey with the use of telehealth model of care over the last 26 months.

RESULTS

A total of sixty-eight video calls were conducted over 26 months. Nature of the consults focused on pressure injury management (82%) and spinal injury surveillance including post discharge reviews (18%). Teleheath activity varied from 1-10 video-consultations/month with an average of two/month. Technical issues including dropouts were present in less than 20% of the consultations and decreased with the regular use of test calls. Considerable travel logistics for clients was saved, given that 50% of the patients were based in rural areas. There were zero cancellations/no-shows in the teleconsults. High degree of satisfactions reported by both clinicians and clients with this manner of consults and all were willing to repeat the same on future occasions.

CONCLUSION

The telehealth model of care is now amalgamated into usual outpatients care at RNSH spinal unit with many successful patient and clinician outcomes.

REFERENCES

The success of flap surgery

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The success of flap surgery

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BACKGROUND AND AIM(S)
Pressure ulcers are one of the most common complications affecting people living with spinal cord injury (SCI). There is a tremendous need to improve the care of these largely preventable complication so that those who are affected are impacted for the shortest time possible. Myocutaneous flap surgery is often performed electively after conservative management has failed.

METHOD
Myocutaneous flaps performed in an elective setting at the spinal unit through the spino-plastics service over a 5 year period were reviewed for their inpatient characteristics. The number of flaps, period of hospitalization (LOS), duration and location of wound needing flap, complications encountered, deviations from usual seating protocol and end outcomes including discharge destination were analysed.

RESULT(S)
The number of flaps per year vary from 10-15 which is approximately 30% of the referrals received. The average LOS is 43 days, majority of wounds requiring flap were grade 4 (73%) and located on ischial tuberosity (83%) for at least 120 days prior. Surgical site wound dehiscence is commonly encountered in at least 50% of patients and appears to be supero-medial margin of flap. Seating protocol was often delayed to 4 weeks post-surgery and most clients tolerated six hours of seating at discharge. 30% of clients required reconditioning and further inpatient rehabilitation post discharge.

CONCLUSION(S)
Myocutaneous flap closure has a successful outcome for a SCI client for wound healing, return to seating and discharge if done within the context of a planned service approach.

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1. Canadian Best Practice Guidelines for the Prevention and Management of Pressure Ulcers in People with Spinal Cord Injury
Usefulness of Palmitoylethanolamide in Neuropathic Pain

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Poster Presentation Day 1, September 13, 2018

Background: Neuropain is defined as “Pain Caused by a lesion or disease of the somatosensory Nervous System”. Elderly Patients generally have highly incidence of chronic and neuropathic pain condition. Chronic pain is a major public health problem, which can adversely affect a patient's overall health-related quality of life including physical and emotional functioning. Palmitoylethanolamide (PEA) is a cannabimimetic compound with tissue protection and anti inflammatory activity.

Objectives: To evaluate the efficacy and safety of palmitoylethanolamide in neuropathic pain.

Methods: The Study was conducted in the Neurosurgery unit of Gandhi Medical College Hamidia Hospital Bhopal for the treatment of Pain.

Result: We have studied 220 patients with Palmiges PEA for 60 to 70 days in a doses of 354 mg three times a day. PEA was associated with greater pain reduction in Study group compared to the controlled group who were treated with gabapantin and pregabalin.

Conclusion: PEA seems to be useful and safe in the treatment of neuropathic pain and it is well tolerated. Large controlled trials are further needed to prove its efficacy and reliability Palmiges reduces the inflammation in Neuropathic Pain, which results in lowering/ reduction of neuropathic pain.

Keywords: PEA, Palmitoylethanolamide, Neuropathic Pain, Efficacy, Analgesics.
Effectiveness of Cerebroprotein Hydrolysate in Acute Spinal Cord Injuries (SCI) and its Outcome.

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Poster Presentation Day 2, September 14, 2018

Abstract:-
Spinal cord injury is a disastrous disease that can occur following motor vehicle accidents or falls that inflicts damage to the cells that are present within the spinal cord. Depending on the magnitude and severity, SCI could result in the quadriplegia/tetraplegia, paraplegia and other lifetime disabilities. Anyone who survived such injury used to live with morbidity and other complications. Cerebroprotein hydrolysate is a unique neurotrophic drug which has unique neurotrophic activity. Some clinical evidence suggest that Cerebroprotein may be beneficial for many neurological conditions, acute and chronic stroke, brain trauma, diabetic neuropathy, and other neurodegenerative disorders. Though some evidence is available concerning the effect of Cerebroprotein on spinal cord injury. We evaluated the effectiveness of cerebroprotein hydrolysate in Acute Spinal cord injury.

Objectives:- To study the effectiveness of Cerebroprotein Hydrolysate in Acute Spinal Cord injury and its Outcome.

Methods:- Present study was undertaken at Surgical Unit of Gandhi Medical College Bhopal to evaluate the effectiveness of cerebroprotein hydrolysate on functional (sensory and motor) outcome in patients with moderate and severe SCI. Total 200 patients were included in the study and were divided into two groups. Group I (100 patients) received cerebroprotein hydrolysate. Group II as a control (100 patients) received only conventional therapy (steroids+methylcobalamin).

Result
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.

Conclusion:- The outcome of SCI treated with Cerebroprotein Hydrolysate depends more on the patients age, severity of the SCI, level and type of the injury and patients selection then on the drug treatment and surgical treatment. There was a significant results in terms of functional outcome in cerebroprotein hydrolysate treated patients.

Key Words:- Neuroprotection, SCI, Spinal Cord Injury, Quadriplegia, Paraplegia.
"International Days" are celebrated to mark important aspects of human life and history. Beginning from 2016, International Spinal Cord Society (ISCoS) along with its 19 affiliated societies has decided to observe ‘Spinal Cord Injury Day’ on 5th September every year with the intention of increasing awareness amongst the general public. It is presumed that the awareness would facilitate an inclusive life for persons with disability and ensure greater chances of success of prevention programs.

First World SCI Day was observed on 05th September 2016, with events organized in 25 countries across the globe. The events were conducted in countries including Argentina, Bangladesh, Belgium, Canada, Cambodia, China, Costa Rica, Czech Republic, Denmark, Finland, Greece, Cyprus, Honduras, India, Myanmar, Nepal, New Zealand, Netherland, Norway, Portugal, Romania, Spain, South Africa, United Kingdom and Uruguay.

Second World SCI Day was celebrated with the theme ‘Yes We Can’ on 5th September, 2018. The theme was chosen to highlight the ability amongst disabilities of persons with SCI. Social integration and awareness amongst general public and administrators would help uplift the condition of persons with SCI. People would be able to understand the importance of prevention programs better and thus help disseminate the information amongst masses. The events were conducted in countries including, Bangladesh, Belgium, Cambodia, Canada, Germany, India, Latvia, Myanmar, Netherlands, Norway, Peru, Romania, Serbia, South Africa, Tanzania, Thailand and Turkey.

ISCoS has been working to contact with world bodies including UN, WHO, UNICEF, etc. to declare 05th September as an official ‘International SCI Day’.
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 those who are injured. While road traffic crashes (RTC) are the leading cause of SCI globally, in low and middle-income countries (LMIC) falling from a height is the 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 years. Research showed that the relative frequency of RTC-related SCI did not change significantly during the period 1975 to 2009. However, the relative frequency of fall-related SCI over the same period increased significantly. It is therefore essential that optimal strategies for preventing falls be identified and incorporated into action plans for implementation across specific regions. The workshop will discuss the changing epidemiological profile of SCI, necessitating the need to deliberate on this topic, brainstorm prevention strategies and strategy to effectively translate interventions at a population level.

Separate propositions for Preventing SCI due to low and high Falls will be formulated based on responses to a questionnaire circulated to all ISCoS members. Proposed draft plans will then be circulated to Prevention Committee members for comments/suggestions and revision prior to being presented in the workshop. Discussions during the workshop will identify different contextual barriers and facilitators for implementation of a Falls Prevention strategy, as well as key stakeholders to involve in the country and regional implementation planning process. The finalized plan will be circulated amongst all stakeholders for implementation in their region of work.

- Epidemiology of SCI: The changing profile of causation from RTC to Fall: Bonne Lee (10 minutes)
- Framework to develop a Global Falls Action Plan: Rebecca Ivers (10 minutes)
- Strategies and proposed plan to prevent SCI due to low falls: Vanessa Noonan (10 minutes)
- Strategies and proposed plan to prevent SCI due to high falls: H S Chhabra (10 minutes)
- Panel Discussion: Deliberations on action plans for Preventing SCI due to Falls: All speakers (45 minutes)
- Summary and take home message (05 minutes)
Timing of Surgery in Spinal Cord Injury- Do we have an evidence based consensus?

Dr Abhinandan Mallepally¹, Dr Raj Singhal², Dr Patrick Kluger³, Dr Hans Josef Erl⁴, Dr Francois Theron⁵
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Abstract: Acute traumatic spinal cord injury (TSCI) is a devastating ailment leading to significant morbidity and mortality. Prognosis for neurologic improvement in complete TSCI patients remains poor. The timing and benefit of surgical decompression after an acute TSCI is one topic that lacks definitive guidelines. Both primary and secondary injury mechanisms are involved in the pathogenesis of acute TSCI. The primary mechanism is usually irreversible, and occurs at the time of injury. Subsequent to the primary injury mechanism, the secondary cascade results in further damage to the spinal cord. These mechanisms include ischemia, electrolyte imbalance and lipid peroxidation. The secondary injury provides a window of opportunity since it can be prevented and reverted. The biological rationale for early treatment is to attenuate secondary TSCI mechanisms in clinical setting. Earlier many experts advocated against early surgery in traumatic spinal cord injuries, especially high cervical injuries, since acute systemic trauma, the need for life saving interventions and hemodynamic/respiratory instability (physiological instability) may further compromise patients’ recovery. However modern methods of intensive care trauma management including respiratory and hemodynamic resuscitation permit such victims to sustain surgery with a very little difference in complication rates from non-operative cases. Now there is growing body of evidence that optimum neurological outcome is possible if patients can undergo early surgery. Thus many experts are now advocating early surgery. This symposium is designed to review the current scenario of timing of surgery in acute TSCI patients and make suitable recommendations.

In the workshop the published data in regard to the timing of surgery for spinal cord injured from various clinical and preclinical studies will be presented. The recommendations of the panelists in this regard in the present day scenario will then be put forth.

Technical requirements: 1 LCD projector capable of handling input from laptop computers will be needed.

The contributing participants and their role is as below:
-Introduction to workshop (05 minutes)
-Definition of timings: Raj Singhal (07 minutes)
-Rationale of early surgery: Patrick Kluger (07 minutes)
-Summary of preclinical data - Hans Joseph Erl (12 minutes)
-Summary of clinical data - Francois Theron (12 minutes)
-Panel discussion: Is early surgery the standard of care in Acute Traumatic Spinal Cord Injury
Moderator: Abhinandan Reddy
Panelist: All faculty (40 minutes)
-Carry home message (SCS- STSG Consensus statement): (07 minutes)
Can currently available classification systems for thoracolumbar spine injuries be uniformly applied for low lumbar fractures: Expert Survey

Dr Abhinandan Mallepally1, Dr Harvinder Singh Chhabra2
1 Indian Spinal Injuries Centre, Delhi, India, 2 Indian Spinal Injuries Centre, New Delhi, India

Introduction: Lumbar spine has a unique anatomy. It is a mobile segment. Posterior elements experience a more compressive force since centre of gravity passes through it leading to lesser degree of kyphosing force. Due to these reasons, low lumbar fractures (L3–L5) may behave differently. Hence some experts have felt that these fractures cannot always be managed in same manner as fractures in thoracolumbar spine and a separate classification system needs to be developed. The study was conducted to obtain opinion of experts on whether currently available classification systems used for thoracolumbar spine injuries can be uniformly applied for low lumbar fractures.

Methods: An online monkey survey was conducted during February-March 2018 using specially designed questionnaire. Members of Spine Trauma Study Group of International Spinal Cord Society and other spinal injury experts were approached, and responses were analysed.

Results: Twenty five spine experts responded. Most (96.00%, n=24) were involved with education and research. Low lumbar fractures constituted 10-15% of spine trauma treated by the experts. AO-Magerl classification was more commonly used (68%, n=17) followed by Denis classification (36%, n=9). AO Spine Thoracolumbar Classification System was more practically implementable in day-to-day practice (54.17%) followed by AO-Magerl (33.33%) and Denis system (33.33%). Existing classification systems did not serve all desired objectives and experts (n= 23, 92%) felt there were shortcomings in existing classification systems. 54.17% (n= 13) experts felt the need for a newer classification system for low lumbar spine fractures that would be better implementable practically in day-to-day clinical practice, better guide treatment, be more reliable, incorporate other modifiers influencing treatment and be more comprehensive.

Conclusion: Expert opinion was almost evenly divided on the need for developing a separate classification system for low lumbar fractures. A more detailed exercise would be needed to come to a conclusion.
Many fatal injuries may be prevented or their severity reduced by adequate prehospital trauma care. The major benefits of prehospital care are realized during the second phase of trauma, when the timely provision of care can limit or halt the cascade of events that otherwise quickly leads to death or lifelong disability.

The World Health Organization (WHO) estimates that 5.8 million deaths annually are attributable to injuries, 90% of which occur in less and least developed countries with mortality rates expected to increase as these nations further develop, urbanize, and industrialize. In addition, an overwhelming proportion of these deaths occur before patients even reach the hospital. Management of trauma is a neglected field in developing nations. The governments in less and least developed countries have been attempting to establish and strengthen prehospital emergency medical systems that can provide patients with prehospital basic life support (BLS) and transportation to higher care. Unfortunately, prehospital trauma care is not available to most of the world’s population.

Epidemiological studies of spinal cord injuries (SCI) in developed countries show 70% as ‘incomplete’ and rest as ‘complete’, which is reverse in less and least developed countries. Speculated reasons include the awareness regarding SCI and the mode of evacuation of victims from the accident site. The first handlers of accident victims lack knowledge about evacuation and immobilization of injured victims. The training and dissemination of knowledge may help in proper evacuation and subsequently change in epidemiological profile of SCI in these countries.
Spinal Cord Injury rehabilitation and pressure ulcer prevention in post-earthquake Pakistan

Dr Jawad Chishtie1, Prof Dr Farrukh Chishtie4, Prof Karen Yoshida2, Prof Robert Balogh3

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Poster Presentation Day 1, September 13, 2018

Background
The 2005 South Asian earthquake resulted in more than 700 people getting traumatic spinal cord injury (TSCI). Pakistan’s health care system was overwhelmed, and had little to provide towards the TSCI population. Although there were many temporary institutional rehabilitation approaches, one collective’s program (Subh-e-Nau Disability Program for Spinal Cord Injury and Dysfunction) transitioned towards a community based rehabilitation model in 2006 in the Muzaffarabad district, in rural and low resource settings. The Program addressed the needs of 117 people with TSCI in Muzaffarabad district, and was evaluated in 2010. One of the major findings were the low prevalence of PUs.

Methods
This cross sectional study elicited recall of PU prevention education, from 33 randomly selected persons with TSCI, from a total sample of 117. The main outcome measures included retention of knowledge, practices and the prevalence of PUs over the last year. Other respondent characteristics such as associated wheelchair mobility and home environmental conditions were also studied.

Results
All 33 persons with TSCI reported being trained by the program outreach team. Almost all (32) correctly recalled “danger signs” for preventing and seeking immediate help from the Program team. Thirty two persons recalled postural change timings in bed but their practices were varied. Most persons with TSCI (27, 82%) reported no pressure ulcers over the last year. Amongst these, most (26, 85%) were mobile on their wheelchairs within their homes, and getting outside if the environment allowed, even in this remote hilly area.

Conclusion
The reported low PU prevalence in persons with TSCI points to the importance of community based approaches, especially prevention education in geographically challenging settings. The research also addresses a gap in literature on PUs, which is mostly limited to hospital based cohorts studied within the first year of the 2005 South Asian Earthquake.

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Background
In response to the 2005 South Asian Earthquake, Subh-e-Nau, a local collective started a community based rehabilitation (CBR) program in 2006 in Muzaffarabad district, where most persons with traumatic spinal cord injury (TSCI) resided. There were 117 persons with TSCI in the program, which was evaluated in 2010 for effectiveness and its perceived value.

Methods
This cross sectional study mainly comprised of 3 data sources: 1. Interviews with persons with TSCI; 2. Interviews with caregivers; 3. Resource mapping for available services. A random sample of 33 persons with TSCI and 12 attendants were selected. Resource mapping consisted of identifying facilities in the district through public and private partners. Interviewees were also asked for value they placed on the program services.

Results
The evaluation reports on outreach visits, involvement of the team members, trainings, and resources available. Training components and intervention effectiveness outcomes included: wound care, bladder and bowel management; ADLs and mobility. Interestingly, the most valued components were peer to peer counseling and home care trainings. The overall impact of the program was cited as “high,” with about 10% of the TSCI population switching to a vocation and improvement in self management skills. The major limitations included: nutrition, narrow focus of the Peer to Peer Counseling, sexual rehabilitation and self evacuation trainings for bowel management.

Conclusion
There is a wide gap in literature related to CBR approaches especially from the TSCI population after the massive 2005 earthquake. The evaluation provides a unique insight of a community based rehabilitation program in resource constrained, hilly terrain of northern Pakistan. The program adapted to the needs on ground, with trainings as a main intervention to avoid recurrent secondary health complications. The research also offers lessons on the weaker links in administering a rehabilitation program in such settings.
Research versus Quality Improvement: Methodological and Ethical Considerations

Ms Jennifer Coker
Craig Hospital, Englewood, United States

Research is defined as “a systematic investigation designed to develop or contribute to generalizable knowledge” while Quality Improvement (QI) is defined as “systematic and continuous actions that lead to measurable improvement in health care and health status of targeted patient groups.” Evidence-based practice (EBP) is the use of the best evidence available in order to ensure the best outcomes for patients. Research and QI work together with EBP in crucial ways, but have important distinctions, and there is often disagreement about which is the most appropriate methodology to use. Research and QI differ in ten key ways: intent, study design, mandate, effect on program or practice, population, benefits, dissemination of results, use of placebo, and deviation from standard practice. Protections of human subjects requirements are typically clear when it comes to research studies, but may be less defined for QI projects. This poster will describe the differences between research and QI, how the requirements for human subjects review differ for each, and how to determine which is best for answering the research question of interest. Decision charts and study scenarios will be provided in order to generate discussion between the presenter and audience. An example is a recent study that looked at the effect of the timing of indwelling catheter removal on number of urinary tract infections in inpatients with spinal cord injury (SCI): the study was determined to be a QI study (all inpatient records were reviewed, results applicable to our hospital only) that also required human subjects oversight (identifiable patient information collected). It is important to be able to identify the nature of a study to ensure compliance with ethical considerations in order to generate the best evidence to improve outcomes for people with SCI.
What is remote? An analysis of spinal cord injury demographics in the Northern Territory

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Poster Presentation Day 2, September 14, 2018

We intended to audit the Specialist Spinal Nurse Supports (SSNS) database to build an understanding of the demographics of spinal cord injury (SCI) to guide service provision, future data collection, and direct future research in the Northern Territory (NT).

A low risk ethics clearance was obtained from Menzies School of Health Research and de-identified data from the Top End and Central SSNS was organised into the following categories – Cause, Location, Level of Remoteness, Age, Years Since Impairment, Gender, Funding Source, Indigenous Status, and Impairment. Level of remoteness was determined using the Modified Monash Model (MMM).

175 people are accessing SSNS in the NT, 135 are in the Top End and 40 in the Central regions. The majority of people identified are male (69%). 53% live in urban Darwin which is classified MMM2 (Inner/Outer Regional), the remaining 47% live throughout the NT which is classified as MMM6 (Remote) or MMM7 (Very Remote).

The 2016 Census Population data reports that 25% of the NT population identify as indigenous. The current study found that 42% of those accessing SSNS identify as indigenous.

53% of people sustained their SCI due to trauma. 11% of cases were due to non-traumatic cauda equina, 7% spina bifida – myelomeningocele, 7% epidural abscess and 3% tumour. The remaining 19% were due to other less common causes. 67% of people are publicly funded, 28% compensable, 5% unknown.

A more consistent approach to data collection would improve data quality but the current data gives an initial understanding of some demographics across the NT.

Almost half of people accessing the SSNS in the NT reside in remote or very remote settings, and Indigenous Australians are overrepresented amongst this group.

Spinal services in the NT need to be culturally appropriate and resourced to enable access and delivery in remote settings.
Successful treatment of Obstructive Sleep Apnoea in people living with tetraplegia: Three case studies

Mrs Susan (Sue) Cross¹, Mr Paul Subong¹, Dr Allison Graham¹, Prof David Berlowitz², Ms Marnie Graco², Dr Rachel Schembri²

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Poster Presentation Day 2, September 14, 2018

Introduction:
Obstructive Sleep Apnoea (OSA) is highly prevalent in people with tetraplegia. The recognised treatment for OSA is Continuous Positive Airways Pressure (CPAP). The CPAP prevents obstruction by splinting the airway open, reducing sleep arousals. CPAP is delivered via a nasal or face mask. It is not well tolerated in the general population, typically only 50% of patients achieve the recommended minimum usage of 4 hours 5 nights a week. People with tetraplegia face additional challenges e.g. inability to don/doff the mask themselves. For those able to tolerate the therapy, the effects are dramatic, as demonstrated by these three case-studies:

Case 1: Male C4A
‘I used to fall asleep all the time, it was embarrassing’
He has used his machine 6 hours a night for the last 6 years. ‘it has changed my life.’

Case 2: Male C6A
‘I used to wake up at night with my heart racing, I was putting on weight, and I was feeling tired while driving’
On CPAP therapy, ‘I am alert. It’s like someone has flicked a light switch’

Case 3: Female C3D
Diagnosed with OSA on first admission following injury and started on CPAP. 2 years post discharge her sleep service conducted a follow-up oximetry sleep study, showing an Oxygen Desaturation Index of 4, and recommended that she stop CPAP. She started feeling tired and needed an afternoon nap every day. Polysomnography sleep study showed an Apnoea Hypopnoea Index of 27, indicating moderate OSA. She restarted CPAP, and now does not need an afternoon nap.

Discussion:
These cases demonstrate that CPAP therapy can be effective for people with tetraplegia. As in the general population, a key factor in achieving compliance with treatment is improved daytime functioning; people who experience less daytime sleepiness with therapy are more likely to continue to use the device.
Clinical lessons learnt from participating in a trial of auto-titrating Continuous Positive Airway Pressure (CPAP) treatment For Obstructive Sleep Apnoea After Acute Quadriplegia

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Poster Presentation Day 1, September 13, 2018

Introduction:
The prevalence of obstructive sleep apnoea (OSA) in quadriplegia is 2-5 times higher than in the general population (Short 1992). OSA is a direct consequence of acute quadriplegia and affects 80% of quadriplegics in the first year after injury (Berlowitz 2005). The consequential neurocognitive deficits are likely to substantially prolong rehabilitation and reduce future independence. The usual treatment for OSA is continuous positive airway pressure (CPAP), however reports of CPAP treatment in quadriplegia in uncontrolled studies are extremely disappointing. The NSIC was a participating site in the COSAQ project: a prospective, multi-centre randomised controlled trial of CPAP for OSA after acute quadriplegia. This poster presents a review of the clinical use of CPAP by participants following the trial. Long term untreated OSA is associated with increased cardiovascular risk and reduced quality of Life.

Methods:
Acute patients with traumatic quadriplegia admitted to the spinal rehabilitation centres within one year of injury were invited to take part in the study. Post-trial all participants were encouraged to continue with CPAP until discharge, and were offered equipment to take home.

Results:
14 of the 35 (40%) participants who were randomised in this trial chose to continue with CPAP after discharge home.

Discussion:
Possible reasons discontinuing CPAP therapy include:

Participants with complex medical and care needs saw the CPAP as something they could ‘wean’ off before discharge.

Participants hoped they would simply sleep better once at home.

Some had concerns regarding the availability of carers to assist them with CPAP overnight at home.

Some participants did not experience excessive daytime sleepiness, so did not feel any positive benefit while using the CPAP.

Conclusion:
More work is needed to identify the optimum point in the patient rehabilitation pathway to test for OSA and initiate CPAP to support the long-term sleep needs of this client group.
Assistive Technology and Environmental Controls for Users with High Cervical Spinal Cord Injuries – A Move Away from Switch Scanning

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Introduction:
Individuals with high cervical spinal cord injuries (SCI) who wish to maximise their independence through assistive technology (AT) and environmental control units (ECU) have had limited options until recently. Head or mouth-operated switches paired with scanning devices are often utilised, enabling phone or computer access and environmental control. This approach, although useful, can be slow and cumbersome to modern technology users. In 2017 and 2018, the Victorian Spinal Cord Service (VSCS) had the unique opportunity to work with three young adult clients with new C1-C3 SCI, trialling AT and ECU options to increase their independence within hospital and at home.

Method:
Case review of three VSCS clients with C1-C3 ventilator dependent SCI about their use of AT and ECU. Current trends as well as facilitators and barriers to the uptake of technology for phone, computer and environmental control were examined.

Results:
All three clients utilised mainstream smart phones with voice assistants and smart speakers for playing music and information retrieval. A mainstream voice dictation programme was popular and cost effective for computer access. Eye gaze was used by one client, however caused eye strain for another, and was not appropriate for the third due to nystagmus. Facilitators to the uptake of technology included pre-injury “tech savviness”, compensation or willingness to self-fund devices and the support of family to encourage regular setup & practice.

Conclusion:
Technology is always advancing in both the disability and mainstream markets. Factors influencing the successful uptake of devices are numerous, with client’s motivation and support from significant others being more influential than financial funding. Mainstream voice-controlled smart products are gaining steady popularity and showing promising options for environmental control. This review will help steer future service provision for clients within the VSCS and inform the wider SCI community about new approaches to technology access.
Association between sprint power and aerobic capacity during arm ergometry in people with spinal cord injury

Dr Sonja De Groot1,2, MSc MD Ingrid Kouwijzer1,2,3, Dr Linda Valent3, Prof. Dr Lucas van der Woude2, Prof. Dr Mark Nash4, Dr Rachel Cowan4
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Introduction: Individual optimization of graded exercise test protocols (GXT) for persons with spinal cord injury requires accurate estimates of peak power output (POpeakGXT). A Wingate test is a low time burden assessment of sprint power that might be associated strongly with POpeakGXT and therefore could contribute to a valid and accurate prediction of POpeakGXT. The study aimed to 1) investigate the association between sprint power and POpeakGXT; and 2) validate the prediction of POpeakGXT based on sprint power and personal and lesion characteristics.

Methods: Manual wheelchair users with tetraplegia (N=35) and paraplegia (N=58) performed a 30s Wingate test and a GXT on an asynchronous arm crank ergometer to determine sprint average and peak power (POmeanWingate and POpeakWingate), and POpeakGXT. Regression analyses (backward and enter procedure) on N=69 were performed to identify the best POpeakGXT (W) prediction model (highest R2). Candidate independent variables included POmeanWingate or POpeakWingate, age (years), sex, body mass (kg) or body mass index (kg/m2), time since injury (TSI, years) and lesion level (tetraplegia/paraplegia). The best regression model was validated (N=24) by comparing the predicted with measured POpeakGXT using a paired sample t-test, intraclass correlation coefficients (ICC) and Bland-Altman plots.

Results: The best association was found between POpeakGXT and POmeanWingate (R2=0.71). The best model (R2=0.82) to predict POpeakGXT included POmeanWingate, TSI, and lesion level. No significant difference was found between the measured (mean±S.D.: 61±36W) and predicted (mean±S.D.: 56±28W) POpeakGXT (p=0.27). The ICC was good (0.80 with 95% confidence intervals: 0.55-0.92). The 95% limits of agreement of the Bland-Altman plots were wide (-34.2 to 45.1 W).

Conclusions: Although a large part of POpeakGXT was explained in the regression model and the relative agreement was good, absolute agreement was low. Therefore, the model can only be used with caution for setting the GXT protocol.
Supporting self-management for people with spinal cord injuries: A tool to facilitate planning for supports

Mrs Amy de Paula
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Poster Presentation Day 1, September 13, 2018

Introduction
Funding for disability supports in Australia is transitioning from funded services to a single insurance-model scheme, the National Disability Insurance Scheme (NDIS). People with spinal cord injuries (SCI) meet with a planner to identify required supports over a 12-24month period. A tool that could be used by people with SCI to prompt them to report their needs was required to support successful self-management under this scheme.

Methods
The following planning process was followed:
1. Review of SCI tools suited to the Australian context and NDIS developed tools (Portney, 2009).
2. Investigation of required constructs/items
3. Investigation of appropriate language and presentation

A tool was drafted using self-management principles (Munce, 2014; Pang, 2009) and person-centred-planning (Donnelly, 2004; O’Brien, 2000). Items were drawn from collated evidence, clinical expertise and consumer lived experience (Hammel, 2007).

Face validity can be established by identifying stakeholders and determining the proportion who consider the test to be credible (Goldsmith, 1993). The ParaQuad NSW Clinical Team, consisting of Occupational Therapists, Clinical Nurse Consultants, Peer Support Officers (with lived experience of SCI) and Social Work, provides community-based services to people with SCI across the lifespan and as such met the criteria for expert stakeholders in rating the tool.

Results
Existing SCI tools showed a bias towards tools designed to be completed by a clinician. NDIS tools did not carry prompts that would assist the person with a SCI to plan to self-manage their supports. An evidence-based search was conducted to inform the drafting of a tool. Face validation was conducted by a multi-disciplinary group, including 2 consumers, prior to finalising an agreed comprehensive tool.

Conclusions
People with SCI in Australia are required to self-manage their supports under the NDIS. A comprehensive tool has been compiled to support self-identification and empowered communication of needs.

References available on request.
Recommendations for bed linen for people with spinal cord injuries: A quality investigation to inform a consumer guide

Mrs Amy de Paula, Mr Jason Lowe, Mr Blair McFarlane, Ms Angela Ryan, Ms Wendy Harris, Ms Robyn Ryan

Paraquad NSW, Newington, Australia

Introduction
There is a high prevalence of pressure injuries within the spinal cord injury population, associated with high care costs and detriment to quality of life (Consortium for Spinal Cord Medicine, 2014). In NSW, Australia, mattresses are frequently prescribed as support surfaces for the prevention and/or management of pressure injuries. Despite education and self-management being key in skin care (Houghton, 2013; NSW ACI SSCIS, 2014), anecdotally consumers have demonstrated limited understanding of how support surfaces function and what linen will interact best with this equipment.

The primary goal of support surfaces is to maximise immersion and envelopment (Consortium for Spinal Cord Medicine, 2014). Immersion is determined by the stiffness of the cover of the support surface (Consortium for Spinal Cord Medicine, 2014). Linen type and multiple layers impacts on this feature (Williamson, 2013). Tight, non-stretch covers are not acceptable for support surfaces (Emily, 2014).

Methods
Devising recommendations for consumers consisted of:
1. A literature review;
2. Testing of common linen types (no sheet; hospital sheet; fitted sheet; commercial stretch fitted sheet; specialty stretch fitted sheet; continence sheet) was conducted on both an air and a foam mattress. Structured clinical observations and pressure mapping (X-Sensor) were utilised.
3. Synthesis of the published evidence and testing into a guide for consumers.

Results
A consumer education guide was developed based on the literature evidence and bedlinen testing results. Consumer lived experience was incorporated in developing the guide to support peer learning and connection to real world experiences (Hammel, 2007).

Conclusions
Bed linen is cited as an important construct in managing and preventing pressure injuries (Williamson, 2013). A quality investigation was conducted to test different linen practices observed in NSW. The results were synthesized into a guide for consumers to assist people to make informed decisions regarding bed linen.

References available on request.
Privately funded Specialist Spinal Multidisciplinary Rehabilitation – Is it cost effective?

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1The Wellington Hospital, London, United Kingdom, 2Aspire Law, Eastleigh, United Kingdom, 3Aspire Law, Eastleigh, United Kingdom

There are 12-16 SCI cases per year per 1000,000 population in UK*, being treated in eleven NHS specialist spinal rehabilitation units.

There is pressure for beds waiting times are long. Pathways are shorter and patients are being discharged earlier, leading to discharge into inadequately equipped care homes or micro-environment. Evidence shows that repetitive intensive, advanced technology based rehabilitation could improve outcomes in incomplete injuries.

There are only two private spinal rehabilitation facilities in the country, both being fairly expensive restricting access.

We discuss four cases involving patients admitted for private specialist spinal rehabilitation in two units in 2017-18 where interim payments from insurers were used to supplement the NHS rehabilitation. The average length of stay was 3.5 months.

Three patients were Tetraplegics and one was a Paraplegic. Two had been admitted from NHS units and two from home.

- Two patients utilised a private case manager and obtained suitable accommodation.
- Bowel management on commode (dignity) was achieved
- Provision and use of specialist equipment.
- Psychological benefits and less requirement for antidepressants and Psychiatry input.
- Achieved stability to Autonomic dysfunction with the use of LOKOMAT, Exoskeleton and standing programme.
- Self control and self management leading to more confidence and better social integration, quality of life and carer experience.

At the right time, private rehabilitation could be helpful for the patient allowing a more integrated journey - from major trauma centre to home, allowing funds to be secured, rather than discharging to an unsuitable environment. This allows patients to come to terms with their accident and secure more involved psychological therapy.

A reduction of private inpatient packages would allow more patients to access these services. Collaboration with insurance companies would allow adequate time to be spent within these centres.

Spinal Cord Injury with Polytrauma: Challenges and scope for doing things differently?

Mr Manish Desai¹, Dr Verity Thakur¹, Ms Mary Licup¹, Ms Catherine Godfrey¹
Royal National Orthopaedic Hospital, Stanmore, United Kingdom

Poster Presentation Day 1, September 13, 2018

Introduction
The introduction of Trauma Networks in the UK has improved acute outcomes for polytrauma. However, rehabilitation programmes developed for monotraumatic spinal cord injury (SCI) may not meet the additional needs of polytrauma patients. This study characterises the complexities of polytrauma SCI rehabilitation.

Method
Retrospective analysis of traumatic SCI inpatient rehabilitation admissions over 12 months during 2017. Polytrauma was defined as at least one additional non-spinal injury scoring at least 3 on the Abbreviated Injury Score.

Results
The majority of admissions (60% of 48) were for polytrauma. There was little difference between time taken from injury to rehabilitation admission (mean 57 days for polytrauma vs 67 days for monotrauma) or inpatient rehabilitation duration (81 vs 76 days).

Polytrauma patients were more likely to have additional speech/swallowing (21 vs 5%), wound healing (21 vs 0%) and infection control (10 vs 0%) needs. Although around half the patients in both groups required specialist input for anxiety or depression, polytrauma patients were more likely to have psychiatric (28 vs 21%) needs.

Additional to SCI, 59% of polytrauma patients had chest injuries, 21% visceral injuries, 21% pelvis fractures, 21% upper limb fractures, and 17% lower limb fractures. The majority of patients with limb fractures had ongoing weight-bearing precautions.

Regarding traumatic brain injury, 55% of polytrauma patients had evidence on imaging, and 31% had clinically significant cognitive impairment. This likely represents the tip-of-the-iceberg.

Regarding outcomes, the two groups had identical Spinal Cord Independence Measure (SCIM) scores on discharge (mean 66) but fewer polytrauma patients were discharged directly home (69 vs 89%).

Conclusion:
Polytraumatic SCI is both common and complex, bringing additional rehabilitation needs which current services may not be designed to meet. Programmes incorporating formal musculoskeletal and cognitive rehabilitation may be necessary to optimise outcomes for patients.
"I am walking - do I need an admission?": A new cauda equina integrated care pathway for ambulant patients

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Poster Presentation Day 1, September 13, 2018

Introduction
Cauda equina syndrome (CES) is a potentially devastating event with life-changing long-term neurological disability. This may be visible, such as impaired mobility, but will also involve invisible disability such as neuropathic pain, urogenital and bowel dysfunction, and psychological sequelae, alongside vocational and relationship issues.

Traditionally, paraplegic CES patients are referred for inpatient rehabilitation, whereas ambulant CES patients are treated as outpatients. This requires multiple separate referrals and appointments, usually over at least a year, with the risk of fragmented care and missed follow up. To address this, we created an innovative Integrated Care Pathway (ICP) for ambulant CES patients, for a three-week fast-track inpatient rehabilitation programme. We are the first centre in the country to implement this.

The aim of this study was to examine the effectiveness of the pathway, benefits to patients, and outcomes of rehabilitation.

Method
A 12 month prospective analysis of ambulant CES ICP admissions.

Results
Over 12 months, there were 19 CES ICP admissions (59% male, age range 18-65). The most common aetiology was disc prolapse, followed by trauma and infection. Most patients had issues around spinal injury education (89%), bladder (89%) and bowel (100%) management, orthotics (74%), and psychological impact (79%) addressed during their admission. However, only around a third accessed the sexual function nurse specialist, and only two-thirds had a formal documented discussion around diagnosis and prognosis with a consultant. The rehabilitation outcomes in terms of bladder and bowel management showed that all patients achieved safe and effective control.

Conclusion
The CES ICP is an innovative, holistic, inpatient rehabilitation programme with structured goals around patient education and self-management. This is particularly important for getting ambulant CES patients with invisible disability back on track.
Psychological aspects and alexithymia in spinal cord injury patients (LCS)

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Poster Presentation Day 2, September 14, 2018

**Introduction:**

The term alexithymia refers to the inability to get in touch with one's emotional sphere, to become aware of it and to express it.

Various theories explain the genesis of this pathology (W.Bucci, Bion) defining it as a real "emotional dysregulation".

With the present study we hypothesize that in patients with spinal cord injury the presence of alexithymia as a defense mechanism against trauma correlates with high levels of anxiety and depression, low self-esteem, low extroversion and low motivation.

**Aim:** To assess the correlation the level of alexithymia, and the psychological status (level of depression, anxiety disorder, self esteem, motivation).

**Materials and methods:** 126 consecutive patients (82 males and 44 females; mean age 51.6 ± 17.8, were evaluated by the American Spinal Injury Association standards to assess neurological status; Barthel Index; SCIM (Spinal Cord Independence Measure) CBA STAI X 2 sheet 3 for anxiety, CBA-QD sheet 8 for depression; self-esteem and motivation tests and the alexithymia (TAS-20: Toronto Alexithymia Scale).

Statistics: the correlation between TAS score and other psychological scales was assessed by means of Pearson’s R. The comparison between patients with and without alexythimia (TAS>61) was performed with the Student’s T test for independent samples.

**Results:** alexithymia score showed a positive, faint but significant correlation with anxiety (r 0.409, p=0.01) and depression (r 0.215, p=0.05). We also demonstrated a negative, faint, but significant correlation with self-esteem (r -0.18, p=0.05) and motivation (r -0.263, p=0.01). The comparison between subjects with and without alexithymia showed that alexithymic subjects have higher anxiety scores (0.33 ± 1.02 vs. -0.35 ± 1.05, p=0.001), lower extroversion scores (6.6 ± 5.9 vs. 10.6 ± 5.5, p=0.001), lower self-esteem scores (59.4 ± 5.3 vs. 61.6 ± 4.4, p=0.05) and lower motivation scores (11.7 ± 2.9 vs. 13.3 ± 2.2, p=0.01) than non alexithymic ones.

**Conclusions:** The results of the study shows that the personality with the presence of alexithymia through the TAS-20 has positive correlation with anxiety and depression. The study also shows that an alexithymic personality has a negative correlation with self-esteem, motivation and extroversion. A possible mechanism to explain these data is that the violence of trauma disrupts the defense mechanisms of the patients and allows the rising of anxiety and depression.

In literature Alexithymia is related to unprocessed traumatic experiences, which in turn are related to anxiety-depressive symptoms. It is suggested, for these patients, an integrated psychological support in order to improve emotional skills and the mentalization of negative emotions.
The implementation and evaluation of the Active Rehabilitation concept for persons with spinal cord injury in Botswana.

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Poster Presentation Day 2, September 14, 2018

Introduction: Active Rehabilitation (AR) is a community peer-based concept that was developed in Sweden 40 years ago. The inaugural AR training program in Botswana took place between 6-13/12/2017.

Methods: The protocol of an international study that evaluates the effects of AR training programs was adapted and implemented. Participants completed an online survey in English in the beginning (T1) and at the end (T2) of the training program, and are scheduled to perform a 6-month follow-up evaluation in 05/2018 (T3). Fifteen English-speaking participants were included in the analysis. Analysis was completed with the Wilcoxon Signed Rank Test.

Results: There were 6 males and 9 females, 3/12 tetraplegia/paraplegia, 11/4 complete/incomplete SCI, age 16-40 years (median 29 years) and 1-10 years since injury (median 4 years). Participants achieved statistically significant improvements in overall SCIM-III SR score (T1: 53; T2: 58; p=.009), with more profound improvements in self-care (T1=18; T2=20; p=0.034) and mobility (T1=14; T2=18; p=.003). A positive trend was noted in Moorong Self-Efficacy Scale (p=0.064). Participants achieved statistically significant improvements in both practical and self-reported wheelchair skills. They improved their ability to perform wheelie (p=.007) and the distance covered during a 6-minute push test (p=0.025) in Queensland Evaluation of Wheelchair Skills. They also achieved statistically significant improvements in both their wheelchair skills performance score (T1: 70%; T2: 79%; p=.006) and their wheelchair skills capacity score (T1: 63%; T2:77%; p=.008) in Wheelchair Skills Test Questionnaire.

Conclusions: This is the first systematic and comprehensive evaluation of the AR training program. The program had very positive short-term effects on participants with SCI in Botswana. The 6-month follow-up will show whether these gains were sustained and will explore effects on participation and life satisfaction. Pending the 6-month follow-up, this program could prove an important adjunct to the newly established Spinal Unit in Gaborone, Botswana.
Evaluating the effects of community peer-based Active Rehabilitation training program for persons with spinal cord injury—design, pilot, implementation.

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Poster Presentation Day 2, September 14, 2018

Introduction: Community programs led by peer-mentors with spinal cord injury (SCI) could promote healthy active living by providing ongoing support, education and skills training. Active Rehabilitation (AR) is a community peer-based concept that has been implemented in more than 20 countries. Despite a plethora of positive anecdotal evidence, the effects of AR-programs have not been evaluated scientifically. Here, we present a study aiming to evaluate the effects of AR-training programs on community-dwelling individuals with SCI.

Methods: This mixed-methods, prospective cohort study involves a close and ongoing collaboration between researchers and a consumer-driven AR-organisation in Sweden. The study will measure the effects of AR-programs on physical independence, wheelchair skills, participation, life satisfaction, physical activity, psychological well-being and self-efficacy, and will explore the perceived effects of program-participation. Data collection will take part in the beginning, at the end, and at 3 months after the AR-program. A pilot, including 7 individuals with diverse lesion and sociodemographic characteristics was conducted. In addition to completing the evaluation protocol, feedback about study procedures was collected through interviews with participants and peer-mentors.

Results: Overall, the evaluation was well received with minimal missing data. Suggestions on how to smoothly integrate the data collection in the AR-program were provided, while the data management processes were thoroughly tested. Participants and peer-mentors stressed the advantage of using a standardized protocol to facilitate goal-setting and identify areas in need of specific attention during and after the program.

Conclusions: A full-scale, long-term evaluation of the AR-concept in accordance with the proposed protocol is feasible, and acceptable by peer-mentors and program-participants. This first ever scientific evaluation of the effects of the AR-concept will provide evidence for the role of AR-interventions in the overall management of SCI. Careful adaptation of the procedures is necessary when implementing the study in other countries.
Analytical comparisons of SCI medicine and rehabilitation systems between Australia and the USA: epidemiology

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Introduction: Multilayer differences exist in the healthcare systems between the United States of America (USA) and Australia. We hypothesized that differences in practice, and economics may cause distinct experiences in spinal cord injury (SCI). We aim to analyse SCI regimens between the two countries to test our hypothesis via a series of reviews.

Methods: The epidemiology of SCI between the USA and Australia was compared, using standardized data available from banks. Here, we used the Australian Spinal Cord Injury Register (ASCIR) and USA’s National Spinal Cord Injury Statistical Centre (NSCISC). For this preliminary study we used 2007-2008 data from the ASCIR; and 2010-2016 from the NSCISC.

Findings: (1) While many factors remain similar, notable differences exist in the following areas. (i) Median hospital stays in Australia (16 days acutely, 133 total) and the USA (11 days acutely, 35 in rehabilitation). (ii) Causes: In Australia, a larger proportion of non-traumatic injuries (21%) appear to occur compared to the USA (8.3%). In the USA, gunshots are the third-leading cause of SCIs (15.3%). In Australia, minimal SCIs are from gunshots. (iii) In the USA, lifetime costs range from $2,123,154 to $4,724,181 for quadriplegia, and $1,516,052 to $2,310,104 for paraplegia. In Australia, lifetime costs are estimated at $9,500,000 for quadriplegia, and $4,500,000 for paraplegia. (iv) In the USA, 65-year-olds with C5-8 injuries (excluding AIS-D) have a 58.5% of normal life expectancy. In Australia, 65-year-olds with Frankel A cervical injuries have 68%. (2) Medical costs: In the USA, private insurance is the primary payer for SCI care where in Australia, it is public.

Conclusion: By analysing epidemiological differences between systems involved in SCI care between the USA and Australia, the strengths and shortcomings of each side can be reciprocally referenced. Our findings provide insight that can be used in constructively to improve SCI medicine worldwide.
Impact of Appraisals in Acute Spinal Cord Injury Rehabilitation

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Introduction: Based on Lazarus and Folkman’s cognitive model of stress and coping (1984), Duff and Kennedy (2003) proposed an individual’s response to SCI is a result of primary appraisals of situation and secondary appraisals of available coping resources. Negative cognitive appraisals have been found to be significant predictors of mood following SCI (Kennedy et al, 2009; Bonnano et al 2012; Kennedy et al, 2015). There is a paucity of research on metacognition in SCI.

Two research projects (using the short and long form of the ADAPSS) will be presented, contributing to our knowledge of appraisals in acute rehabilitation. The first, using Principle-Component Analysis to determine the factor structure of the ADAPSS-sf and the relationship between cognitive appraisals and mood. The second, addressing the paucity of metacognition research by examining the relationship between metacognitions and psychological distress independent of well-known predictors and whether mediating relationships exist.

Method: Two research studies involving the appraisals of acutely injured SCI patients who are first admissions to the NSIC will be discussed. Paper one measures cognitive appraisals the ADAPSS-sf and HADs. Paper two uses the ADAPSS long-form, HADs, MCQ-30 and B-COPE.

Results: Findings demonstrate ADAPSS-sf has a two factor structure, resilience and loss, which account for 60.7% of the variance collectively. Regression analysis found that gender, loss and resilience factors were significant predictors of anxiety. Loss and resilience factors were significant predictors of depression. Study two presents analysis on the relationships between metacognitions, cognitive appraisals and distress.

Conclusions: Both papers provide further support for the role of cognitive appraisals in psychological adjustment in the early phases of rehabilitation. Findings validate the ADAPSS-sf as a short and reliable measure of cognitive appraisals in acute SCI rehabilitation. Findings highlight vulnerable subgroups that initially endorse negative appraisals which may influence clinical practice and an avenue for further research.
A Clinical Perspective on Rehabilitation Outcome measures enabling people to live well following Spinal Cord Injury.

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Poster Presentation Day 1, September 13, 2018

Introduction: Acquiring a spinal cord injury (SCI) is a major trauma involving immense change in an individual’s life. Acute and rehabilitation care provide a holistic, biopsychosocial model that incorporates physical, social and psychological domains to enable individuals to develop skills and regain independence (Duff & Kennedy, 2003; Middleton, Perry & Craig, 2014). Yoshida et al (2015) identified four values in action that are critical to user’s developing lifelong rehabilitation skills and enabling people to become Expert by Experience. The presentation will critically examine two internationally recognised outcome measures used at the National Spinal Injury Centre (NSIC) at Stoke Mandeville, comparing functional outcome and analysing the added value of user based assessment of rehabilitation progress.

Methods: Newly injured patients admitted to the NSIC since February 2015 that had both a Needs Assessment Checklist (NAC, Kennedy & Hamilton, 1999) and SCIM-III (Itzkovich et al, 2007) on admission and prior to discharge were included in the review.

Results: Both measures reliably demonstrate a significant change over the course of SCI rehabilitation in MDT lead functional capabilities and patient reported independence. Ceiling effects based on injury level are evident in the SCIM-III, but not evident in NAC due to the inclusion of verbal independence ratings. Psychosocial richness of the NAC provides data on user’s values and participation goals, employment, community preparation and psychological markers.

Conclusions: Critical analysis of both measures, within the same cohort, highlights the contemporaneous relevance of using measures that enable user involvement whilst capturing outcome on functional change and psychosocial need. Additionally the NAC enables patient’s engagement in their rehabilitation promoting long term behavioural change and adjustment, self management and people to live well with SCI. Understanding the value of both measures emphasises the importance of developing internationally recognised standards for measuring progression through rehabilitation across all psychosocial domains.
Considerations for Supinator to Posterior Interosseous Nerve transfers in C5 and C6 tetraplegics when combined with standard forearm tendon transfers. A retrospective case series.

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Poster Presentation Day 2, September 14, 2018

Introduction
Supinator to Posterior Interosseous Nerve (SPIN) transfers are a recent development in upper limb surgical options for tetraplegic populations. Most commonly done in C5 and C6 tetraplegics, the aim of the surgery is to restore wrist and/or finger extension and improve functional outcomes when combined with upper limb surgical options.

Methods
Clinical notes of patients who received SPIN and standard forearm tendon transfers from May 2014 to Aug 2017 were reviewed. Information was extracted on wrist and finger extension strength and Metacarpophalangeal (MCP) positioning one year post SPIN transfer and pre and post tendon transfer surgery.

Results
Nine limbs (five right and four left), received SPIN and subsequent standard forearm tendon transfers at the Burwood Spinal Unit between May 2014 and August 2017. These consisted of three C5 AIS A, one C5 B and one C6 AIS B tetraplegic. Post SPIN, all limbs achieved at least Grade 4 wrist and finger extension at time of tendon transfer surgery. However all C5 limbs were unable to separate active wrist extension from finger extension. When combined with subsequent ECRL to FDP tendon transfers, four C5 limbs lost at least two grades of wrist strength post transfer. Six C5 limbs developed neutral or hyperextended MCP positioning which impacted negatively on lateral key grip platforms. Four limbs required volar plate advancements to augment MCP positioning at time of tendon transfer surgery and a further two limbs were recommended the same surgery.

Conclusions
There were higher incidences of negative outcomes, or the need for augmentation surgeries in C5 populations. C6 populations showed positive outcomes in function when SPIN and standard forearm tendon transfers were combined. C5 tetraplegics may require MCP augmentation techniques such as splinting, positioning or surgery to maintain MCP flexion for lateral key grip and when combined with forearm tendon transfers.
Living well with spinal cord injury. A peer-focused analysis of the benefits of supporting family members and caregivers following spinal cord injury.

Miss Charlie Fraser¹, Mr Andrew Dickinson¹, Ms Debra Edmonds², Ms Teri Thorson³
¹Back Up, London, United Kingdom, ²New Zealand Spinal Trust, New Zealand, ³Spinal Cord Injury BC, Vancouver, Canada

Poster Presentation Day 2, September 14, 2018

Most individuals across the world live as part of a family. A spinal cord injury (SCI) does not occur in isolation; it has a significant psychosocial impact on the whole family unit. Effective family support is a crucial determining factor in positive adjustment to SCI. In order to live well with an SCI, support must be given to target the whole family rather than exclusively focussing on the person with the injury.

However, while generally recognising the need for support, there is an ongoing question within the community of SCI professionals about how to deliver support to family members. Back Up, New Zealand Spinal Trust, and Spinal Cord Injury BC have all individually identified a need for family support and have collaborated to produce a series of impact-based recommendations on how to market, design, and deliver effective family support. For example, Back Up’s research shows that 98% of family service users improved in at least 3 out of 5 positive coping strategies as a result of being supported by a peer mentor. Recommendations include: the importance of peer involvement throughout service design and delivery; and recognising and adapting to the unique challenges of supporting family members.
Bone mineral density and body mass index of spinal cord injured wheelchair users before and after acute rehabilitation period - pilot study

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Poster Presentation Day 1, September 13, 2018

Introduction:
Prevention and treatment of osteoporosis are essential to avoid additional functional impairment and increased costs due to long-term hospitalization. Nevertheless, it is not clear if early verticalization, physical activity, vitamin D and calcium intake are helpful for patients with SCI. Therefore, further investigations are necessary. The present study aimed to determine bone mineral density (BMD) and body mass index (BMI) at the beginning of first acute rehabilitation period and to find out if these parameters change a half year later when regular verticalization in hospital and counseling in respect of nutrition and physical activity were provided.

Methods:
11 subjects (age 45.0±19.90) with tetra- (n=6) and paraplegia (n=5) who used a manual wheelchair as the primary mode of mobility underwent dual-energy x-ray absorptiometry (DXA) examinations as part of their medical evaluation to determine BMD in femoral bone and BMI. Data were collected retrospectively. Standard statistical methods were used for analysis. The average length of inpatient rehabilitation period was 74.36±36.29 days, time from injury to first measurement 10.18±6.31 months, and the period between two measurements was 7.09±1.81 months.

Results:
The mean femoral neck T-score was at the beginning of rehabilitation -1.56±1.52 on the right and -1.40±1.29 on left femur. After rehabilitation period T-score was decreased 26.2% (-1.97±1.44) on right and 40.9% (-1.97±1.27) on left femur. T-score of three patients changed from osteopenia to osteoporosis and of one from normal to osteopenia.

Conclusions:
Ten months after injury SCI wheelchair users' BMD corresponds to osteopenia and, despite verticalization and counseling during rehabilitation, it remained significantly reduced after seven months. BMI and lean mass didn't change remarkably, but fat mass increased 6.3%. Further investigations with more participants would hypothetically show a significant difference in the changes of lean mass and BMI.
Relationship of the inflammatory response to spinal cord injury and susceptibility for peripheral edema

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1Flinders University, Adelaide, Australia, 2The University of Adelaide, Adelaide, Australia

Poster Presentation Day 1, September 13, 2018

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Introduction
The patho-aetiology of the peripheral edema that accompanies spinal cord injury (SCI) is incompletely understood. The involvement of T-helper (Th) cells in Th2 auto-immune inflammatory response is well documented in patients who develop lymphedema as a consequence of immunosuppression, as exemplified by the causal link between breast cancer treatment and susceptibility for lymphedema. SCI is known to stimulate the synthesis and release of inflammatory cytokines, allowing for the possibility that a Th2 response participates in the development of peripheral edema. The aim of this study was to review and analyse evidence in the literature for linkages between the Th2 inflammatory cytokine response, lymphangiogenesis, and susceptibility factors for peripheral edema following SCI.

Method
The PubMed database was utilised to search for relevant articles between the years 1992-2016 with meshed keywords: “chronic edema, lymphedema, lymphangiogenesis, spinal cord injury, cytokines, and Th2”. Bibliography searches also were conducted.

Results
Due to conflicting studies, it remains unclear as to whether the skewed inflammatory response following SCI is predominantly pro- or anti-inflammatory. Additionally, Th2 cytokine response (interleukin [IL]-4 and IL-13) has been shown to negatively regulate lymphangiogenesis due to the anti-inflammatory properties of the cytokines. Therefore, as these cytokines perpetuate the development of lymphedema, this may lead a potential unremitting peripheral edema. Genetic predisposition for lymphedema following breast cancer treatment was demonstrated, whereby both anti-inflammatory (IL-4 and IL-10) and pro-inflammatory (NF-κB) genes were implicated.

Conclusions
Th2 response to spinal cord injury may precipitate the development of lymphedema from generalised peripheral edema.
TRANSANAL IRRIGATION USING A CONE SYSTEM IN PATIENTS WITH LOWER MOTOR NEURONE SPINAL CORD INJURY

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Poster Presentation Day 1, September 13, 2018

Introduction: For spinally injured people who are able to sit on a toilet, a cone-based transanal irrigation (TAI) system may have an advantage over catheter based systems in terms of ease of setting up, procedure time and low likelihood of complications. The Qufora IrriSedo Cone system comprises a tube connecting a suspended water bag via a simple valve to a hydrophyllic-coated cone. Patients with lower motor neurone (LMN) spinal cord injury tend to have intact upper limb function, and a cone system may offer an advantage over catheter systems.

Methods: We report on 20 consecutive patients (11 female; mean age 41, range 22-72) with LMN spinal injury and bowel symptoms refractory to lifestyle, laxative, suppository or enema management. The aetiology of injury: spina bifida (n=8), following spinal disc herniation and surgery (n=7), following spinal tumour surgery (n=5). All patients were trained to use the Qufora cone system and followed up for a mean of 29 months (range 8-52). The neurogenic bowel dysfunction score (NBDS) was collected at baseline and each follow-up.

Results: At latest follow up, 17/20 (85%) were still using cone TAI. The NBDS fell from baseline 16 (range 7-31) to 8 (2-30) at latest follow-up. Mean time spent on toileting fell from 57 (30-120) to 22 minutes/day (12-45). Laxatives use fell from 13 to 5 patients. Three patients discontinued to lack of effect. No complications were reported by any individual.

Conclusions: TAI with the Qufora cone is a safe and effective option for patients with bowel symptoms secondary to lower motor neurone spinal cord injury.
TRANSANAL IRRIGATION USING A CONE SYSTEM IN PREGNANT PATIENTS WITH SPINA BIFIDA

Dr Anton Emmanuel\textsuperscript{1,2}, Mrs Julie Storrie\textsuperscript{1}, Mrs Elizabeth Bambury\textsuperscript{2}, Dr Amir Mari\textsuperscript{1}, Dr Valentina Passananti\textsuperscript{1}

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Poster Presentation Day 1, September 13, 2018

Introduction: Bowel management for individuals with spina bifida (SB) can be challenging with over 50% experiencing regular faecal incontinence and difficulty with rectal voiding. Transanal irrigation (TAI) is an effective and evidence-based way of managing such neurogenic bowel dysfunction (NBD). When SB individuals become pregnant, bowel management can become ineffective. Current guidance suggests that TAI is relatively contraindicated in pregnancy. The Qufora IrriSedo Cone system comprises a tube connecting a suspended water bag via a simple valve to a hydrophylic-coated cone. Compared to a catheter based system it may provide a safer yet effective way of undertaking TAI in pregnant SB individuals.

Methods: Currently, 7 (5 female) of 31 (20 female) SB patients with NBD use TAI in our practice, five with a cone and two catheter. We report three SB individuals, two with pre-pregnancy bowel dysfunction (neither on TAI) and one with no bowel symptoms prior to pregnancy. All three were commenced on Qufora cone irrigation during pregnancy.

Results: Two women developed worsening constipation and faecal incontinence in the first trimester and the woman who was asymptomatic before pregnancy developed constipation at week 20. All failed to respond to conservative therapies. Baseline questionnaire NBD showed moderate-severe impairment (scores 13, 17, 23). All three were trained and started on cone irrigation at weeks 11, 24 and 13 respectively. They irrigated on alternate days with the use of docusate in two. No complications of TAI occurred and NBD scores at delivery fell to 4, 3 and 5 respectively. All three delivered between 38 and 39 weeks gestation to healthy babies. Post-partum two patients reverted to use of docusate and suppositories alone and one continued to use cone TAI.

Conclusions: TAI with Qufora cone is an option for spina bifida individuals who develop bowel symptoms refractory to conservative measures during pregnancy.
Health care services and health care needs in adolescents and adults with Spina Bifida from an international perspective.

1. Introduction in Spina Bifida
   - Cause & Pathophysiology
   - Types of Spina Bifida, Arnold-Chiari malformation and hydrocephalus
   - Treatment: Closing the MMC, prenatal & postnatal
   - Signs and symptoms
   - Common secondary health problems in Spina Bifida
   (Janneke Stolwijk-Swuste, 15 minutes)

2. Epidemiology of Spina Bifida: current prevalence and projected impact of global food fortification with folic acid
   (Martin Brinkhof, 15 minutes)

3. Principles of neuro-urological treatment across the lifespan in persons with Spina Bifida (Jens Wöllner, 15 minutes)

4. Standard of care in adolescents and adults with Spina Bifida
   - Transition to adult care
   - Presentation of international questionnaire on “Standards of Care in adolescents and adults with Spina Bifida” * (Inge Eriks-Hoogland, 15 minutes)

5. Questions and Discussion (Janneke Stolwijk-Swuste, 15 minutes)

6. Summary and Closing (Inge Eriks-Hoogland, 5 minutes)

*Presentation of the results of the literature study and international questionnaire on standards of care for adolescents and adults with Spina bifida
Establishing a formal training program for peer wheelchair skills coaches

Mr Bryn Fittall
Victorian Spinal Cord Service (VSCS), Austin Health, Melbourne, Australia

Background:
This project investigated implementing a framework for the recruitment and training of new peer wheelchair skills coaches. This follows on from a 2015 VSCS project, which suggested the positive impact of peer coaching. Peer coaches are utilised whenever possible, however the small number of available coaches has limited frequency of sessions. This follow-up project sought to expand our coaching pool to improve session frequency, as well as appropriate matching of peers to patients based on functional capacity. The formal training and assessment process was aimed at ensuring consistent, high quality coaching.

Methods:
Three participants were recruited from the VSCS peer support program. A four hour practical course was delivered by therapists and existing coaches. Course curriculum emphasized skills teaching and provision of effective feedback. Participants each provided a wheelchair skills coaching session to an inpatient; their competence in explanation, demonstration and feedback was assessed by therapists. Participants completed a survey assessing perceived change in knowledge pre- vs. post-course. Qualitative course feedback was obtained by surveying participants, inpatients and therapists.

Results:
All participants achieved high scores on competency assessments, and were deemed suitable as peer wheelchair skills coaches. Participant survey scores demonstrated improvements in perceived knowledge, from 60% pre-course to 95% post-course. Qualitative feedback surveys collected from participants, patients and therapists was consistently positive.

Conclusion:
Although featuring a small participant group, this project suggests that formal training for peer coaches is effective. Existing coaches were an invaluable resource, contributing strongly to course design and delivery. Additional courses will be refined based on feedback and offered twice yearly to new coaches. Future projects will investigate utilising peers in teaching power wheelchair skills and in other areas of rehabilitation. In response to growing interest, this course will be modified and offered to community therapists in order to share our wheelchair mobility expertise.
Interventions to mitigate or reverse peripheral nerve damage following spinal cord injury: a scoping review of the literature

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Poster Presentation Day 2, September 14, 2018

Introduction: Spinal Cord Injury (SCI) profoundly impacts patient independence, with improved hand use the highest priority for tetraplegics. The advent of nerve transfers has allowed for direct reanimation of key muscle groups. However, recent studies have identified abnormalities consistent with axonal neuropathy in both the donor and recipient nerve which may impact on long-term outcomes. The aim of this review is to scope interventions that may maintain or improve peripheral nerve integrity following SCI.

Method: A scoping review was conducted of literature published in English from inception to March 2018 using Medline, EMBASE, CINAHL and grey literature. A key search term strategy was employed using keywords and related terms. Further studies were identified through reference lists. Articles were screened by two investigators based on title, abstract and full text for those meeting the inclusion criteria, with data extracted independently and compared to reduce bias.

Results: Exercise (15 articles) and electrical stimulation (25 articles) are most frequently reported in the human SCI population. Novel interventions in peripheral nerve regeneration include tissue grafting, cell-based techniques, laser therapies and magnetic therapies. Such interventions are primarily experimental and more prevalent in animal models, with limited uptake in human populations thus far. Direct use of peripheral nerve interventions in the SCI population for the purpose of nerve regeneration has been limited (1 article).

Conclusions: Peripheral nerve abnormalities consistent with axonal neuropathy can be present following SCI. Interventions to mitigate or reverse peripheral nerve abnormalities in humans post spinal cord injury most commonly involve exercise and electrical stimulation. These modalities may allow for improved outcomes post nerve transfer. Due to the small and heterogeneous population in these studies and variations in intervention methodology, further research is required to optimise application and timing of interventions, and potential translation of novel interventions from similar neuropathies.
Upper Limb Nerve Transfer To Restore Hand Function Post Transverse Myelitis - A Paediatric Case Study

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Introduction:
Nerve transfer post SCI is a surgical procedure that involves cutting a functioning donor nerve (originating above the level of injury) and reconnecting it to a more crucial but non-functioning nerve (below the level of injury).

The following will outline the case of BF, an 11 year old boy who had upper limb nerve transfer surgery on the 8/2/16, after being diagnosed with longitudinally extensive transverse myelitis (LETM), C5 AIS D on the 10/8/15. Our aim is to present the improvements BF had in his motor function and Canadian Occupational Performance Measure (COPM) scores, at 2 years post-surgery.

Methods:
A COPM, conducted with BF, highlighted hand function as the major issue preventing his independence in completing activities of daily living and his ability to participate in activities of leisure and education. BF had needle electromyography on the 21/12/15, which confirmed the results of the manual muscle test (MMT) of nil voluntary motor units in his left C7/8 muscles and normal motor units/volitional movement of C5-C6 muscles.

BF underwent the following nerve transfer surgery on his left upper limb, with the goal of restoring hand function; brachialis to anterior interosseous nerve (finger flexion) and supinator to posterior interosseous nerve (finger extension).

Results:
At 2 years post-surgery, BF’s MMT improved from 0/5 to 4/5 for left finger flexion and extension. BF’s COPM reassessment at 2 years had significant change; performance and satisfaction scores improved 5.2 and 5.8 points, respectively.

Conclusion:
Current evidence is based on a small number of single case reports, BF’s results indicate that upper limb nerve transfer should be considered as a treatment option for appropriate paediatric cases of transverse myelitis. Time frame for surgery requires further investigation in regards to allowing adequate chance for natural recovery versus preventing lower motor neuron death.
A systematic scoping review of economic evaluations of traumatic spinal cord injury interventions and programs

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Poster Presentation Day 2, September 14, 2018

A systematic scoping review of full economic evaluations relating to traumatic (spinal cord injury) SCI programs and interventions was undertaken to understand the current situation in this field with particular reference to traumatic SCI physical rehabilitation programs, and to identify important methodological components that could inform future economic evaluations in these areas.

Following an extensive multi-database and website search, 48 papers published between January 1990 and December 2017 were identified, reporting findings from 47 unique studies; just over half of the studies were conducted in north America;

The studies addressed a wide variety of preventative, diagnostic, treatment and ongoing support functions, covering a broad range of clinical areas relevant to traumatic SCI; approximately 30% compared strategies to manage bladder or urinary tract dysfunction; none investigated physical rehabilitation programs; almost 50% of the studies were in undertaken in hospital inpatient settings.

Approximately two thirds of the economic evaluations were undertaken within/alongside clinical effectiveness studies, and just over half were from the narrowest of perspectives, a single health service.

Many had limitations with respect to their clinical effectiveness and/or economic evaluation methodologies, although methodological quality improved over time.

These findings have illustrated the scarcity of full economic evaluations of SCI interventions overall, and in the physical rehabilitation arena in particular, and highlighted some of the difficulties faced by researchers in this field.

Significant opportunities therefore exist to investigate alternative strategies for conducting economic evaluations of SCI programs in the future.
Effects of lateral trunk support on pulmonary function and exercise performance in wheelchair rugby athletes with spinal cord injury

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Poster Presentation Day 2, September 14, 2018

Introduction: We assessed the effectiveness of individually customized braces for lateral trunk support on respiratory muscle strength, pulmonary function and mechanics, exercise capacity, and field-based exercise performance in wheelchair rugby athletes with cervical spinal cord injury (SCI).

Methods: Five male athletes (33±3 years, C5-C7, 185±45 months post-injury) with motor-complete cervical SCI participated in the study. Indices of pulmonary function were assessed with no abdominal strapping or braces (CONTROL), tight abdominal strapping but no lateral braces (STRAPPED), and both abdominal strapping and lateral braces (BRACED), and were compared to able-bodied predicted values. Peak oxygen consumption (VO2peak) was assessed via a graded exercise test to exhaustion that was followed by a sub-maximal test with inspiratory capacity maneuvers performed at rest, 20, 40, 60, and 80% peak speed to determine operating lung volumes. Field-based exercise performance was assessed by a wheelchair rugby specific agility test and repeated sprint test. Statistical analyses were performed using one-way analysis of variance or paired samples t-tests as well as magnitude based inference based statistics.

Results: Compared to CONTROL, PEmax increased when STRAPPED (53±9 vs. 72±11 cmH2O, p=.036) and BRACED (81±14 cmH2O, p=.002), all were lower than predicted (p<0.001). PImax was only lower CONTROL vs predicted (-83.6±18 vs -114±6). Inspiratory capacity, forced vital capacity, and peak expiratory flow were lower only CONTROL vs predicted (all p<0.05) and expiratory reserve volume was lower under all conditions compared to predicted (all p<0.005). Compared to STRAPPED, agility improved 2.5% (p=0.001, Cohen’s d=0.30, 100% likely beneficial) and VO2peak improved 5.1% (Cohen’s d=0.25, 73% likely beneficial) when BRACED. Operating lung volumes throughout exercise were not different between conditions.

Conclusion: These data suggest lateral trunk support may improve expiratory function as well as exercise capacity and field-based performance in elite athletes with cervical SCI.
Quality peer mentorship: using community-based Delphi methods to reach consensus on characteristics of high-quality spinal cord injury peer mentors

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Poster Presentation Day 1, September 13, 2018

Introduction:
Individuals living with spinal cord injury (SCI) are at greater risk of experiencing decreased social participation. SCI peer mentorship (PM), which involves peer mentors with lived experience of SCI providing knowledge, guidance, and/or counsel to mentees, shows promise as a strategy to promote participation. Understanding of the mechanisms of quality PM is limited. This study aimed to use community-based Delphi methods to establish formal consensus on characteristics of high-quality and low-quality peer mentors.

Methods:
27 peer mentors and 18 mentees with a SCI completed a thought-listing activity to generate characteristics of high-quality and low-quality peer mentors. Two Delphi rounds were then completed. In each round, 11 SCI peer mentors, 8 mentees and 12 SCI organization staff used an 11-point scale to indicate their level of agreement as to whether each characteristic identified high-quality or low-quality peer mentors. Characteristics that met established Delphi guidelines (mean score: >8; rated >8.0 by >66% of participants) were kept after each round. After Round 2, remaining characteristics were analyzed abductively by three coders to develop a framework to further understand high-quality and low-quality PM.

Results:
348 characteristics of quality PM were generated through the thought-listing activity. After both rounds, 225 characteristics met established Delphi guidelines. Abductive analyses indicated five overarching themes of high-quality and low-quality PM with 85% agreement among coders. Themes include: outlook, personality, competencies, reasons to mentor, and emotional state.

Conclusions:
A consensus framework of high-quality and low-quality PM was co-developed with over 55 members of the SCI community. The community-based Delphi method is a reliable means to reach consensus on mechanisms of high-quality and low-quality PM and will inform PM training and evaluation offered by SCI community organizations. These methods hold promise for ensuring the voices of people with lived experience of SCI influence our understanding of PM.
Partnership is power: a case study of the co-development and dissemination of community-based consensus methods in partnership with a spinal cord injury community organization

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Poster Presentation Day 2, September 14, 2018

Introduction:
Research that benefits people with spinal cord injury (SCI) is often not implemented into practice. While including people with SCI in research and implementation decisions is a gold-standard approach, methods to ensure people with SCI are meaningfully involved in these decisions are limited. This study aimed to examine the feasibility of co-developing, disseminating, and implementing a large-scale, community-based consensus exercise within a SCI organization.

Methods:
Three researchers and a SCI organization partnered to co-develop consensus methods to identify implementation needs and priorities among the SCI community (e.g., clinicians, researchers, policy makers, people with SCI). Specifically, the SCI organization wanted to know which strategies should be implemented to ensure research was used in practice within four topic areas: primary care, neuropathic pain, bladder management and pressure injuries. Potential needs and priorities were informed by syntheses of evidence related to the four topic areas. The consensus methods were piloted by four people with SCI and refined by five large-scale SCI organizations. Implementation of the methods was lead by the SCI organization involved in consensus method co-development.

Results:
The team co-developed a three-step, consensus process that included two Delphi surveys and one face-to-face workshop. The SCI organization feasibly implemented the methods and Survey 1 was disseminated to >2500 organization members. In total, 352 members (78% with lived experience of SCI) completed Survey 1, 127 members indicated interest in Survey 2, and 70 individuals expressed interest in the workshop. Across the topic areas, members were asked to consider 34 strategies.

Conclusions:
Feasible methods for disseminating and implementing a large-scale, community-based consensus exercise were co-developed. The methods allow for the voices of over 350 members of the SCI community to influence the SCI organization’s implementation decisions. The methods also inform knowledge translation science as they provide a template for conducting large-scale, community-based consensus exercises.
Acute traumatic spinal cord injury (SCI) bladder management in Western Australia (WA) closely mirrors published ‘best practice’

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Poster Presentation Day 1, September 13, 2018

Introduction: Post-SCI bladder management is complex, differing at Spinal Units around Australia, with the relationship between management and urological outcomes largely unknown. In WA, patients are managed at Royal Perth Hospital (RPH) and, when medically stable, rehabilitated at Fiona Stanley Hospital (FSH). We examined current practices and clinician-perceived barriers and facilitators to best practice in SCI bladder management.

Methods: Clinicians involved in SCI bladder care at RPH and FSH (6 doctors/consultants, 32 nurses) were given a recommendations matrix compiled from a Rapid Evidence Review of SCI bladder management literature (Wright and Bragge, 2015) before attending recorded focus groups to discuss the extent to which current practice mirrored recommendations. Recordings were transcribed and themes coded using NVivo software. Thematic analysis was inductive.

Results: Current management very closely (~95%) mirrors matrix recommendations. Perceived facilitators included importance of preventing complications (particularly through minimisation of indwelling catheters and early implementation of intermittent catheterisation) being ‘ingrained into practice’ and regular competency audits of catheterisation technique. Barriers to optimisation included lower than optimal nurse/patient ratios (impacting on patient and staff education) and conflicts and delays associated with prescribing and implementing long-term bladder management. Recent service changes resulting in Urology consultation occurring upon referral, rather than via weekly review of all patients, concerned some senior clinicians.

Conclusions: The findings suggest that acute post-SCI bladder management in WA standards are high, but weekly urology rounds, dedicated theatre lists and education standardisation would improve practice.
Robotic exoskeleton ambulation in a C4 incomplete person with spinal cord injury

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Poster Presentation Day 1, September 13, 2018

Introduction: To determine whether an individual with C4 incomplete spinal cord injury (SCI) with limited hand functions can effectively operate a powered exoskeleton (Ekso) to improve parameters of physical activity as determined by swing-time, up-time, walk-time, and total number of steps.

Case Presentation: A 21 year old male with incomplete chronic (>1 year post-injury) SCI C4, participated in a clinical exoskeleton program to determine the feasibility of standing up and walking with limited hand functions. The participant was invited to attend 3 sessions including fitting, familiarization and gait training separated by one week interval. Walk-time, up-time and total number of steps were measured during each training session. A complete body composition assessment using dual-energy X-ray absorptiometry (DXA) of the spine, knees and hips was conducted before training.

Using a platform walker and cuffing both hands, the participant managed to stand up and ambulate successfully using exoskeleton. Over the course of 2 weeks, maximum walk-time increased from 7 to 17 minutes and number of steps increased from 83 to 589 steps. The total up-time increased from 19 to 31 minutes.

Discussion: Exoskeleton training may be a safe and feasible approach for persons with higher levels of SCI after effectively providing a supportive assistive device for weight shifting. The current case study demonstrates the use of a powered exoskeleton for an individual with high level tetraplegia (C4 and above) and limited hand functions.
Optimizing completion of the International Standards for Neurological Classification of Spinal Cord Injury (ISNCSCI) at a specialist spinal cord injury centre.

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Introduction: Complete and accurate recording of the ISNCSCI is an ongoing challenge for those working in the field of spinal cord injury (SCI). We assessed the effectiveness of a series of quality improvement activities by measuring ISNCSCI completion rates over time.

Methods: A retrospective analysis was performed of the ISNCSCI records of all patients admitted to the Victorian Spinal Cord Service between 2012-2018. Four sequential six month periods represented the four different practice conditions. In the baseline condition a doctor performed the assessments alone and recorded manually onto an ISNCSCI worksheet. In the second condition, a doctor and physiotherapist performed the assessment together, recording manually onto worksheets. The third condition saw the introduction of an electronic database where a member of clerical staff transcribed worksheets onto the database. In the final condition assessments were uploaded directly by the physiotherapist and doctor and a validated online algorithm used to calculate the classification.

Results: At baseline (first condition) the average number of documented assessments per patient was 1.3, with 44% of patients having at least two assessments. This increased to 1.8 and 61% respectively after the second condition was introduced, and 2.2 and 84% following the third condition. The online algorithm (fourth condition) was introduced in July 2017 and results will be available in July 2018.

Conclusions: Our results indicate that the doctor plus physiotherapist assessments improved completion of the ISNCSCI, which were then further improved by database use. Future work will include an analysis of the accuracy of these assessments.
Burden versus benefit of Continuous Positive Airway Pressure therapy for the treatment of obstructive sleep apnoea in chronic tetraplegia: a mixed methods study.

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Introduction
Continuous Positive Airway Pressure (CPAP) therapy has been shown to improve daytime sleepiness in people with tetraplegia and obstructive sleep apnoea (OSA). Adherence to CPAP may be worse in people with tetraplegia than in those without disability due to additional physical and psychosocial issues. The aim of the study was to estimate CPAP adherence in people with chronic tetraplegia and OSA, and to explore barriers and facilitators to CPAP use.

Methods
People with chronic tetraplegia prescribed CPAP by a sleep physician were implemented in the CPAP clinic at the Austin Hospital, Melbourne. Telephone support was provided for four weeks. Semi-structured interviews were undertaken with participants after 4 weeks; the audiotaped interview was transcribed and analysed thematically. CPAP usage data were collected at 4 weeks and 6 months, with adherence defined as achieving more than 4 hours average per night.

Results
Sixteen patients with chronic tetraplegia were implemented with autoset CPAP (80% male; mean age 56 (SD=15); 21 (15) years post injury, 25% complete spinal cord injury). Mean nightly CPAP at 4 weeks was 3.07 hours (SD=2.53) with 50% adherent, and at 6 months was 2.40 hours (SD=2.5) with 19% remaining adherent. All participants initially experienced burdens from CPAP including frustration, discomfort, guilt about partner burden, and disruption of established routines. Those who persevered with the therapy tended to experience immediate daytime benefits and reported improvements in drowsiness, energy levels, spasm, mood, and productivity. Many adherent participants had misattributed daytime sleepiness to aging with tetraplegia until receiving diagnosis and adequate treatment for their OSA.

Conclusion
CPAP use is particularly challenging for people with tetraplegia. CPAP usage is similar to that reported in the non-disabled at 4 weeks, however it declines substantially over time. The reasons for this decline, and potential interventions to prevent it, warrant further investigation.
Pan-European Paediatric Spinal Cord Injury (PEPSCI) Collaboration: Preliminary Service-User Defined Research Priorities from the UK and Spain

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Poster Presentation Day 2, September 14, 2018

Background: Spinal cord injuries (SCI) in children are rare with significant, life-long complications affecting their physical and psychological well-being. Studies identifying research priorities for paediatric SCI based on service user perspectives for future research activities are limited. The PEPSCI Collaboration has been formed with the overall aim of identifying high priority research areas to help ensure that clinically and socially relevant issues in this field are addressed.

Methods: Following Institutional Ethical Approval and signed consent/assent, a cross-sectional, quantitative, multi-centre, international survey designed by the PEPSCI Collaboration was distributed to children, adolescents and young adults with SCI and to their parents/caregivers via mail in the UK and Spain to obtain information regarding demographics, quality of life, health and life domains and neurological impairment.

Results: Surveys were distributed via 5 UK and 2 Spain hospitals. Of the 177 participants who consented/assented to take part in the study to date, 52% were children, adolescents and young adults aged 0-25 with a neurological level between C3-T12 with SCI graded as AIS A-D. Priority issues regarding health and life domains for young individuals with SCI are emerging.

Conclusion: Preliminary findings from the UK and Spain hospitals suggest a number health and life-related issues which should be considered within future research agendas involving children, adolescents and young adults with SCI.

Acknowledgement: Funded by the Buckinghamshire Healthcare NHS Trust Charitable Funds and Stoke Mandeville Spinal Research, Buckinghamshire, UK and sponsored by the Buckinghamshire Healthcare NHS Trust. We acknowledge contributions of Maria Luisa Jauregui Abrisqueta and Patricia Subiñas Medina with participant recruitment and data collection.
Ethical issues in cannabis research

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Poster Presentation Day 1, September 13, 2018

The League of Nations instituted the 1912 international opium convention, which pressed countries to restrict import and export of opium and cannabis; signatories' instituted laws restricting the trafficking of opium and cannabis by way of taxation and certification. The US, China and Japan requested that the medical and scientific properties of cannabis and opium be investigated, but the other countries voted the request down. Even the long history of medical literature on the medicinal properties of cannabis could not stem the tide.

The result of the international conventions is that cannabis received the classification of having no medical value. Cannabis use for over 10,000 years became criminal activity in the US less than 70 years ago. Published research has completely eroded the evidentiary basis for the claim that cannabis is a drug with no medicinal value. The discovery of the endocannabinoid system indicates the observed medicinal properties of cannabis have a biological basis for action. The National Academies report that there is conclusive evidence of the effectiveness of cannabis for controlling chronic pain, nausea, and spasticity; has natural control over pain pathways, and its withdraw symptoms are very mild.

The patient voice is clear. Patients with SCI and chronic pain report that cannabis was the single most effective medication out of 26 pain treatments and the fourth longest acting for pain relief. Eighty-one percent of patients strongly agreed that cannabis alone was more effective for pain than cannabis and opioids. Others report relief of pain in 75-83% medical cannabis patients and 92% of the patients reported improved quality of life after other treatment have failed. There is no reported difference in the occurrence of serious adverse events compared to control group. It has been reported that the overall adult lifetime dependence rate is 9% of cannabis users. Drug researchers have consistently listed cannabis as less addictive than caffeine, nicotine and alcohol; placing cannabis last or near the last in a list of addictive drugs. The misclassification of cannabis by international convention motivated by political bodies has created a unique situation researchers. The moratorium on cannabis research leaves clinicians with little scientific base when counseling patients who may be interested in using cannabis for medical reasons.

The purpose of this instructional course is to provide the learner with timely, factual and relevant information pertaining to the historical, social and medicinal uses of cannabis for persons with spinal cord injury. Of particular interest will be an examination of ethical considerations faced by patients and caregivers.
Metastatic spinal cord compression - a growing concern

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Introduction:
Along with recent advances in oncology treatments and increased survival rates for people with cancer, more people are presenting with metastatic spinal cord compression (MSCC). For those with MSCC, symptoms of paraparesis / paraplegia and loss of bladder and bowel function are often the first sign of a spinal tumour as well as a primary cancer elsewhere. Dealing with the diagnosis and subsequent paralysis and incontinence leaves many people stunned and traumatised by their situation. In the UK the majority of these patients do not access a specialist spinal cord injury centre (SCIC) rehabilitation pathway despite their often reasonable prognosis. As a result they maintain a higher care dependency, suboptimal continence management and lack knowledge and problem solving ability to maintain healthy lifestyles. Currently in the UK SCIC’s are not commissioned for this group of patients. Therefore the Spinal Injuries Association (SIA) has received growing numbers of referrals for this cohort.

Method:
The SIA SCI Specialist Nurses have interrogated their own database and the National Spinal Cord Injury Database, to identify the numbers of people with MSCC referred to their service for ongoing support and advice, linking with MSCC Nurses in various organisations to further understand the scale of the problem.

Results:
Illustration of the numbers of people referred for ongoing SCI support following diagnosis of MSCC, the primary tumour (if known) and the numbers accepted for specialist SCI rehabilitation. Also discussion of the strategic plan of delivering educational days for health care professionals - widely acknowledged as a very successful initiative of the SIA.

Conclusion:
As this patient group continues to grow, systems need to be developed to improve their care pathway. Highlighting the issues identified, the SIA will influence both professionals and providers of care that people with metastatic spinal cord compression deserve appropriate rehabilitation provision.
Developments in enhancing neurogenic bowel management provision

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Poster Presentation Day 2, September 14, 2018

**Introduction:**
It is well documented that management of neurogenic bowel dysfunction is one of the most challenging aspects of care for those who have acquired SCI and the team members supporting them, particularly in non specialist settings (Guidelines for Management of Neurogenic Bowel Dysfunction, MASCIP 2012). Since developing the SIA SCI Nurse Specialist Service two years ago, the team have been inundated with enquiries and requests to assist with many issues around this important aspect of care provision. This presentation / poster will identify the most common problem areas from both client and care team perspectives and how they can be addressed.

**Method:**
Using the Freedom of Information Request to Healthcare Trusts within the UK, working with professionals and commercial organisations, collaborating with the royal College of Nursing and NHS England, and scrutinising data from our own database, it has become clear how much still needs to be done to improve this aspect of care for SCI people.

**Results:**
The presentation will illustrate how the SIA SCI Nurse Specialists have challenged these issues using a global approach at strategic and policy level as well as a practical level. Tools have been developed to assist in the alleviation of some of these concerns including a Skills and Competency Module, template policy document, guide to assist teaching clients, and an improved anatomical model for teaching practical techniques.

**Conclusion:**
Practical and strategic solutions have been developed to enhance the provision of this aspect of care for SCI people and to support their care teams.
Usability assessment of a hands free Robotic Exoskeleton - REX Bionics

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Poster Presentation Day 1, September 13, 2018

Introduction:
Gait and mobility impairments are commonly seen in disabling Neurological disorders. Robot assisted gait training is an effective rehabilitative treatment but the evidence supporting its use alongside conventional options needs further evaluation. REX is a hands-free, self-supporting, independently controlled robotic mobility device that was designed to aid in the physical rehabilitation in patients with severe neurological conditions. It facilitates sit to stand position, allowing supported walking, stretching exercises and other rehabilitation goals thus improving patient’s quality of life. It is currently being used in patients with spinal cord injury, multiple sclerosis, traumatic brain injury and stroke.

Method:
3 staff members including a Neurorehabilitation Consultant, a physiotherapist and an occupational therapist received extensive training in the use of this device. They then cascaded the training to 27 therapy staff who trialled the device on colleagues. The device was also evaluated by four patients. Their feedback was recorded on a questionnaire which focused on the ease of use and efficacy of therapy with the device.

Results:
Overall the feedback following the use of REX Bionics was positive. 20 (74%) assessors felt that the patient measurements were easy and manageable. Only 2 subjects were not confident or were unsure on how to fit a patient on to REX. 75% (3 out of 4) of the patients were happy with the session overall and felt that devices like the REX should be incorporated in routine therapy.

Conclusion:
The use of REX Bionics is promising in neurological rehabilitation, offering patients the opportunity of robot assisted mobility. However, our cohort of patients felt that a more prolonged use is necessary to assess the effectiveness in the long term. The therapists also noted benefit although felt that more training was required in the technical aspects of the device.
Life situation of people with Spinal Cord Injury in Germany

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Poster Presentation Day 1, September 13, 2018

Introduction
Germany is a participating partner of the International Spinal Cord Injury Survey (InSCI). Due to a lacking German Spinal Cord Injury Register, there are currently no information on the life and health care situation of people with Spinal Cord Injury living in Germany (Blumenthal et al., 2016).

Methods
A questionnaire was sent to people with SCI in Germany via their specialized SCI-centers. A paper-pencil or an online questionnaire version could be completed.

Results
Of n=5,598 persons with SCI who were sent a questionnaire, n=1,406 returned the completed questionnaire by post and n=327 online. The response rate is therefore 31.0%. First results and descriptive analysis are already available for n=158 people.

Mean age was 56.4 years (SD=14.7). Men were represented more frequently with 72.8%. The majority of respondents was married (55.1%) or lived in a partnership (13.9%).

The time since injury or disease varied widely and ranged from 2 years to 58 years (mean=12.7). The distribution of the lesion height was very homogeneous with 50.3% para-plegia and 49.7% tetraplegia.

Participants reported in 30.7% a complete paralysis. The cause of the SCI was 82.4% traumatic and 17.6% disease-related.

31.4% of people aged 18-65 years were employed, while 32.1% were retired because of their health status and 29.5% because of their age. 32.7% would like to do a remunerable employment, 35.6% could not find a job because of their health status. Slightly less than half of those of working age (42.3%) participated in activities for professional reintegration.

Conclusion
The results of the first participants indicate that the health status is a barrier for return to work. Further analyzes will investigate more hindering and facilitating factors.
Exercise induced hypotension during arm crank test

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Poster Presentation Day 1, September 13, 2018

Introduction:
Spinal Cord Injury (SCI) may interrupt autonomic pathways leading to disturbed cardiovascular homeostasis. Physical activity requires a range of integrated autonomic and cardiovascular adjustments in order to maintain homeostasis. SCI may endanger the control of blood pressure resulting in hypotension. Exercise induced hypotension, defined as a≥10 mm Hg fall in systolic blood pressure during exercise, can be a significant symptom.

Methods:
A 55 year old man sustained an incomplete SCI at C6 after a sport accident in 1980. He planned to go skiing and underwent an arm crank test to access his exercise capacity. The test was performed whilst he remained seated in his wheelchair. Blood pressure (BP) was measured continuously by Finometer and intermittent by Dinamap.

Results:
Both Finometer and Dinamap struggled to record his BP as it was very low. BP measured by Dinamap was 78/48 mmHg with a heart rate 79 beats per minutes.
He managed to use the arm crank at 0 Watts at 45 rounds per minutes for less than a minute before he had to stop due to drop in BP, which was undetectable by Finometer and Dinamap. He had a transient reduction of consciousness and recovered very slowly after reclining his wheelchair and having an ice pack placed on his neck.

Conclusions:
Minimal arm exercise resulted in severe BP fall and reduced consciousness. Cardiovascular responses to exercise in subjects with a SCI and affects the ability to perform exercise. Assessing blood pressure during exercise is recommended when suspecting exercise induced hypotension.
Is postprandial hypotension correlated to nocturnal dipping in spinal cord injured patients?

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Poster Presentation Day 1, September 13, 2018

Introduction:
Spinal Cord Injury (SCI) may interrupt autonomic pathways leading to disturbed cardiovascular homeostasis. Ambulatory blood pressure measurement (ABPM) provides a simple non-invasive assessment of cardiovascular autonomic dysfunction after SCI. The aim of the study is to describe asymptomatic and symptomatic postprandial hypotension in patients with a SCI ≥T6. Postprandial hypotension (PPH) was defined as drop in BP > 20 mmHg within 2 hours of a meal from average blood pressure with or without symptoms.

Methods:
A 24-hour-ABPM monitor was performed on all admitted patients to our unit for primary rehabilitation from 01.01.-31.12.2016. Data and diary activities from the first ABPM from each patient were analyzed. The diary comprised activities which induce changes in BP and HR, including meals as well as symptoms, including PPH. ABPM was recorded using Meditech Card(X)plore device and CardioVisions 1.18.22 software.

Results:
41 patients with SCI ≥T6 were included in the study. Paraplegia (N=14): 34 %, tetraplegia (N=27): 66 %, complete (N=7): 17 %, incomplete (N=34): 83 %, mean age: 60 years, F/M-ratio: 1:1.5. 39 % (N=14) had a nocturnal dip. 15 episodes of PPH were observed in 13 patients. 77% of the episodes in tetraplegics (N=10). Three episodes of PPH was observed after breakfast, nine after lunch, two after dinner and one after bolus tube feeding at night. 31 % (N=4) of patients with nocturnal dip, and 69 % (N=9) of those non-dippers had PPH. None of the patients reported any symptoms.

Conclusions:
Our findings show, that PPH occurs in both para- and tetraplegics; it’s either asymptomatic or not reported by the patients. PPH in our study is not more frequent in non-dippers. Further studies are needed to investigate if PPH is a separate risk of mortality and morbidity in SCI patients as described in other patient groups.
A Shared Path: Growing an Accessible Kitchen Garden

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Poster Presentation Day 2, September 14, 2018

Background:
Plant2Plate Accessible Kitchen Garden (AKG) is an Occupational Therapy Quality initiative that employs horticulture and Nature Assisted Therapy to cultivate a holistic engaging approach to Spinal Rehabilitation. Nature Assisted Therapy has been demonstrated to be effective and appropriate in a public health setting (Annerstedt & Wahborg 2010, p.371)

Promoting inclusiveness, accessibility and independence, the AKG empowers wheelchair users and acts as a demonstration space for what can be achieved beyond rehabilitation.

Methods:
In conjunction with weekly OT cooking retraining sessions, the AKG provides a safe space to explore and implement innovative accessible gardening options for inpatients who have recently sustained a Spinal Cord Injury (SCI). During these sessions, patients grow, cultivate and harvest food for meal preparation and cooking retraining sessions.

Results:
Participants have engaged in informal discussion and feedback about the garden, reporting improved mood, interaction with other peers and participation in meaningful occupation. Moving forward we aim to collect more formal qualitative and quantitative data to evaluate the effectiveness of the garden project.

Conclusion:
Since its inception, Plant2Plate AKG has grown relationships, successfully engaged patients in pre morbid activities and show cased innovative accessible gardening options for independent use at home. The garden is about practical applications in an authentic garden space for wheelchair users.

Future Directions:
Through digital media platforms and connecting with the wider wheelchair community, Plant2Plate AKG will grow to become an information sharing Hub to demonstrate to all what can be achieved in accessible gardening.

The serial changes and characteristics of dysphagia in patients with acute traumatic cervical spinal cord injury: a prospective study

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Poster Presentation Day 1, September 13, 2018

Introduction
Dysphagia following cervical spinal cord injury (CSCI) can increase the risk of pneumonia, that may cause life-threatening conditions. In our previous retrospective study of 298 cases, we reported old age, severe paralysis, and presence of tracheostomy were the risk factors of dysphagia (Spinal Cord 2017). The relationship between CSCI and dysphagia has been recently reported, however, to our knowledge, no previous study has been reported serial change of dysphagia. The purpose of this study was to examine the serial change of dysphagia and elucidate the critical period for dysphagia in patients with CSCI.

Methods
We prospectively examined patients with acute traumatic CSCI admitted within 2 weeks after injury. Severity of dysphagia was classified using dysphagia severity scale (DSS: 1 Saliva aspiration, 2 Food aspiration, 3 Water aspiration, 4 Occasional aspiration, 5 Oral problems, 6 Minimum problems, and 7 Within normal limits) and was evaluated at 2 weeks, 1 month, 2 months and 3 months after injury. Condition of oral intake before injury also assessed by history taking. In addition, American spinal injury association (ASIA) impairment scale and ASIA motor score were assessed.

Results
65 patients with CSCI were prospectively assessed for 3 months after injury. The serial changes of DSS on average were decreased at 2 weeks after injury, however, gradually increased thereafter (before injury: 6.8, 2 weeks after injury: 4.9, 1 months after injury: 5.2, 2 months after injury: 5.8, 3 months after injury: 5.9, respectively). Significant correlation between ASIA motor score and DSS were found in 2 weeks after injury (\(p=0.66\)), indicating that patients with severer paralysis had severer dysphagia.

Conclusions
We prospectively examined the serial changes of dysphagia after acute CSCI. Dysphagia occurred after injury, however, swallowing dysfunction gradually improved over time. Patients with lower ASIA motor score showed severer swallowing dysfunction.
Using Spinal Cord Injury Patient Reported Outcomes as Clinical Tools to Enhance Quality of Life and Improve Clinical Practice

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Poster Presentation Day 1, September 13, 2018

Over the last 17 years, twenty-two patient reported item banks and scales have been developed that have been targeted to individuals with Spinal Cord Injury (SCI). While these SCI-QOL instruments have become important measures of physical, medical, emotional, and social functioning and are now incorporated in several research studies. These measures have potential to facilitate clinical work and recent work has focused on developing standards for interpreting scores and examining barriers to integrating these measures into routine clinical care.

This instructional course is designed to introduce the SCI-QOL measurement system, present some of the recent advances to assessment in SCI medicine, and discuss barriers to incorporation of PROs into SCI clinical practice. Barriers such as the response burden on patients, the length of time to score measures and the lack of interpretive guidelines. The SCI-QOL measures can be administered as brief yet precise computer adaptive tests (CATs) which are scored automatically but, currently, there are not any interpretive guidelines to identify clinically significant scores along with actionable benchmarks to prompt clinicians to take action to mitigate symptoms or improve quality of life.

Recent research has focused on engaging individuals with SCI and clinicians who specialize in SCI medicine to identify clinical “cut points” which would facilitate the interpretation of the scores. The research has utilized an innovative standard-setting approach that has been utilized in education settings. This methodology places individuals with SCI and SCI clinicians in the role of experts and has identified a set of scoring cut points to differentiate between those individuals with “no problems”, “mild problems”, “moderate problems” and “severe problems,” respectively. The presentation will review how cutpoints have been identified for the following SCI-QOL Item Banks: Basic Mobility, Self-Care, Bladder Management Difficulties, and Bowel Management Difficulties, Depression, Anxiety, Resilience, and Ability to Participate in Social Roles & Activities.

The Instructional Course will focus on further research designed to identify barriers and supports to use patient reported outcomes measures in SCI rehabilitation. The discussion will examine the feasibility, effectiveness, and sustainability of implementing PRO measures in clinical practice. Finally, there is recent research to evaluate the potential impact of SCI-QOL adoption on clinical team functioning and the potential impact on communication and patient care.
Increased CSF GFAP levels in surgically treated SCI patients with progressive neurological deterioration due to tethered cord and/or syringomyelia

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Poster Presentation Day 1, September 13, 2018

Introduction
Patients with SCI may develop a progressive myelopathy, due to scarring and tethering of the spinal cord and/or cyst formation, causing gradual neurological deterioration. The condition may occur after some months up to many years after the SCI. The treatment is neurosurgical with untethering of the cord and, when indicated, drainage of the associated spinal cord cyst(s) with the aim of stalling further deterioration. Body fluid biomarkers might be important to elucidate the etiopathogenesis of myelopathy as well as to assess and monitor ongoing damage and to inform clinical management. The present study aims to examine a panel of novel injury biomarkers in CSF and plasma of surgically treated SCI patients with progressive neurological deterioration.

Methods
Between March 2013 and October 2015, 12 patients having microneurosurgical treatment due to spinal cord tethering and/or syringomyelia at Uppsala University Hospital were included. Of these, 6 patients had a traumatic SCI and 6 had other reasons for SCI such as subarachnoidal or intraspinal hemorrhages. Three patients required repeat surgery and in total, 15 biomarker samples were collected. Nine patients having surgery for benign lumbar tumors and 10 patients treated for cervical radiculopathy without spinal cord involvement were used as controls.

For CSF sampling, 3-5 mL was obtained at time of dural opening at open surgery, or via lumbar puncture the day prior to surgery in the cervical radiculopathy controls. The analyzed biomarkers were a) Neurofilament Light (NF-L), an intraaxonal structured proteins highly expressed in large axons, b) phosphorylated Neurofilament Heavy (pNF-H), a biomarker of axonal and neuronal injury, c) Glial Fibrillary Acidic Protein (GFAP), an astroglial marker and d) Ubiquitin C-terminal Hydrolase (UCH-L1), an enzyme highly expressed in neurons. Plasma samples were collected from all patients.

To evaluate general health status and functional level the mJOAC questionnaire and the EQ-5D instrument were used prior to and at three months after surgery. For statistical analysis, Kruskal-Wallis followed by, if significant, Mann-Whitney U test for groups-wise comparisons was used.

Results
The patients were satisfied with surgical treatment and EQ-5D-VAS (self-assessed health status) was significantly improved after surgery in the SCI group. The improvement in mJOAC scores were significant for the Cervical and Quality of Life dimensions (p<0.05). There were no postoperative complications. GFAP was significantly higher in the CSF of patients in the SCI group compared to the cervical radiculopathy controls (p=0.0043). The CSF biomarker levels of NF-L, pNF-H and UCH-L1 were similar in all three groups. In plasma,
the levels of all evaluated biomarkers were comparable among the SCI and control groups. In addition, there were no correlations between the plasma and CSF levels for any of the evaluated biomarkers.

Conclusion
CSF biomarker sampling at time of surgery is feasible in patients with cord scarring and/or spinal cord cyst formation. Our data indicates that neurological deterioration is associated with increased CSF GFAP levels. Taken together, these findings suggest that continuous glial scar formation contribute to the clinical deterioration and that GFAP could be valuable to characterize and monitor the ongoing disease progression.
Analysis of transduction efficiency and tropism of AAV serotypes in chronic spinal cord injury

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Poster Presentation Day 2, September 14, 2018

Introduction: A combination of several treatment options, including gene therapy, is thought to be necessary for the management of chronic spinal cord injury (SCI). In this study, we focused on the use of adeno associated virus (AAV) vectors as a therapeutic gene transporter. It is well known that AAV serotypes have different tropisms. However, a comprehensive study investigating the efficiency of the different serotypes in chronic SCI has never been performed. The aim of this study is to elucidate the character of AAV serotypes in chronic SCI.

Method: We produced AAV serotypes 1~9, rh10, DJ and DJ/8 with CMV promoter. Luciferase and VENUS were used as an in vivo reporter. First, intraparenchymal injections of each serotype was given to the intact mouse spinal cord and bioluminescence images (BLI) were measured. Second, the three most promising serotypes, based on the results of the BLI, were injected into the chronic SCI. BLI and immunohistological evaluation was performed.

Result: In the study using intact spinal cords, AAV5, AAV6 and AAVrh10 had the highest photon count measurements with BLI. Therefore, we selected these serotypes for injecting into chronic SCI. Among these, AAVrh10 had the highest photon counts. Immunohistological analysis revealed AAVrh10 transduced into more neurons, astrocytes and oligodendrocytes than others. A higher infiltration of the injury epicenter was achieved using AAVrh10.

Conclusions:
We showed that AAVrh10 was the most effective in transducing the chronic SCI. AAVrh10 could be a good candidate for therapeutic gene transfer and as a tool for research of chronic SCI.
Substance use in acute spinal cord injury: a five year review

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Introduction
Substance use is common among persons with newly acquired spinal cord injury (SCI). In those with complex conditions such as SCI, negative impacts of substance use may be magnified.

Alcohol and tobacco have been regularly studied in this population, with stimulants, sedatives, and illegal substances rarely researched.

This project aimed to determine prevalence of substance use in the newly spinal cord injured population, seen by the Victorian Spinal Cord Service (VSCS) over 5-years.

Methods
A file audit was completed, of clients admitted to the VSCS with a new SCI, between 2013-2018. Data extracted included demographic and injury details, history of substance use, and substances used at time of injury. Information regarding associated injuries, incidents, mental health history, and hospitalisation period was obtained.

Results
151 of 377 files have been audited, with full analysis expected by May, 2018.

At time of writing, 62% of clients with newly sustained SCI reported a history of substance use. Common substance use included alcohol (89%), tobacco (43%), and stimulants (15%). Clients using substances at time of injury represented 19% of total population. Alcohol was reported in 88% of cases, followed by stimulants (18.5%), marijuana, hallucinogens and opiates (4%). Relationships between substance use and demographics, behavioural incidents, mental health history, and hospitalisation length have been analysed.

Conclusion
Substance use in persons with newly acquired SCI is common in Victoria. Limitations exist in the accurate reporting of substance use, particularly illegal substances.

Results will inform future research and improvement activities in Victoria, focussed on harm minimisation.
First year’s data from the New Zealand SCI Registry

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Poster Presentation Day 2, September 14, 2018

Introduction: A national adult spinal cord injury (SCI) registry was established in August 2016 in partnership with the Rick Hansen Institute, Canada. Results from the first year of the New Zealand Spinal Cord Injury Registry (NZSCIR) are presented.

Methods: During the NZSCIR’s first year (1 August 2016 – 31 July 2017) prospective data collection was collected for people admitted to either of the NZ SCI centres. Either a minimal data set (not requiring consent) or the full data set (with consent) was entered. Data was entered by clinicians, two coordinators and extracted by the Rick Hansen Institute.

Results: A total of 161 participants were enrolled in the NZSCIR in its first year. This included complete records for 101 consenting and non-consented participants for whom key admission and discharge data was available.

Of the 161 participants, 67% had a traumatic SCI and 33% had a non-traumatic SCI. Men account for 73% of all SCI and 78% of traumatic SCI. Ages ranged from 15-88 years. Most participants are NZ European (47%). Maori are over-represented in traumatic SCI (18.6%).

The top three causes of traumatic SCI were falls (36%), sports (28%) and transport (23%). Injury to acute admission to a SCI service ranged from 0.7-217.8 hours. Time to spinal cord decompression ranged from 4.8-237 hours. Seven participants received surgery within 12 hours and a further 9 within 24 hours. The median length of stay in acute SCI services was 12 days and rehabilitation was 77 days.

Conclusions: NZSCIR derived data will prove useful for service improvement and research. Changes to the minimum data set are planned to improve capture of aetiology data, time to surgery and secondary complications. Collection of non-traumatic SCI data in a registry is unique. Work is underway to improve consent rates and collection of non-traumatic data. Community follow-up and historical data collections are underway.
The Effect of Spinal Cord Injury on the Developing Bladder and Kidney

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Poster Presentation Day 2, September 14, 2018

Introduction
In the past, urinary tract infection and kidney injury were the main causes of death of patients with spinal cord injury (SCI). There have been various studies about the bladder function in adult patients with SCI, but only a few studies have been performed in pediatric subjects. The aim of this study was to assess the effects of SCI on the developing bladder and kidney in pediatrics with aging.

Method
A retrospective review of 13 pediatric cases of SCI followed up until adolescence was performed. Mean age of onset was 3.6 years with a range of age 0 to 17 years. To evaluate the tendency of developing bladder in pediatric patients with SCI, we reviewed serial urodynamic study (UDS), voiding cystourethrography (VCUG), and ultrasonography of kidney, ureter, and bladder (US KUB). We checked bladder volume in the last UDS and VCUG to know whether they reach predicted maximum bladder capacities by their age. Predicted maximum bladder capacity was calculated using the Koff’s formula; \((\text{age} + 2) \times 30\). Detrusor functions were divided into overactive and non-overactive.

Results
In most cases, detrusor function was shown to be non-overactive. Maximal bladder capacity was found to be relatively well reached to predicted volume with aging while two subjects did not reach. Most of the patients experienced the change of detrusor function within 1 or 2 years from onset. Trabeculation in the bladder was observed 12 subjects, mostly within a year from the onset, showing a tendency of aggravation with aging. Seven subjects (53.9%) showed vesicoureteral reflux (VUR), 7 (53.9%) were diagnosed as hydronephrosis, and 8 (61.5%) reported urine leakage.

Conclusion
In this study, changes in detrusor function of pediatric patients with SCI were similar to those of adult. Most of the subjects showed non-overactive bladder. It is thought to be the effect of adequate medications and interventions. Various urological complications were found depending on the duration of disease in pediatric patients. According to these findings, regular evaluations for the bladder function in pediatric patients with SCI are important to prevent urological complications and improve life expectancy with better management of bladder.
Living and health conditions for adults with spina bifida in Sweden – a comprehensive prevalence group study

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Poster Presentation Day 2, September 14, 2018

Abstract

Introduction Seventy-five per-cents of children born with Spina Bifida (SB) are expected to live into adulthood, meaning that the adults will need more attention in the future. Adulthood involves great demands for persons with SB, but also for their families, the social well-fare and healthcare systems, as the group has a persistent need for care and support. The aim is to describe the living and health conditions for adults with Spina Bifida in different life stages including medical, physical, psychological, cognitive and social aspects.

Methods A cross-sectional study conducted by a multidisciplinary team. Data collection was performed through structured interviews, questionnaires and clinical assessments. All individuals > 18 years with SB (n=219) registered at a regional outpatient clinic were offered participation; 196 persons (104 women, 92 men 18-73 years) were included.

Results There was a great variation in the group concerning problems related to their congenital injury. The persons > 45 years and especially > 61 years seems to have less problems such as less prevalence of hydrocephalus, Chiari II malformation, tethered cord syndrome and they also walked to a higher extent. They passed elementary school to a higher extent and performed better on the tests for psychomotor speed and executive function.

Conclusions The study shows the multifaceted problems this group is facing as adults with SB and contributes to increased knowledge concerning the living and health conditions. Increased knowledge can lead to targeted interventions and better care, thereby decreasing secondary complications, reducing costs for society and hopefully increasing quality of life for persons with SB and their families.
Setting up a new Nerve & Tendon Transfer service – from patient, therapist and medical perspective

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Introduction
It has been some years in WA since tendon transfer surgery has been offered for individuals with SCI, and it is a new innovation to consider nerve transfers for this population. Surgical options to enhance upper limb function enable individuals with tetraplegia to make best use of potential abilities.

Method
This poster describes the current service delivery model and presents the challenges of developing a new service from a range of perspectives.
12 Semi structured interviews have been conducted with:
• patients who are considering surgery (both locally and interstate)
• rehabilitation medicine physicians and surgeons
• therapists from the public and private sector

Results
Thematic analysis identified communication was the highest priority including:
• written material for those considering surgery; covering types of surgery, risks and outcomes, procedural issues, commitments and timeframes
• access to surgeons to discuss individual patient and therapist concerns
• clear protocols pre and post surgery, including detailed upper limb assessment
• support of all involved including carers, family, patients who have undergone the surgery
Other themes included financial support, access to equipment and services post surgery and need for knowledgeable therapy and medical staff.

Conclusions
Nerve and tendon transfer surgery has become embedded as a choice to improve hand function across the globe. In WA individuals with tetraplegia warrant access to this alternative, with a service that is well supported by informed therapy and medical staff. Development of clear pathways, protocols and processes will provide patients with the confidence to pursue this opportunity.
Nogo receptor antagonist LOTUS promotes axonal regeneration and functional recovery in clinically relevant contusive spinal cord injury model of mice

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Poster Presentation Day 1, September 13, 2018

Introduction: Lateral olfactory tract usher substance (LOTUS) was identified as a Nogo receptor antagonist which suppresses axonal growth inhibitors. Although the efficacy of LOTUS expression has been demonstrated with the regeneration of raphespinal tract and functional recovery following hemisection spinal cord injury (SCI), its significance has not been evaluated in a more clinical relevant and more detailed analyses are required. The purpose of this study is to determine the efficacy of LOTUS using a more clinically relevant contusive model.

Methods: Contusive SCI was induced at the tenth thoracic level in LOTUS-overexpressed mice (LOTUS group; n=20) and wild-type (control group; n=16). Hindlimb motor function was evaluated for six weeks post-injury using BMS scores, DigiGait and rotarod test. On this sixth week, anterograde tracing of corticospinal tract and retrograde tracing of reticulospinal tract were performed. Two weeks later, electrophysiological and histological analyses were examined.

Results: Tracing analyses showed significant corticospinal and reticulospinal regeneration post-injury in the LOTUS group. Immunohistochemistry revealed that the NF-H, 5-HT and p-GAP43 positive fibers increased significantly at the caudal sites. As for the reticulospinal tract, there was a significant increase 14 days post-injury which continued increase up to 56 days. Furthermore, cleaved caspase-3 staining revealed that LOTUS suppressed cellular apoptosis during the acute inflammatory phase. Significant improvements in BMS scores, DigiGait, rotarod test and electrophysiological analysis were seen in the LOTUS group.

Conclusions: LOTUS showed neuroprotective and regenerative effects, which contributed to the functional recovery in contusive SCI. Application of LOTUS for the treatment of SCI is promising.
Nutrition practices of patients with spinal cord injury in specialist rehabilitation – an exploratory study

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Poster Presentation Day 2, September 14, 2018

Introduction
Good nutrition is vital for good health and wellbeing. There is some evidence that dietary intake is positively correlated with nutrition knowledge². Whilst few studies have observed the dietary intake data of individuals with spinal cord injury (SCI)³,⁴, there is paucity of data on the nutrition knowledge and food behaviours.

The primary aim of this study is to explore the knowledge, attitudes and nutrition behaviours of patients with spinal injury in specialist inpatient rehabilitation. Objectives include 1. to ascertain if current food choices and nutrition practices are in line with national food guidance systems 2. to identify knowledge deficits 3. to determine any correlation between the participant’s nutrition knowledge and food behaviours/practices and 4. to determine priority areas in food and nutrition to design an intervention project.

Methods
This cross-sectional study is a situational analysis within an inpatient rehabilitation setting. Participants completed a knowledge questionnaire¹, three-day food records and an exploratory interview.

Results
Preliminary data (n=50) indicates overall nutrition knowledge score of 58.6±13.2 (maximum score 85). Greater scores were observed in male participants, tetraplegia and a higher level of education. All participants (n =44) rated healthy eating as important whilst almost all (n=41) believed national food guidance systems are health promoting. Current intakes tended to exceed requirements (7745±1281kJ vs 7610±1483kJ energy; 72.6g 13.3g vs 50.06 18.4g protein, P=0.000).

Conclusion
This is the first study exploring nutrition knowledge in the SCI population in a rehabilitation setting. There is evidence of nutrition knowledge gaps in SCI patients varying with demographic factors. Preliminary data analysis also indicates increased energy and protein intakes. Intervention programs to address the knowledge gaps and dietary behaviours may be beneficial in this high-risk group.
Factors associated to return to study of students after spinal cord injury: An explorative study

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Poster Presentation Day 1, September 13, 2018

Introduction: This study examined the associated factors to return to study of students with Spinal Cord Injury (SCI) after getting discharged from rehabilitation centre.

Method: In this cross-sectional study, patients who were students before injury and completed rehabilitation during 2014-2016 were excerpted from the medical records of Centre for the Rehabilitation of the Paralysed (CRP), Bangladesh. All eligible participants were contacted over telephone and those who consented were interviewed by using a structured survey questionnaire. Descriptive analysis was conducted by using SPSS (Version 20).

Result: Out of 103 eligible participants, 49 (47.6%) of them responded to the telephone interview. Participants were age range between 10-30 years, and majority (53.06%) of them were at age group of 16-20 years. At the time of the interview, there were 28 (57.2%) participants who have returned to study, of whom 39.3% returned to the same institute, 32.7% continuing study. Positive support from the family members was reported by 92.8% of respondents to be most influential factor in returning to study, whereas financial hardship (28.6%) and inaccessible environment (19.0%) were found as the two most common barriers to continue their student life.

Conclusion: Around half of the students with SCI do not return to their academic role. Emphasis to improve family attitude towards returning to study, providing financial support, and improving environmental accessibility for person with SCI in the academic institute are likely to increase resuming study of students with SCI.
Central Nervous System Connectivity in a Man with Motor Incomplete Tetraplegia

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**Poster Presentation Day 1, September 13, 2018**

Introduction: Diffusion acquisition imaging and transcranial magnetic stimulation (TMS) can measure central nervous system (CNS) changes following spinal cord injury (SCI). As rehabilitation needs are based on functional progress, adding CNS quantitative data could allow targeted intervention and justification for rehabilitation. Spared white matter is predictive of locomotor recovery in mice, thus suggesting potential predictive value for humans. The purposes are to examine CNS structural connectivity using neuroimaging, and to examine corticospinal tract (CST) connectivity using TMS.

Methods: 32 year old man with incomplete motor tetraplegia (AIS C) and 10 subjects without neurologic injury participated. Subjects underwent cervical spinal cord/brain multishell diffusion acquisition imaging (3T MRI). Diffusion tensor imaging (DTI) and neurite density orientation dispersion imaging (NODDI) examined white matter integrity. The subject with SCI underwent single pulse TMS testing.

Results: Fractional anisotropy (FA) was decreased with SCI (0.25 SCI, 0.47±0.08 non-SCI) indicating loss of white matter and degeneration of spinal tracts. Orientation dispersion index (ODI) was increased showing increased fiber dispersion (0.39 SCI, 0.16±0.10 non-SCI). In the brain, ODI values were increased by 10.8% with SCI with little difference seen with FA values (decreased by 0.9%). Using TMS, high stimulus intensity activated thoracolumbar erector spinae and tibialis anterior (TA).

Conclusions: Structural connectivity changes were seen in the spinal cord and brain for the subject with SCI. TMS activation matched volitional TA ability. While trunk muscle motor function is difficult to assess clinically, TMS results indicate CST connectivity. These preliminary results are encouraging and warrant further investigation.
Challenges associated with repatriating non-compensable patients with newly acquired spinal cord injuries: An Australian experience.

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Poster Presentation Day 2, September 14, 2018

Introduction
Spinal cord injury (SCI) is life changing for patients and their families. Overseas patients, in Australia at the time of their SCI, encounter significant financial, logistical and emotional challenges. For non-compensable patients, these challenges necessitate an intensive multidisciplinary approach involving early coordination with the patient, their family, airline carriers and the destination hospital, to optimise timely, safe repatriation. The aim of this review was to explore the specific needs of patients who required repatriation in order to develop clinical pathways.

Methods
We conducted a retrospective database review of patients within a tertiary referral facility in Sydney, Australia for acute SCI’s between 2013 and 2018, to identify non-compensable patients requiring repatriation. We extracted data related to their injury, social and financial circumstances which could potentially impact on successful repatriation. With this data we identified many challenges and requirements within this patient group.

Results
Of the nine patients identified, five were non-compensable, requiring repatriation to Ireland, Philippines, Canada, Malaysia and New Zealand. The complex support required to repatriate these patients included considerable financial cost, liaison and coordination with healthcare facilities and airlines, education for family members supporting the repatriation and psychosocial support.

Financial costs included medical treatment, airfares, equipment and carer living needs. Considerable effort was required to coordinate between our facility, overseas healthcare providers and airlines. Education included instruction on personal care, continence, and training for potential emergencies such as managing autonomic dysreflexia inflight. Psychosocial support included managing visas, providing updates with interpreters and assisting families to fundraise.

Conclusions
Our review highlights the need for a pathway that provides guidance on the priorities and sequence for a safe and streamlined repatriation process. Furthermore, there is a need for standardised patient and carer educational resources. We will pursue this in order to ease the burden for this extremely vulnerable patient group.
Cardiovascular risk factors and the association with leisure time physical activity among older adults with long-term spinal cord injury

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Poster Presentation Day 1, September 13, 2018

Introduction: Cardiovascular disease is one of the leading causes of death in people with spinal cord injury (SCI). There is therefore a need to elucidate modifiable, lifestyle-related factors that could prevent this outcome, especially in older adults with long-term SCI. The aim of this study is to describe the association between cardiovascular risk factors (i.e., body mass index (BMI), waist circumference (WC), blood pressure, blood glucose and blood lipids) and leisure time physical activity (LTPA) in older adults with long-term SCI.

Methods: Data from the Swedish Aging with Spinal Cord Injury Study (SASCIS), including 123 participants (mean age 63 years, mean time since injury 24 years, injury levels C1-L5, AIS A-D). Data were collected through interviews, assessments and blood sampling. The Physical Activity Recall Assessment for People with Spinal Cord Injury was used to assess LTPA. Associations were investigated using multivariable linear regression analyses controlling for sociodemographics and injury characteristics.

Results: Overweight, hypertension, dyslipidemia and impaired fasting glucose were highly prevalent. Almost one third of the participants performed no LTPA at all. In the multivariable analyses, more minutes/day of moderate-to-heavy intensity LTPA were significantly associated with lower BMI (B=-0.04; p=0.001) and lower WC (B=-0.09; p=0.012). No other significant associations between LTPA and cardiovascular risk factors were found.

Conclusions: Participation in LTPA is linked with better cardiovascular health in older adults with long-term SCI. Further studies are needed to establish the directional causality of the associations and the amount of LTPA needed to obtain positive health effects in this group.
"Spinal Rehabilitation Clinical Pathway: A tool to keep us on track instead of the system tracking us"

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Poster Presentation Day 1, September 13, 2018

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Introduction:
The Spinal Rehabilitation Clinical Pathway was designed by a group of clinicians from Northern Sydney Spinal Cord Injury Service (Royal North Shore Hospital and Royal Rehab) in 2015. The acute and subacute units in Northern Sydney are located on different sites unlike the Prince of Wales Hospital Spinal Service and posed an independent set of challenges which were identified by Exit Block Project team. The aim of the clinical pathway is to deliver high quality patient centred service and to act as a diagnostic tool to identify gaps within the existing framework to further enhance and develop the flagship service into the future.

Method
Mixed method was adopted which included process mapping along with focus group discussions and multidisciplinary workshops.

Results
1. Duplication of the service across two sites as a result of inconsistent communication channels between the units
2. No established links with multiple external agencies that had lengthy and complex approvals process which affected length of stay
3. Patients adjustment to injury contributed to delays in engaging with the complex discharge planning process which often runs in parallel with patients physical rehabilitation journey

Conclusion:
Regular meetings across the units strengthened and streamlined the patients journey and well demarcated work allocation process reduced duplication of service.
The tool identifies discharge barriers enabling early intervention by the SCI case Coordinator to reduce length of stay.
Early Intervention by clinical psychologists to assist with adjustment disorder was crucial to enable participation in the complex discharge planning process.
EXIT BLOCK PROJECT; Enhance delivery of care between Acute Spinal Cord Injury Unit and Spinal Rehabilitation Unit

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Introduction
The State-wide Spinal Cord Injury Service in NSW has two units that deliver world class service to patients with spinal cord injury. Royal North Shore Hospital (RNSH) and Royal Rehab (RR) are part of one service that is located at different sites for Northern Sydney and NSW catchment area. The other unit is based at Prince of Wales Hospital (POWH) which has acute and rehab co-located.

In 2014, RNSH developed a project called EXIT BLOCK to address the long-standing exit block issues contributing to extended length of stay within RNSH and RR units. Most delays relate to external factors, however optimising communication with a collaborative approach was deemed crucial to optimize patient flow and outcomes.

Methods
Aim of the project - to improve discharge planning and patient flow, provide timely access to rehabilitation care and resettlement in community, improved seamless transition between acute/subacute and community care.
Methodology adopted was medical record audit (20) and analysis, process mapping workshops, stakeholders interviews and workshops, data compilation & analysis and team issues prioritisation.

Results:
1. Complexity of patients significantly increases length of stay (LOS) at acute unit at RNSH
2. Ability to access suitable housing significantly increases stay at rehabilitation unit at RR
3. Patients referred to non spinal rehab facility had significantly difference in LOS at RNSH
4. Communication between the 2 sites was inconsistent and there was no clear process and work allocation
5. Readiness for rehabilitation referral was inconsistent

Conclusion:
The service prioritised issues it had ability to influence and streamlined the service as a continuum with the following steps:
1. Design of a Spinal Clinical Rehabilitation Pathway - to standardise patients journey across 2 sites
2. Fund a Spinal Cord Injury Service Case Coordinator – vital link between the units and key external stakeholders to advocate for efficiencies in processes
3. Funding for Clinical Psychologist at RNSH - support patients throughout their journey
4. Transition care options for patients with lengthy delays at RR
Rights-based approaches to living well with spinal cord injury for those with intimate health care needs related to bladder and bowel management

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Poster Presentation Day 1, September 13, 2018

Poster Abstract
Introduction: Many persons with spinal cord injury (SCI) have intimate health care needs related to bladder and bowel management. Meeting these needs is often a requirement for living well. Research suggests that improvement of bladder/bowel function is a high priority for individuals with SCI. Rights-based approaches, including those in the widely ratified Convention on the Rights of Persons with Disabilities (CRPD), offer holistic frameworks to address unmet intimate health care needs of persons with SCI, with implications for health care professionals, political and administrative decision-makers, researchers, and SCI advocates.

Methods: A qualitative literature review and legal analysis was undertaken to assess rights-based framings of disability, and the degree to which such frameworks and related instruments have been or can be utilized to address the intimate health care needs of SCI persons.

Results: Management of bladder and bowel needs for persons with SCI impacts health, independence, employment, and other areas of life addressed by the CRPD and disability rights standards. Some research addresses stigma associated with the management of bladder and bowel needs as a barrier to living well with SCI, yet monitoring mechanisms have paid little attention to stigma-related discrimination experienced by this population. Medical professionals and other decision-makers have not fully utilized rights-based frameworks to ensure that the rights of SCI persons with unmet bladder and bowel management needs are respected, protected and fulfilled.

Conclusions: Leveraging rights-based frameworks offers the opportunity to substantially improve the ability of SCI persons with bladder and bowel management needs to live well across all areas of life. Rights-based frameworks support comprehensive and holistic healthcare, law, policy, and research responses to meet the needs of this population. Harnessing the standards set forth in the CRPD provides much-needed direction in an under-utilized area of disability rights protection.
TIME TO COMPLETE BOWEL CARE. A COMPARISON OF LOW VERSUS HIGH ENEMA IN PEOPLE WITH A RECENT SPINAL CORD INJURY: PROTOCOL OF A RANDOMISED CONTROLLED TRIAL

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Poster Presentation Day 1, September 13, 2018

Introduction
Appropriate neurogenic bowel management is critical to living well with Spinal Cord Injury. In the Sydney spinal nursing community, there is division around current bowel care practices. Some recommend daily standard micro-enemas. Others suggest administering the enema higher into the rectum using additional equipment. High enemas cost more and have more risk than low enemas. However, it is believed that this is justified because high enemas have better results despite no evidence to support or refute these beliefs. Therefore, the aim of this study is to determine whether low enemas are as good or better than high enemas in people with a recent spinal cord injury.

Methods
The HELMeT study will be a pragmatic non-inferiority, multi-centre, double-blinded, cross over, randomised controlled trial. 90 participants will be recruited from 3 spinal units in Sydney. Participants will be randomised to one of two treatment sequences (A or B) for a total of 8 weeks, crossing over at 4 weeks. The primary outcome is time to complete bowel care. There will be a number of secondary outcomes reflecting participants’ perspectives. All outcomes will be collected at 4 and 8 weeks by blinded assessors. The results will be analysed by intention-to-treat using regression models.

Results
Recruitment has commenced and study completion is anticipated by March 2020.

Conclusion
This trial will answer a significant question where little evidence exists, helping people with SCI to live well. The trial design is intentionally simple to facilitate collaboration between spinal units.
Non_traumatic vs traumatic spinal cord injury: demographics, length of stay and resource utilisation in a community_based, metropolitan statewide service

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Poster Presentation Day 1, September 13, 2018

Background: Non-traumatic SCI (NTSCI) forms a significant proportion of people requiring specialised SCI services, which may increase with the aging population. The NSW Statewide Spinal Outreach Service (SOS) accepts referrals for people with recent SCI, paediatric transitional clients or those recently readmitted to a SCI unit. SOS aims to promote health, prevent potential complications, and achieve client_centred goals for a period of 12 months. Referrals are also received from non-SCI units, which have mostly been of a NTSCI nature.

Objectives: To compare data for demographic,characteristic,level and extent of injury using American Spinal Injury Association impairment classification, referrer, funder and FIM, against service utilisation (length of stay, number of service hours, type of clinician involved, and cost) between NTSCI and SCI in a community based, metropolitan setting.

Method: Retrospective cohort study of consecutive clients referred and discharged over a 4_years from 1/8/14 – 31/7/18. A review of paper and electronic records was undertaken to extract clinical data for each group and analysed against administrative data (clinician hours, type of clinician involved, duration and service-related costs).

Results: there were 182 completed discharges in the period 1/8/14 – 28/2/18, with 19 declining the service. 68% (111) were males, 32% (52) females, with a mean age of 56. The average length of stay was 423 days (range 10 – 951). We hypothesize that the NTSCI group will have a higher proportion of incomplete injuries, higher admission FIM, shorter length of stay, and less service utilisation, consistent with current literature. The notable exception would be the subgroup referred from non-spinal units, who have not had specialised spinal involvement before SOS, with a possible predominance of time spent addressing equipment and psychosocial issues.

Conclusion: Result will provide an insight into service gaps help future model of care planning.
Quality of life of adults with spinal cord injury: a study using Korean version of WHOQOL-bref

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Poster Presentation Day 1, September 13, 2018

Introduction: To assess difference of the quality of life (QOL) according to the level of injury and duration after injury in adults with spinal cord injury (SCI).

Methods: Forty-five adults with SCI (33 men, 12 women; mean age 50.1±11.5 years) were enrolled in the study. Patients with complete injury (AIS A) were 13 (28.9%), and incomplete injuries (AIS B, C, D) were 32 (71.1%). Twenty-one of the adults with SCI were tetraplegia (46.7%), 24 adults with SCI were paraplegia (53.3%). Duration after injury ranged from 1 to 240 months (mean duration after injury 33.5±63.4 months). Data was collected using the Korean version of WHOQOL-bref for assessing QOL, SCIM III for activity of daily life, and a questionnaire with sociodemographic variables. Outcomes were compared according to the level of injury and duration after injury.

Results: Most SCI participants (51.1%) are unsatisfied with their QOL, and the physical, psychological and environmental domains showed a higher correlation with QOL. The physical and environmental domains had significant correlation with SCIM III score. Tetraplegia group experience a lower satisfaction of physical and environmental domains than paraplegic group (P<0.05). Adults with SCI less than 6 months after injury showed a lower QOL only in the physical domain and no significant difference in the psychological, social and environmental domains (P<0.05).

Conclusion: These results indicate that problems of physical health and environmental aspects resulted from SCI reduce their QOL. Adults with SCI experience low QOL in the psychological and social domains, regardless of their duration and level of injury. This may be due to the lower awareness of the psychosocial domain compared to the physical functioning in rehabilitation setting.
The effect of aerobic exercise after Granulocyte-colony stimulating factor (G-CSF) treatment in rats with spinal cord injury

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Poster Presentation Day 1, September 13, 2018

Introduction: To identify more effective treatments for functional recovery after spinal cord injury (SCI) by comparing the effects of G-CSF treatment, treadmill exercise, and treadmill exercise plus G-CSF treatment in rats.

Method: Animals were divided into 4 groups: a spinal cord injury (SCI) group treated with G-CSF (G-CSF group, n=6), a SCI group treated by treadmill exercise plus G-CSF (G-CSF/exercise group, n=6), a SCI group that received treadmill exercise alone (exercise group, n=6), and a SCI non-treated control group (control group, n=6). Laminectomy at the T8–10 spinal levels with compression injury of the spinal cord was performed in all 24 rats. G-CSF (20 μg/ml daily) was administered via intraperitoneally for 5 consecutive days after SCI in G-CSF and G-CSF/exercise groups. From one week after surgery, animals in G-CSF/exercise and exercise groups received 30 minutes of treadmill exercise 5 days per week for 4 weeks. Functional recoveries were assessed using the Basso, Beattie, and Bresnahan (BBB) scale and the inclined plane test, and five weeks after SCI, glial scar formation and neuro-regeneration factor expression were assessed by hematoxylin and eosin staining and immunohistochemically.

Result: Rats in G-CSF/exercise group showed better functional recovery than rats in the other groups as assessed using the BBB scale and the inclined plane test (p<0.05). Furthermore, spinal cord cavity sizes by injury were smaller in G-CSF/exercise group than in the other groups. Immunohistochemistry revealed that BDNF (brain-derived neurotrophic factor) expression was higher and GFAP (glial fibrillary acidic protein) and VEGF (vascular endothelial growth factor) expressions were lower in the G-CSF/exercise group (p<0.05).

Conclusion: In this study, G-CSF treatment plus treadmill exercise provided more effective neuroplasty and better functional recovery than G-CSF or treadmill exercise alone.
Differences in Clinical Implications between Non-Traumatic and Traumatic Cauda Equina Syndrome

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Introduction
In literature, 45\% of cases of cauda equina syndrome (CES) are attributed to a lumbar herniated disc. The prognostic factors of CES have been reported as bladder and bowel dysfunction, perineal anesthesia, time to achieve decompression, and so on. There are abundant of studies focused on non-traumatic causes of CES, but only few studies about traumatic causes. The purpose of this study is to investigate the differences and clinical implications according to causes including trauma in patients with CES.

Methods
We retrospectively reviewed 37 patients diagnosed as CES from 2008 to 2017. The subjects were divided into two groups: non-traumatic and traumatic. Functional status was measured using the Spinal Cord Independence Measure (SCIM) score. We also analyzed the difference of neurologic level of injury (NLI), American Spinal Injury Association Impairment Scale (AIS), findings of urodynamic study (UDS), and pudendal nerve somatosensory evoked potentials (SSEP) between two groups using the chi-square test.

Results
There was no significant difference in age and gender between non-traumatic and traumatic groups. Neurologic level of injury (p=0.59), AIS (p =0.42), finding of UDS (p=0.92), and pudendal nerve SSEP (p=0.89) were not statistically associated between two groups. There was no significant difference in SCIM sub-score and sum of motor grades of lower extremities.

Conclusion
In this study, there was no significant difference in functional status and clinical implications between non-traumatic and traumatic groups with CES. These results suggest that the etiology itself in patients with CES cannot predict functional status, severity of injury, or bladder function. Comprehensive consideration about etiologic factor of CES will be needed with prospective study design for future study.
Selective ablation of tumorigenic cells following human iPS-NS/PC transplantation in spinal cord injury – using suicide genes for improving the safety of stem cell therapy

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Poster Presentation Day 2, September 14, 2018

Introduction: When certain “tumorigenic” lines of hiPS-NS/PCs are transplanted into the spinal cord of spinal cord injury model mice, we have seen significant improvements in the motor function which is then followed by an abrupt deterioration secondary to the mass effect of the tumor. A significant proportion of the transplanted cells remain undifferentiated. The aim of this study is to selectively ablate these undifferentiated cells whilst preserving the fully differentiated cells and hence the motor function.

Methods: For this experiment, we used the Herpes Simplex Virus 1 Thymidine Kinase (HSV-TK) gene. Ablation with the prodrug, Ganciclovir(GCV,) is known to be only effective in cells that are multiplying. In vitro, we introduced the HSV-TK gene into a line of hiPS-NS/PCs that is known to have tumorigenic properties (hiPSC-NS/PC-HSV-TK). We allowed these cells to differentiate and administered GCV in an attempt to ablate the undifferentiated cells. In vivo, hiPSC-NS/PC-HSV-TK was transplanted into the spinal cord of NOD/SCID mice nine days after a spinal cord injury. Six weeks following the transplantation, GCV was administered. Motor function was evaluated through weekly BMS scoring.

Results: In vitro: There was a significant decrease in the immature Nestin and proliferative Ki67 positive cells (p<0.01), while the Tuj1 positive neuronal cells were relatively well preserved (p>0.05). In vivo: In the mice with GCV administration (GCV(+)) n=8), the improved motor function was preserved throughout the 12 weeks (fig.1) and no tumor formation was observed. Immature Nestin, SOX1 and Ki67 positive cells were more abundant in the GCV(-) mice (p<0.01). Mature post-mitotic NeuN positive neuronal cells were preserved (p>0.05) as well as the APC and GFAP positive cells (p>0.05) (fig.2).

Conclusion: We believe that, by employing this system, we can minimize the risks of tumorigenesis and improve the safety of iPS-NS/PC transplantation in the treatment of SCI patients.
Introduction
Diving related spinal injuries are common in every part of the world while incidences may be different. Their management is different with the availability of local resources and knowledge.

Diving related decompression illness (DCI) is classified into 2 main categories: arterial gas embolism and decompression sickness (DCS). DCS is divided into types 1 and 2, depending on clinical presentation. DCS is a clinical syndrome caused by alterations in environmental pressure, which result in the liberation into tissue or blood of inert gas bubbles previously loaded within tissues as a soluble phase. The bubbles in the blood and body tissues can result from excess nitrogen from inadequate decompression after a dive. DCS sometimes is called “divers’ disease” or “the bends”.

The objective is to review the current protocols of management in rural settings and compare with those in the developed world

Methods
Review of best available evidence and case report of a managed case in Philippines

Conclusions
There is need for the vigorous treatment with hyperbaric oxygen of all divers with neurological symptoms after dive. This has to balanced with available local facilities and geography. Divers can develop DCS on very short dives or in shallow water, even adhering to protocols. Divers should consider DCS risk factors when planning the dive profile with appropriate education and safety briefing
Intrarater reliability of ventilatory thresholds determined during arm ergometry graded exercise tests in individuals with spinal cord injury

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Poster Presentation Day 1, September 13, 2018

Introduction: In wheelchair-bound individuals with spinal cord injury (SCI) physical capacity is generally reduced. To increase physical capacity, individualized training schemes are necessary. These schemes are based on training zones. The boundaries of these zones are often defined by two ventilatory thresholds (VTs), determined during a graded exercise test (GXT). Despite the widespread use of VTs, reliability of threshold determination during GXTs in individuals with SCI is unknown. Therefore, this study aimed to examine the intrarater reliability of VTs determined during a GXT in individuals with SCI, and whether similar results are found for different GXT protocols and individuals with tetraplegia versus paraplegia.

Methods: 34 individuals with tetraplegia (N=13) or paraplegia (N=21) performed two arm ergometry GXTs each: with a 1-min protocol and 3-min protocol. To determine both VTs in each test twice, an experienced sports physician assessed all tests in random order and blinded for subject number during two separate sessions. The power output (PO), heart rate (HR) and oxygen uptake (VO2) at each VT was compared between the two rating sessions using the paired samples t-test, intraclass correlation coefficient (ICC) and Bland Altman plots.

Results: No systematic differences in PO, HR and VO2 at both VTs were found between rating sessions (all p>0.06). The ICCs of the PO, HR and VO2 at both VTs were high to very high (0.82 – 1.00). These ICCs apply to the 1-min and 3-min protocol, and to the total group as well as both subgroups. Bland Altman plots showed relatively small 95% limits of agreement but with a few outliers.

Conclusions: In general, the intrarater reliability of ventilatory thresholds determined during GXTs in individuals with SCI is high to very high for this experienced rater. The intrarater reliability and the clinical use of ventilatory thresholds need to be further investigated for this population.
An epidemiological study of spinal cord injuries in Japan, the most aging society in the world

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Introduction
The incidence of incomplete traumatic cervical spinal cord injury (SCI) appears to be increasing, especially in aging societies. The percentage of the Japanese population ≥65 years old is the highest in the world. The purpose of this study was to investigate the epidemiology of SCI in the most aging area in Japan.

Methods
Patients with acute traumatic SCI who needed hospital treatment between 2012 and 2016 were included. Incidence of traumatic SCI, cause, level, skeletal injury, Frankel grade and initial treatment were investigated in Akita prefecture, with an aging rate of 32.5%.

Results
On the basis of the estimated approximately 1,000,000 residents of Akita, the annual incidence was 98.1/1,000,000 population during the 5-year study period, with a mean age of 65.9 years (male, 74.6%) and patients in their 60s as the largest age group. The most common cause was falls on level surfaces (33.6%), followed by low falls (20.3%) and road traffic accidents (15.5%). SCI was cervical in 90.5% of cases, and cervical SCI without skeletal injury was seen in 73.9%. Frankel D was the most common neurological deficit (47.2%), followed by Frankel C (24.2%). Conservative treatment was performed for 79.3% of acute traumatic SCI patients. Percentage of the population of Akita ≥65 years old, incidence of SCI, and falls on level surfaces as a cause of SCI were twice as frequent as approximately 30 years ago.

Conclusions
An increase in the incidence of SCI with relatively mild neurological deficit was related to aging of the population. The results of this study resemble findings from other recent studies. We estimated the impacts of the presence of narrow spinal canal and a high incidence of ossification of the posterior longitudinal ligaments in the Japanese elderly on cervical SCI.
Patient positioning post myocutaneous flap surgery for pressure injury management in a tetraplegia patient: thinking outside the square.

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INTRODUCTION
Pressure injury (PI) in the spinal cord injury (SCI) population can be a significant problem sometimes requiring myocutaneous flap (MF) surgery to heal wounds. Pre-operatively, patients must be medically stable with all co-morbidities optimally managed, including nutritional and emotional state and able to be positioned prone or side-lying for a minimum of two weeks, to enhance the surgical outcome.

In this case study, a male C4 tetraplegic patient presented with a large, non-healing, ischial tuberosity PI despite surgical debridement, intravenous antibiotics and Negative Pressure Wound Therapy. He also had significant comorbidities including diabetes, significant shoulder pain, spasms, renal calculus, pleural effusion, pericarditis and obstructive sleep apnoea requiring Bi-level Positive Airway Pressure. He required medical stabilization by urology, respiratory, spinal rehabilitation and infectious diseases specialists and multidisciplinary support from dietitian, occupational therapist (OT), clinical nurse consultant and social worker. It was identified that he was unable to tolerate prone or side-lying. In this case study we aimed to explore a creative and unique approach to patient positioning post MF.

METHOD;
During the pre-operative period, a side lying trial was carried out by nursing and OT. A bolster was trialled to enable side-lying, however, he was only able to tolerate this for short periods due to shoulder pain, autonomic dysreflexia and respiratory compromise. To address this, the assistive technology and seating therapist (AT&S) and the OT, customised a bolster designed to elevate his leg, relieve surgical site pressure whilst allowing him to maintain a supine position.

RESULTS:
Post-surgery, he alternated between right side lying and supine positions utilizing the customized bolster. This successfully relieved surgical site pressure, shoulder pain, respiratory compromise and promoted nutritional intake and emotional wellbeing.

CONCLUSION:
Successful planning, creative thinking and a cohesive multidisciplinary team approach optimise post-operative positioning and improve physical and emotional outcomes for patient.
Intermittent catheter choice impacts quality of life and bioflora colonisation: Clinical study on safety and preference of single vs. reuse catheters.

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Poster Presentation Day 2, September 14, 2018

Introduction
Intermittent catheterization (IC) is common bladder management for people with neurogenic lower urinary tract dysfunction (NLUTD). At present, there is an ongoing debate whether catheter reuse is as safe as single-use catheterization as there is a general lack of clinical evidence.

Methods
This was a prospective, multi-center, clinical trial investigating patients who currently practised catheter reuse, and who agreed to prospectively evaluate single-use hydrophilic-coated (HC) catheters for 4 weeks. The Intermittent Self-Catheterization Questionnaire (ISC-Q) were used to study patient satisfaction and health-related quality of life (HRQoL). Reused catheters were collected and studied with regard to contamination.

Results
The study included 39 patients (spinal cord injury 46%, spinal cord/brain disease 15%, neural tube defects 5%, other 33%) with a mean age of 55 (SD = 13) years (69% men, 31% women). Patients had practiced IC for 10 years (SD = 9), 6 times daily (SD = 2). At inclusion, all patients reused catheters for a mean of 21 days (SD = 48) per catheter. A total of 36 patients completed the prospective test period and the mean ISC-Q score increased from 58.00 (SD = 22.57) to 67.19 (SD = 17.70) when patients switched to the single-use HC catheters (p = 0.0101). This corresponds to a 16% increase in HRQoL. At the end of the study, 83% (95%CI [67%, 94%]) preferred to continue using single-use HC catheters. All collected reused catheters (100%) were contaminated by debris and 74% (95%CI [58%, 87%]) were contaminated by bacteria. The most common detected species were Staphylococcus, Enterococcus and Pseudomonas.

Conclusions
Single-use HC catheters improved HRQoL and were preferred over catheter reuse among people practising IC. Catheter reuse may pose a potential patient safety concern through biofilm colonization as well as reducing IC acceptance by people with NLUTD.
A global map for the epidemiology of paediatric spinal cord damage: towards a living data repository.

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Poster Presentation Day 1, September 13, 2018

Study Design: Literature review.
Objectives: Globally map key paediatric spinal cord damage epidemiological measures and provide a framework for an ongoing repository of data.
Setting: An initiative of the ISCoS Prevention Committee.
Methods: Literature search of Medline and Embase. Relevant articles in any language regarding children with spinal cord damage included. Stratification of information about incidence and prevalence into Green/Yellow/Red quality ‘zones’ allowed comparison between data.
Results: 862 abstract were reviewed and data from 21 articles included from 13 countries in 6 of the 21 WHO global regions. Twelve of these were studies of paediatric traumatic spinal cause injury (TSCI) and six by non-traumatic spinal cord injury (NTSCI). An additional three articles provided both paediatric TSCI and NTSCI data. The median TSCI incidence rates in WHO regions were: Asia, East 59.9/million population/year; Australasia 9.9/million population/year; Western Europe 4.1/million population/year and North America, High Income 48.0/million population/year. The median NTSCI incidence rates in WHO regions were: Australasia 6.5/million population/year; Western Europe 7.5/million population/year and North America, High Income 7.4/million population/year. SCI was mostly due to land transport (34% – 75%), falls (7% – 35%) and sport/recreation (5% – 29%) and NTSCI was mostly caused by tumours (24% – 59%) and inflammatory/autoimmune causes (22% – 52%).

Conclusions:
There is a scarcity of quality studies regarding the epidemiology, aetiology and survival following paediatric TSCI and NTSCI. Recent ISCoS frameworks provide better guidance for the classification of NTSCI and age group cut-off levels for future studies.

Key Words: spinal cord injury; Spinal Cord Diseases; Epidemiology; Incidence; Prevalence; Pediatrics or paediatrics; Infant or child; youth or Adolescent; or children or childhood
Preliminary evaluation of the reliability and validity of gait stability parameters as measured with wearable sensors in individuals with spinal cord injury

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**Poster Presentation Day 2, September 14, 2018**

Introduction:
Walking stability is impaired following a spinal cord injury (SCI). Although most falls occur during walking, there is no validated clinical measure of gait stability for SCI. In other populations, wearable sensors can provide gait stability parameters to enhance clinical evaluations while being more affordable and unobtrusive than in-lab assessments. This project aimed to evaluate the test-reliability and construct validity of parameters derived from wearable sensors that may characterize gait stability after SCI.

Methods:
Sixteen ambulatory individuals with chronic AIS D SCI (4 females, 12 males) were evaluated on two occasions spaced two weeks apart. They walked 20 meters under four conditions that challenged stability: (i) hard surface with reduced vision, (ii) foam pad secured to the shoes, (iii) foam pad with reduced vision, and (iv) a dual cognitive task. Participants wore five wearable sensors (feet, shanks and pelvis) while walking. Inter-stride coefficients of variation (CV) of gait parameters were used to characterize stability and were compared across walking conditions to evaluate construct validity. Intra-class correlation coefficients (ICC) were used to evaluate test-retest reliability of the CV of gait parameters.

Results:
CV of cadence and swing time showed high (ICC>0.7) test-retest reliability across all four walking conditions. The CV of cadence and swing time were significantly higher (p<0.05) in the most challenging walking condition, “foam pad with reduced vision”, than in the other three conditions, indicating lower gait stability and supporting construct validity.

Conclusions:
Measurement of gait stability through use of wearable sensors is repeatable and valid among individuals with SCI.
The neuromodulative role of the spinal cord during cognitive processing after subliminal exposure to sexual stimuli

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Poster Presentation Day 1, September 13, 2018

Background: Spinal cord injury (SCI) is a life-altering disability that affects motor-sensory pathways between brain and body in forward and feedback directions. Studies show that cerebral changes take place after SCI. Sexual responses depend on automatic (subconscious/pre-attentive) processes, and voluntary (conscious/attentive) processes. To date, no study assessed whether SCI patients and normal population process sexual stimuli differently.

Objectives: 1) To determine differences between SCI and normal population regarding the effects of subliminally presented sexual stimuli on conscious reports of sexual arousal; 2) To determine cognitive changes associated with implicit motor learning and sexual processing by administering Choice Reaction Time (CRT) Tasks using sexual stimuli subliminally presented to both groups.

Methods: Part 1. Participants were exposed subliminally to the prime picture and then were asked to rate the extent to which they were emotionally aroused while watching another set of target pictures of moderately sexually arousing individuals of the opposite sex or landscapes. Part 2. After the prime picture, participants were shown the target picture with a superimposed black dot, and asked to locate the dot and press the corresponding button on the keyboard.

Results: Part 1. Differences exist in the way subliminal sexual pictures modulated sexual arousal of SCI and normal population in terms of self-reported emotional arousal during both subconscious and conscious stages during sexual processing. Part 2. Slower CRT was found in the SCI group. SCI patients exhibited specific difficulty with implicit motor learning tasks, affected by the presence of sexual pictures at pre-attentive level.

Conclusion: Difference exists between SCI patients and normal population in the interpretation of sexual stimuli, both at pre-attentive and attentive levels. These findings suggest potential application in existing sexual rehabilitation protocols.
EAST VERSUS WEST SEXUAL REHABILITATION PERSPECTIVES IN SPINAL CORD INJURY PROGRAMS AROUND THE WORLD: A SYSTEMATIC REVIEW

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Introduction: Sexual health is an essential aspect of well-being including individuals with Spinal Cord Injury (SCI)(Kreuter et al., 2011). Cultural idiosyncracy, moral convictions, sexual myths and lack of sufficient knowledge to provide for sexual education are among the reasons why sexual health is overlooked within the SCI rehabilitation programs. The objective of this work is to review the Literature on state-of-the-art SCI sexual rehabilitation on the world, to elaborate a sexual management model for SCI rehabilitation in the emerging countries.

Methods: A comprehensive literature review was undertaken through 4 search engines. Articles published between 1969 to 2017 were tag by using the term Sexuality & Sexual rehabilitation programs in SCI and/or by adding the word: “sexual education”, “sexual counseling”, “sexual management”, “programs sexual rehabilitation”, “sexual function” and SCI in in women or men were search. An Italian and Philippine research group independently analyzed the relevant search papers.

Results: 52/84 articles. Data extrapolated from Spinal Cord + Paraplegia 16(30,77%), Sexuality and Disability 5(9,62%), Journal Rehab 3(5,77%), Archives of Sexual Behavior 2(3,85%) and other 28 Journals with a mean of 1(1,92%). The majority published within the years 2011-2017 (53.7%). Review articles 15(28,8%), Survey 12 (23.08%), Case-control 10(19,23%), Cross-sectional 8(15,38 %), followed by other studies (#7). Western articles (73.58%), Eastern articles (26,42%). #14 relevant variables were identified. According to the bio-psycho-social model of health, Western countries unlike the Eastern countries focus their attention in all three domains of health, with particular emphasis on the needs of sexuality to achieve a better quality of live.

Conclusion: When developing a new model of sexual rehabilitation program Eastern and Western culture countries will need to address the needs and preferences of people with SCI, in particular sexual intimacy and pleasure to improve their quality of live.
SEXUAL SATISFACTION AND BIOPSYCHOSOCIAL FACTORS AMONG SPINAL CORD INJURY PATIENTS AND THEIR PARTNERS

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Poster Presentation Day 2, September 14, 2018

Background
Sexuality varies across life stages, and it is affected by physiological and psychosocial changes that occur inherently with aging and even disability. Regaining sexual activity is one of the most important priorities for spinal cord injury (SCI) patients during chronic phase. Particularly among SCI male and female patients and their spouses, sexual activity and sexual satisfaction have been proven to decline, but the role of patients’ and spouses’ perception of sexuality is unclear. We hypothesize that one’s perception of sexuality determines the way the individual attains sexual satisfaction, and thus generalizations on one’s level of sexual satisfaction must safely take into account the way he/she personally defines or gives importance to sexuality. Little is known about the relationship between sexual satisfaction and perceived functional status after SCI.

Methods
This pilot study involved SCI patients, who were diagnosed with Spinal Cord injury (SCI) at least 6 months prior to data collection, and his or her partner (if present). Participants individually answered online self-administered questionnaire related to functional status, quality of life and sexual satisfaction. The questionnaire evaluated different dimensions of sexuality before and after the injury.

Results
No significant relationship with sexual satisfaction was found for physical functionality. Sexual dissatisfaction was significantly directly associated with depression particularly among sexual partners of the patients. We found differences in the way patients and relative partners experience sexuality and sexual satisfaction among the couple. Moreover, body image satisfaction seems to play a role in the way SCI patients perceive sexual satisfaction.

Conclusions
Patients with SCI and their partners were not very satisfied with their sexual functioning. The picture emerging from patients and partners depends from the multi-factorial nature of the concept of sexuality. Sexual rehabilitation should explore and manage the biopsychosocial factors that contribute to sexual satisfaction of patients and their sexual partners.
WITHDRAWN - Curative effectiveness of tDCS for neuropathic pain (NP) after spinal cord injury

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Poster Presentation Day 2, September 14, 2018

Introduction: To observe the effects of tDCS for the NP after spinal cord injury.

Methods: Eighteen cases of SCI were screened by LANSS, BDI and MMSE, then assigned into observation group (n=12) and control group (n=6), the observation group were divided into subgroup based on duration of the disease less than 3months and more than 3months. The control group received conventional rehabilitation therapy and medication; the observation group, received conventional rehabilitation therapy, medication and tDCS therapy. The visual analogue scale, brief pain inventory were used to evaluate the change of pain, mood and ADL situation before and after treatment.

Results: The impacts of tDCS for mood and daily life had no significant difference between two groups. There was no significant difference of VAS between the subgroup of observation group. While the VAS significantly declined in the observation group after treatment compared to the control group (p<0.05).

Conclusions: tDCS combined with conventional rehabilitation and medication can promote recovery of NP after SCI. But there is no difference between the acute stage (<3months) and subacute stage (>3months).

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Poster Presentation Day 2, September 14, 2018

Introduction:
To investigate the use of functional outcome measurements after spinal cord injury (SCI) in current clinical practice and the knowledge about the Spinal Cord Independence Measure (SCIM) among SCI physicians in China, and to find facilitators for a broader utilization of SCIM.

Methods:
125 Chinese SCI physicians attending annual workshops in two consecutive years. A questionnaire was administered. The following items were included: whether functional outcome measurement for SCI individuals was performed and with which assessment tool(s); what items should be included in the assessment; whether they knew about the SCIM, its latest version, the Chinese translation, and if so from what source; the possible reasons why SCIM was not implemented in clinical practice; and whether training before using the SCIM was needed, and the training method preferred.

Results:
Among these physicians, 84.8% performed functional outcome measurement for individuals with SCI, but only 29.6% of attendees were aware of the SCIM and 20.8% had used it. Lack of training was the major reason why SCIM was not used in clinical practice. Furthermore, 74.4% of the physicians felt they needed formal training before using the SCIM.

Conclusion:
Use of SCIM is limited in clinical practice in China, which is mainly attributed to lack of knowledge and training. Formal training on the use of the SCIM is essential for its dissemination and will improve functional SCI outcome measurement in China.
Validation of the Chinese translation of the self-report version of the Spinal Cord Independence Measure (SCIM-SR) in individuals with spinal cord injury

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Poster Presentation Day 1, September 13, 2018

Introduction:
To translate the self-report version of the Spinal Cord Independence Measure (SCIM-SR) into Chinese and to test its validity in individuals with spinal cord injury (SCI).

Methods:
The SCIM-SR was first translated into Chinese, then the back translation was performed, and finally the Chinese version of SCIM-SR was established. The physicians performed SCIM III through observation and interview, followed by the SCIM-SR filled in from the patients. The agreements for the total score and scores from the three subscales between SCIM III and SCIM-SR were calculated. Influence of several factors such as age, gender, duration post injury, level of injury (LOI), completeness of injury and etiology were also investigated.

Results:
The Pearson’s correlation coefficient and intraclass correlations (ICCs) for the total scores between SCIM III and SCIM-SR were 0.96, indicating excellent correlation. The Pearson’s correlation coefficient and ICCs for the scores of self-care, respiration and sphincter management, and mobility subscales between SCIM III and SCIM-SR were all above 0.90. Agreement of scores between SCIM III and SCIM-SR remained good to excellent when the participants were stratified according to age, gender, duration post injury, LOI, completeness of injury and etiology, respectively.

Conclusion:
The Chinese translation of SCIM-SR has good validity in individuals with SCI and in different stratifications by the age, gender, duration post injury, LOI, completeness of injury and etiology. It could accurately reflect the severity of functional capacity limitation and could be served as the valid assessment tool for the functional independence in individuals with SCI.
Impact of the National Disability Insurance Scheme on a spinal outreach service.

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Poster Presentation Day 2, September 14, 2018

Introduction: The National Disability Insurance Scheme (NDIS) is rolling out incrementally to provide care, equipment and services for Australians with permanent disabilities. The Spinal Outreach Service (SOS) at Austin Health offers expertise in spinal cord injury and appears to have experienced an increase in service demand since the NDIS commenced. The project aimed to assess and analyse this impact, and to provide recommendations to Austin Health on how best to address this in the future.

Methods: A qualitative survey was developed and distributed to SOS staff. Episodes of direct contact with service users was also analysed, and a comparison between pre and post-NDIS data completed.

Results: 6 out of 7 staff completed the survey. Emerging themes included the perception of increased workload since NDIS commenced, the need for further education around the scheme and additional administrative support. Reviewed quantitative data showed an increase of 30% in overall contacts, and 38% more clinical time spent with clients since NDIS commenced. 71% of SOS clients will be eligible by roll out completion.

Conclusion: This project concluded by providing recommendations to Austin Health, regarding moving forward with the SOS in the context of NDIS. These included the potential registration of the SOS, in order to ensure that clients with spinal cord injuries continue to receive care from clinicians with expert skills and experience in this field.
Factors associated with persisting spinal cord compression after reduction of cervical dislocation

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Introduction
Reduction of dislocated cervical spine has occasionally resulted in neurological worsening, and attention has been mainly paid to the post-reduction disc herniation. In this study, we conducted MRI and CT evaluation in patients with cervical dislocation to elucidate factors associated with spinal cord compression remained after reduction.

Materials and Methods
Seventy-six patients underwent posterior open reduction and fusion for acute traumatic cervical dislocation with facet interlocking. Six patients with complete paralysis showed 1 or 2 level ascent of their neurological level of injury after the reduction, and underwent additional anterior discectomy and fusion. Pre-reduction, and immediate post-reduction MRI was available in 22 patients; 5 of the 6 patients with post-reduction neurological worsening, and 17 of 70 patients without neurological worsening. Maximum spinal cord compression (MSCC) was assessed by MRI. Post-reduction spinal cord compression were classified into anterior (protruded disc) and posterior elements such as disrupted ligamentum flavum and epidural hematoma. Spinal canal diameter was measured by CT.

Results
After reduction, 12 of 22 patients showed less than 25% MSCC (N-group), and 10 patients had more than 25% MSCC (C-group). All 5 patients with post-reduction neurological worsening belonged to C-group. After reduction, average lengths of anterior and posterior compressive elements were 2.8mm and 1.7mm respectively. Size of posterior element in C-group was significantly larger than that in N-group. Although anterior element in C-group tended to be larger than that in N-group, the difference was not statistically significant. Canal diameter was significantly smaller in C-group patients than that in N-group patients.

Conclusions
It was not unusual to recognize residual spinal cord compression after reduction of cervical dislocation. Besides protruded disc material, posterior elements such as disrupted ligamentum flavum significantly contribute to the spinal cord compression after reduction. Narrow bony canal is also an important factor for post-reduction spinal cord compression.
The epidemiological trend of spinal cord injury in Japan: Warning from a super-aged society

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Poster Presentation Day 1, September 13, 2018

Introduction

The rapidly aging of society is a universal issue in the world’s developed countries and Japan is home to the oldest citizenry in the world. Many studies have reported an increasing number of spinal cord injuries (SCI), and the purpose of this study is to determine if these two occurrences correlate.

Methods

This study looks at the demographics, incidence rate, mechanism of injury, and neurological involvement of SCI patients to project the prevalence of disability from SCI of our aging society. The sample of analysis involved 730 patients who received treatment at our specialty care center for SCI in Hokkaido, Japan, from 2008 to 2016. Our facility provides comprehensive treatment from the initial acute phase, rehabilitation, and finally to community reintegration.

Results

81% of SCI patients were males and the mean age of all patients at the time of injury rose from 59.7 years in 2008 to 65.8 years in 2016. The leading cause of SCI was low-level falls (24%). Leading other categories were 81% of SCI occurred in the cervical region, and the most common acuity was ambulatory AIS D, which led to 35%. SCI in the group over the age of 75 was 24% whereas they represent only 13% of the overall population. The incidence rate in all age group in Hokkaido increased from 30.9 per one million in 2008 to 58.6 in 2016.

Conclusions

This report shows two unique attributes of SCI in our aging society. The total number of SCI cases in Japan has increased dramatically with low-level falls as the leading cause rather than high-energy trauma. It is presumed that these attributes derived from the change of the population ratio to a more aged society. This report is an alert to advanced nations of the ever-changing healthcare demands of a super-aged society.
The influence of surgical timing on neurological recovery after severe cervical spinal cord injury. Analysis of complete paralysis cases.

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Poster Presentation Day 2, September 14, 2018

Introduction: Accumulated evidences show that early surgical decompression and fusion may be beneficial for acute spinal cord injury (SCI). However, it remains unclear whether surgery needs to be done as early as possible after injury to maximize neurological recovery. The purpose of the current study is to elucidate the influence of the surgical timing on neurological recovery of severe cervical SCIs.

Methods: Traumatic cervical SCI cases from 2011 to 2016 were retrospectively analyzed at the local SCI center. To exclude the compromising effect of escape from acute spinal shock, only subjects showing complete paralysis at 72 hours after injury were analyzed. Recovery was determined by the improvement of 1 or more of ASIA grade, 1 or more of NLI, or 2 or more of ASIA motor score (MS). Surgical timings were compared between recovery and non-recovery groups, and their correlation with the MS improvement was also determined.

Results: Total of 18 cases out of 76 cervical traumatic SCIs was analyzed, and their average follow-up period was 319 days. Seven cases demonstrated recovery and received surgeries at the average of 9.9 (2.3 to 18.4) hours after injury, whereas 11 cases of non-recovery group received surgeries at the average of 17.5 (3 to 39.8) hours after injury, resulting in no statistical difference of the surgical timing between 2 groups. MS improvement didn’t correlate with the surgical timing. All cases receiving surgery after 19 hours after injury failed to show recovery.

Conclusions: The current study suggests that surgical decompression and fusion may be beneficial when performed within 19 hours after injury, but doesn’t support the idea that surgery needs to be done as early as possible after injury to maximize neurological recovery.
Enhancing access to specialized care in persons with spinal cord injury living in rural regions of New South Wales, Australia

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Poster Presentation Day 1, September 13, 2018

Introduction: Timely access to primary and specialized health services is challenging for people with spinal cord injury (SCI) living in rural communities. Additional to shortages of health practitioners, some rural health professionals are not specifically skilled or resourced to address the unique, complex needs of the SCI population. The aim of this service has been to improve access to health services and quality of care to people with a spinal cord injury (SCI) living in rural areas through collaboration, communication and capacity-building.

Methods: The Rural Spinal Cord Injury Service (RSCIS) was developed based on results of a pilot study (Middleton et al, 2008). It comprises a metropolitan-based multidisciplinary team supporting five Rural SCI Coordinator positions within NSW rural Local Health Districts (LHDs). The service is based on a ‘hub and spoke’ model, where support for each coordinator is provided at local level by network managers, with SCI-specific support and linkages provided by the Spinal Outreach Service in Sydney.

Results: Over ten years since inception, the RSCIS has conducted 1,222 medical and multidisciplinary assessments for people with SCI living in NSW rural communities, with 23-53% of clients each year being new to the service. Over 10,000 health issues have been identified. Ninety-nine rural visits were conducted across all LHDs, including ninety-four education sessions provided to rural clinicians, with over 250 health professionals attending each year, building capacity with numerous resources and workshops developed. Having sufficient local capacity, particularly a single local point of contact, promotes timely communication, linkages to local and tertiary services and facilitates follow-up from clinic assessments with improved patient-reported outcomes.

Conclusions: Promoting local expertise and knowledge of issues and solutions is crucial for creating successful and sustainable networks. Clear linkages have been established between the rural sector and Spinal Outreach Service promoting a model of integrated care.
The After Hours Spinal Gym (AHSG) is a weekend gym program for the spinal inpatients to exercise without supervision from therapists. We established the AHSG in response to patients’ requests. Their reasons were several: wanting more opportunity to exercise, a chance to apply their skills independently, to take greater advantage of the unique space and equipment and to kill the boredom of hospital weekends. After we received the go-ahead from the hospital, we established gym rules and a process of therapist approval. On the weekend, the only staff input is from security personnel who open and close the gym. There is no therapy staff present between opening and closing. During the week, the patients’ treating therapists work with the patients to establish their independent exercise program and teach them how to use the applicable pieces of equipment. For those patients who need assistance, the treating therapists teach family members how to help.

Since its inception, the AHSG has been universally popular: most patients see the benefit and express their interest and we have never had any patient openly object to the opportunity. In contrast, actual attendance fluctuates dramatically. Some are committed to attending regularly and the rest attend sporadically. The group of regular attendees do not exhibit a more rapid improvement in functional skill, but they do demonstrate a habit of exercising regularly.
“The Paediatric Spinal Cord Injury Journey -Teamwork is the Key”

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Poster Presentation Day 1, September 13, 2018

Introduction
In 2014 a 3½ year old male from southern NSW was admitted to Sydney Children’s Hospital (SCH) with a traumatic spinal cord injury (SCI - T6) and severe brain injury (TBI) post motor vehicle accident (MVA). He had a complicated and prolonged hospitalisation, requiring in an intense inpatient program with our Rehab2Kids (R2K) multidisciplinary team (MDT).

Methods
Assessments performed assisted in developing family centred goals, focusing on promoting independence, neurological and functional recovery, and education for James* and his family. Early planning for discharge was a priority and included linkage, and establishing the important relationship with his local physiotherapist.

Results
On discharge James’ therapy sessions focussed on skill development and upper limb strength progression. Effective communication with his inpatient team was imperative in providing support and ensuring compliance as James settled back into home life. Regular reports, teleconferences, team meetings and multiple joint clinic reviews have ultimately led to continuity of care across all therapies and teams. Support in James’ home and community is ongoing and he has now successfully integrated into school. James has progressed to independent wheelchair mobility and is now playing wheelchair basketball. James will access the R2K day rehabilitation program in the future for an intensive block of goal specific therapy using the functional electrical stimulation (FES) bike.

Conclusions
The importance of teamwork in supporting a child with a SCI cannot be over-emphasized. James’ healthcare teams, both within the hospital and his community setting, have been collaboratively working together, sharing the responsibility for problem-solving and decision making while formulating and instigating care plans. Ultimately, this has ensured that James and his family have been well supported, both in the tertiary centre specialist hospital and in his local community. The journey with a SCI is continuing for James, however, he is at the centre of the teamwork, which is the key.

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Poster Presentation Day 1, September 13, 2018

Introduction: Full participation in society is considered a human right by the United Nations. Participation is often lower in people with a spinal cord injury (SCI) than the general population. Peer mentorship has shown promise for supporting participation among people with SCI. Peer mentorship is an interaction that aims to help individuals who share similar lived experiences adapt and/or thrive after an SCI. Research has not examined the topics discussed and techniques used during SCI peer mentorship conversations to support people with SCI. The purpose of this study was to apply a coding manual to identify real-time topics discussed and techniques used during SCI peer mentorship conversations.

Methods: Participants with SCI completed a baseline survey and peer mentors and mentees were matched by gender, injury and availability. Telephone conversations were audio recorded and transcribed verbatim. A previously developed coding manual identified 14 main topics whereby 31 techniques are used during the peer mentorship conversations. Using this manual, two researchers independently coded each transcribed conversation.

Results: Ten conversations were recorded between 5 mentees and 5 mentors (51.6±13.3 years, 40% female) with a mean duration of 43.30±17.24 minutes. Two researchers coded topics (75.8% agreement) and techniques (70.5% agreement) used in 2760 lines of conversation. Noteworthy topics (% of total codes) included personal information (34.6%), emotional outcomes (8.0%), and physiological outcomes (7.8%). Noteworthy techniques included giving personal information (54.3%), sharing perspective (17.3%), and closed question (16.5%).

Discussion: Peer mentorship conversations appear to focus on injury-related topics and providing information. These findings highlight the potential importance of sharing lived experiences of SCI. To our knowledge, this study is the first to audio record and characterize statements made during SCI peer mentorship conversations. The methods developed from this research allow for in-depth analyses of peer mentorship conversations which can inform SCI peer mentorship programs.
What do ISNSCI and SCIM tell us about the participation with spinal cord injury (SCI)? An ICF based inventory of SCI in Germany

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Introduction: Since March 2017 the survey group “German Spinal Cord Injury” (GerSCI) as part of an international study group started to send questionnaires (ICF and short-form-36 (SF-36) health survey based questionnaire) to individuals with spinal cord injury (SCI) all over Germany. We aim at investigating the relationship between the individual neurological and functional status and the level of participation.

Methods: The GerSCI questionnaire with 86 questions was mailed to 5,568 patients. The replies were connected to the subgroup of patients documented in the EMSCI (European Multicenter Study about SCI) database of the spinal injury centers in Bayreuth, Heidelberg and Ulm to perform a multiple regression analysis between the Spinal Cord Independence Measure (SCIM) III and the International Standards for Neurological Classification of SCI (ISNCSI) datasets of the chronic stage (6 months or 1 year after SCI) with a questionnaire-based individual SF-36 health score from 0 to 100.

Results: A total of 1,451 individuals with SCI of 8 centers replied (response rate 28.8%). The response rate varied from 17.6% to 37.4% between centers. The chronic SCIM and ISNCSI scores of 366 participants from the 3 SCI centers (response rate 30.4% within the 3 centers) were connected to ICF-based questionnaires of the corresponding persons.

Discussion: The response to the GerSCI survey was favorable (compared internationally) despite the various challenges (often changes of place of residence of individuals, missing contact details) during the roll-out of the survey and the burden of a very detailed questionnaire. The standardized EMSCI-assessments together with the electronic documentation form the basis for merging of multicenter assessment data enabling correlations with additional data, e.g. about participation.

Conclusion: A standardized multicenter collection of clinical data allows the conduction of further longitudinal studies such as linking clinical outcomes to the self-perceived level of participation outside the clinic.
Redesign of a Model of Care for Children and Adults with Spinal Cord Injury in New South Wales (NSW), Australia

Ms Frances Monypenny¹,², Prof James Middleton¹,²,³,⁴, Mrs Louise Kelly⁵, Miss Megan James¹, Mr Chris Shipway¹
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INTRODUCTION
The State Spinal Cord Injury Service (SSCIS), NSW Agency for Clinical Innovation, forms a network of statewide services responsible for the management of people who have sustained a spinal cord injury (SCI) due to trauma or from a non-progressive disease process. On expiry of the Statewide Services Plan for SCI (2012-2016), SSCIS was tasked with development of an improved and expanded evidence-based model for management and support of children and adults with SCI in NSW.

METHOD
A diagnostic review was undertaken to better understand SCI management systems and practices, identify consumers' needs, and determine evidence-practice gaps in service-provision. This included a selective literature review; population-based data analysis from the NSW Health Admitted Patient Data Collection for all traumatic (TSCI) and non-traumatic SCI (NTSCI); visits to specialist SCI and other health services; extensive consultations with people with SCI, including parents of children, clinicians and key stakeholders; online surveys; and workshops.

Guided by the findings of the diagnostic review and further consultations, a framework for service improvement was developed. The solution design phase identified priority areas for implementation at local and statewide levels.

RESULT(S)
Data identified gaps and inequity of access to specialist services delivered by SSCIS for a large number of patients, in particular those with NTSCI. The comprehensive framework for service improvement incorporates 10 essential components to enable accessible, person-centred and integrated SCI management across the lifespan, highlighting the delicate balance between all aspects of the person’s life and their impact on health and wellness that requires access to all levels of health care and community support.

CONCLUSION(S)
The roadmap for improvement includes processes to embed person-centred practices, strengthened access to specialist services by addressing critical blockages to enhance patient flow and efficiency, and expanding community-based access using in-reach and outreach service delivery with improved links with primary care.
Bone as Regulator of Energy Balance and Male Fertility

Dr. Leslie Morse¹, Dr. Ricardo Battaglino²
¹Craig Hospital, Englewood, United States; ²Department of PMR, UC Denver, Aurora, USA

Poster Presentation Day 2, September 14, 2018

Ricardo Battaglino, PhD (35 minutes): Dr. Battaglino will provide an overview of the research to date evaluating the hormonal function of undercarboxylated osteocalcin. He will review the undercarboxylated osteocalcin signalling in fat, pancreas, and testis to coordinate total body energy balance, bone metabolism, and reproductive function.

Dr. Leslie Morse, DO (35 minutes) will review the prevalence and pathophysiology of male infertility, diabetes, and metabolic syndrome after SCI. She will provide an overview of recent clinical trials targeting osteocalcin carboxylation status to improve glucose metabolism insulin resistance, or fertility.

20 minutes: Both speakers will facilitate an audience discussion focused on the therapeutic implications of targeting bone health to improve glucose metabolism and/or fertility in SCI.

Dr MJ Mulcahey1, Dr Lawrence Vogel2, Dr Cristina Sadowsky2, Dr Loren Davidson4, Dr Heather Taylor5, Ms. Jackie Bultman6

1Thomas Jefferson University, Philadelphia, United States, 2Kennedy Krieger Institute, Baltimore, USA, 3Shriners Hospitals for Children, Chicago, United States, 4Shriners Hospitals for Children, Sacramento, USA, 5TIRR Memorial Hermann, Houston, USA, 6Mary Free Bed Rehabilitation, Grand Rapids, USA

Poster Presentation Day 1, September 13, 2018


Design/Method: This was a non-intervention multi-center study, using a repeated measures design. A sample of youth between 8-17 years of age with chronic spinal cord injury/dysfunction (SCI/D) was recruited at the point of usual care across six pediatric facilities in the United States. Youth completed the SCIM-III SR-Y twice, separated by at least one hour. Mean (m), standard deviation (SD) and range (r) values were calculated for the total sample, three age groups (8-12, 13-15, 16-17 years), neurological levels (NL) C1-C4, C5-T1, T2-T12 and L1-S4/5, and American Spinal Injury Association Impairment Scale (AIS) A, B, C, D. Analysis of variance (ANOVA) was used to examine differences in SCIM-III SR-Y total, self-care (SC), sphincter/respiration (S/R) and mobility subscales across groups with known differences. Ceiling and floor effects for the total score and each subscale score were examined for the entire sample, and for paraplegia and tetraplegia. Intraclass Correlation Coefficient (ICC) with 95% confidence intervals (CI) was calculated to examine test-retest reliability.

Results: 75 youth with a mean age of 13.6 years (SD 2.8, range=8-17) were enrolled. The majority of the sample was female (54.7%), Caucasian (80%), non-Hispanic (62%), and had paraplegia (64%). An equal number of youth with motor complete (50.6%) and incomplete injuries were enrolled. There were no differences in SCIM-III SR-Y total or subscale scores across the three age groups. There were significant differences between C1-C4 and T2-T12 NL in total (p=.004) and SC (p<.001) scores; C1-C4 and L1-S4/5 NL in total (p<.001), SC (p=.001), S/R (p=.027) and mobility (p=.001) scores; C5-T1 and T2-T12 and L1-S4/5 in SC score (p<.001); C5-T1 and L1-S4/5 in total (p<.001), S/R (p=.042) and mobility (p=.001) scores. Mobility subscale scores differed between AIS A and D (p<.001) and AIS B and D (p=.004). Except for a moderate ceiling effect (20%) in the mobility subscale for the paraplegia group, ceiling and floor effects were acceptable and ranged between 0 and 10%. Except for the S/R subscale, test-retest reliability was high (ICC range=0.97-0.99).

Conclusion: This study is the first to examine the psychometric properties of the SCIM-III SR-Y. In this sample, it discriminated among known groups (known group validity) and reliability of scores on repeated measures was high (test-retest reliability). Ceiling and floor effects for the total scale and each subscale were negligible, except for mobility in the group with paraplegia. These initial psychometric data support the use of SCIM-III SR-Y in youth 8 years of age and older. As investigators and practitioners use the SCIM-III SR-Y, they are encouraged to further examine the psychometric properties in their own samples and clinical populations.

Vocational Status of People with Spinal Cord Injury in Bangladesh

Mr Md. Julker Nayan

Centre for the Rehabilitation of the Paralysed (CRP), Savar, Bangladesh

Poster Presentation Day 2, September 14, 2018

Introduction: Spinal cord injury (SCI) is a disastrous event that results in physical disability and psycho-social dysfunctions which can significantly impact individual daily lives including productivity. Environmental factors and other individual attributes have great effects on the success of re-employment with these clients, and this has been confirmed by a variety of studies.

Objective: To identify the job status of the people with spinal cord injuries, their demographics and job related factors from whom have completed rehabilitation from the Centre for the Rehabilitation of the Paralysed (CRP) since last one year.

Methodology: Descriptive cross-sectional study design was used for this study. Purposive sampling methods were used. 110 participants selected on the basis of inclusion and exclusion criteria’s.

Results: The mean age of the participants is 33.52 (SD ±12.078) whereas male was 86.4%. This study found that 37.3% in self-business, 12.7% in NGOs and 33.6% didn’t involve. The present employment rate is 56.4% in comparing with previous rate is 79.1%. Study results showed that the main barrier of un-employment were inaccessible environment, transportation system, individual physical abilities and skills. Moreover family and social attitudes towards persons with SCI were good. Interestingly more than seventy percent attendant doesn’t consider them as burden.

Conclusion: The person with spinal cord injuries is relatively young and high proportions are from falls by people that are within the working age range in Bangladesh. Though the productive activities rate is high there is still need to work towards reducing the barrier of getting a job.
Identification of wheelchair skills capacity, confidence and performance level of manual wheelchair users with spinal cord injury in the selected community of Bangladesh

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1Centre for the Rehabilitation of the Paralysed (CRP), Savar, Bangladesh

Introduction: Wheelchair is one of the most important mobility aids for people with spinal cord injury. Manual wheelchair allows them to engage in major life activities by increasing independence and improving satisfaction with participation. But manual wheelchair users need wheelchair skills capacity, confidence and performance to accomplish their ADLs independently.

Objectives: To identify the level of wheelchair skills capacity, confidence and performance of persons with SCI, along with to find out the association between socio-demographic factors and correlation of wheelchair skills capacity with confidence and performance.

Methodology: A descriptive cross-sectional study design was used. Ninety manual wheelchair users were selected purposively from the rural community of Bangladesh based on inclusion criteria’s. Data was collected by using structures demographic questions and Wheelchair Skills Test Questionnaire (WST-Q) version 4.3 in Bangla. Data was analysed by using descriptive statistics and non-parametric test of SPSS.

Results: This study found that the manual wheelchair user’s capacity, confidence and performance level is good in the context of Bangladesh. The mean age of the participants were 35 (SD ±12.89) years whereas male was 89%. Among the participants 70% were paraplegia and 30% were tetraplegia. Most of the participants were traumatic cases (93%), and 62% were married. Among the participant’s wheelchair dependent life mean 7.54 (SD±7.15) years. Results showed that SCI wheelchair user skills capacity, confidence and performance were significantly associated with gender and level of injury. It was also proved that SCI wheelchair user skills capacity was significantly correlated with their level of confidence (r=.95; P<.000) and performance (r=.88; P<.000).

Conclusion: Many people with SCI are unable to perform some of the wheelchair skills that restrict them to participate in functional life. More intensive wheelchair skills training may improve the wheelchair skills capacity, confidence and performance that will enhance their community participation and improve quality of life.
Inspiratory pre-motor potentials during quiet breathing in spinal cord injury

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Poster Presentation Day 2, September 14, 2018

Cortical pre-motor potentials, or Bereitschaftspotentials, are low-amplitude negativity potentials in the averaged electroencephalogram (EEG). If present ~1 second before inspiration, they are evidence of compensatory neural drive to the respiratory muscles from the motor cortical region (i.e. supplementary to automatic respiratory drive). Bereitschaftspotentials are present in healthy people and people with respiratory disease when there is an imbalance between the load on, and capacity of, the inspiratory muscles, but are normally absent in healthy young people during quiet breathing. The neural control of breathing may be altered in people with tetraplegia due to respiratory muscle paralysis. We hypothesised Bereitschaftspotentials would be present in participants with tetraplegia. EEG was recorded in 6 participants (5M, 22-50 years, C4-C6 injury, AIS A-D, >1 year post-injury) with reduced lung function and respiratory muscle weakness (FEV1: 57 ± 19% predicted, FVC: 69 ± 25% predicted and MIP: 55 ± 18% predicted (mean ± SD)). Participants performed quiet breathing and voluntary self-paced sniff manoeuvres (positive control condition). A minimum of 250 EEG epochs during quiet breathing and 60 EEG epochs during sniffs, time-locked to the onset of inspiration, were ensemble-averaged and assessed (blinded to the experimental condition) to determine the presence of a Bereitschaftspotential in Cz, FCz, C3 and C4 derivations. Five participants (83%) had a Bereitschaftspotential in the positive control condition (4 in Cz/FCz, 1 in C3). Of these 5 participants, only one (20%) had a Bereitschaftspotential in quiet breathing. This incidence is similar to that previously reported during quiet breathing in healthy able-bodied participants (~16%). Further studies and analyses will determine definitely if inspiratory-related cortical activity is present in tetraplegia to compensate for weakened respiratory muscles and will assess whether respiratory-related motor cortical activity adapts after tetraplegia as has been previously observed for the upper and lower limb muscles.
Can a smart speaker be used as environmental control unit?

Dr Kenichiro Noda

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Introduction:
A smart speaker is a device with an integrated artificial intelligence and far field microphone that supports voice recognition. These devices, such as Google home and Amazon Echo, allow for complete hand-free operation for various actions, including for playing music, for information retrieval, and for environmental control such as operating the lights and various household appliances. These relatively inexpensive devices, coupled with third party smart home kits could easily be utilised by clients with physical or functional impairment from spinal cord injury/disease (SCI/D) to control their environment. In another words, clients with disability could turn smart speakers into a relatively simple and inexpensive environmental control units (ECU) that is completely voice activated and wirelessly connected to various appliances.

Methods:
Literature review was conducted on ECUs, and on its prevalence in SCI/D clients. Most up to date information was sought on the current smart speakers in the market and their capabilities, its connectivity, as well as peripheral devices currently available for home environment modification.

Results:
Currently there are three major smart speakers with home integration ability in the Australian market - Google Home, Amazon Echo, and Apple HomePod. All of these devices have the ability to be simply connected to home modification kits for lighting, air conditioner and thermostats, alarm system, door and garage opener, robot vacuum, window shutter, and numerous electrical appliances. Furthermore, these speakers can make phone calls, book transport, make shopping lists, add and retrieve reminders on calendar, and operate TV shows with just a simple voice command.

Conclusion:
Clients with SCI/D could turn a smart speaker into a simple ECU to promote independence and improve their quality of life. Smart speakers, with their ease of setup, low cost, and versatility, may be a more affordable and accessible alternative to the traditional ECU.
10 COLLABORATIVE STEPS TO RESEARCH, CREATE AND IMPLEMENT A PROGRAM IMPROVING BLADDER HEALTH FOR THOSE WITH SPINAL CORD INJURY IN THE VICTORIAN SPINAL SERVICE (VSCS)

Assoc Prof Andrew Nunn1, Prof Belinda Gabbe4,5, Dr Derek Hennessey5,7, Dr Sandra Braaf2, Ms Catherine Byrne5, Associate Prof Peter Bragge6, Dr Alyse Lennox2, Dr Denise Goodwin6, Prof James Brock3, Ms Melinda Millard1, Ms Janette Alexander1, Mr Johan Gani1, Mr John Rogerson1

1 Victorian Spinal cord Service, Austin Hospital, HEIDELBERG, Australia, 2 Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, Australia, 3 Department of Physiology, Melbourne University, Melbourne, Australia, 4 The Farr Institute @ CIPHER, Swansea University Medical School, Singleton Park, United Kingdom, 5 Department of Urology, Austin Health, Heidelberg, Australia, 6 Behaviour Works, Monash University, Melbourne, Australia, 7 Dept. of Urology, Craigavon Area Hospital, UK

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10 steps driving a better bladder health initiative for SCI will be discussed

1/ DATA LINKAGE USING CODING
“Incidence, Type and Costs of Complications Following Traumatic Spinal Cord Injury in Victoria, Australia” showed Urological conditions, particularly urinary tract infection were the most common reasons for readmission to hospital, with the greatest readmission costs

2/ UNIT CLINICAL AUDIT
Causes Complications Audit of Urological Issues in Spinal Cord Injury Study (CAUSES)

3/ BASIC SCIENCE in rats and then humans.
Microscopic investigation of urine collected from patients with a recent spinal cord injury: a pilot study
Altered barrier function of the urothelium increases the risk of UTI with increase in tissue markers.

4/ CONSUMER NEEDS through interviews
"Experiences with navigating and managing information in the community following spinal cord injury"
“Social activity and relationship changes experienced by people with bowel and bladder dysfunction following spinal cord injury”

5/ THINKTANK
With consumers, multiple disciplines and funders issues and project defined.

6/ SUBSTANTIAL FUNDING
by the Transport Accident Commission, through the Institute for Safety, Compensation and Recovery Research

7/ BEHAVIOUR CHANGE MANAGEMENT RESEARCH
Behaviour Works implemented a Theoretical Domains Framework to understand the drivers of behavior of current practice optimising early use of IMC in individuals with newly acquired SCI admitted to the VSCS. Interviews to establish current practice/ attitudes of those with SCI and staff.

Longer-term lag indicators of this research project:
a) Decrease in the incidence of UTIs during the SCI inpatient phase;
b) Decrease in readmissions.
c) Increase in the number of patients performing IMC.

8/ EDUCATION / INFORMATION
Package in bladder health Website/video www.mybladdermylife.com
Mandatory hospital training
9/ HOSPITAL ROLL OUT in detail
10/ ASSESSMENT, TRANSLATION and resultant Information Technology PHd to be discussed
PRAGMATIC STAFF AND PATIENT ISSUES IN CHANGING CULTURE TO IMPROVE BLADDER HEALTH IN SPINAL CORD INJURY IN THE VICTORIAN SPINAL SERVICE (VSCS)

Associate Prof Andrew Nunn, Associate Prof Peter Bragge, Dr Denise Goodwin, Ms Catherine Byrne, Ms Janette Alexander, Ms Melinda Millard, Ms Caitlin Jessop

Austin Health, Heidelberg, Australia, Behaviour Works, Monash University, Melbourne, Australia

Poster Presentation Day 1, September 13, 2018

Introduction
State then unit audits showed significant urological complications. VSCS had delays in implementing IMCs following acute SCI and retaining the use of IMC on discharge to the community. Intermittent catheterisation (IMC) in SCI shown to reduce urological complications, specifically UTIs, compared with use of IDCs. SCI individuals rank bladder issues as one of the greatest long-term problems. Behaviour change strategy promotes best evidence-based neurogenic bladder management.

Hypothesis
Bladder catheter management practice change in acute SCI decreases the time taken to remove the IDC and commence IMC.

Method
PHASE 1 PRESERVE
Initiate IC within 10 days unless contraindicated.
Opt off approach giving bladder best chance in first few weeks.

PHASE 2 ENGAGE
Shared understanding of bladder health/rationale for IC.
Mandatory training program and competency developed for all staff.
Nursing given concern re changed workloads so additional resources ie. daily urology nurse review, allied health and peer support.
Targeted trusted staff became bladder champions with regular presence on wards.
Debunked staff concern of patient not able to cope and indwelling simplest solution.
A comprehensive standardized and staged education program my bladder my life provided to all patients assessed as consenting to and having the cognitive and physical ability to undertake CISC.

PHASE 3 PLAN
Trial IC
Individuals who potentially could benefit from a device specifically designed to meet their individual needs with self-catheterization (e.g. impaired hand motor function), identified needs addressed.

Perceived behavioural control, considered patient decision.

Results
3-month intensive intervention started a new model of care.
37 new acute SCI admitted to the VSCS. 5 did not receive bladder management in line with developed algorithm as 2 transferred and 2 inappropriate.
Remainder of newly admitted SCI patients (28) had catheters removed on average within 19.5 days of injury (average 4.25 days of acute admission).
Changed practice for staff and patients.
The development of a peer support framework in New Zealand

Dr Jo Nunnerley1,2, Mrs Rachelle Martin1,2, Ms Zahra Shahtahmasebi1, Dr Johnny Bourke1, Dr Debbie Snell2, Dr Jennifer Dunn2

1Burwood Academy of Independent Living, Christchurch, New Zealand, 2University of Otago, New Zealand

Poster Presentation Day 1, September 13, 2018

Introduction
Peer mentoring positively influences the rehabilitation experience of individuals with SCI. However, how health outcomes are improved as a result of peer support, and the specific mechanisms of effect, are poorly understood. New Zealand has two peer support services provided by separate organisations and neither has an explicit framework underpinning their service. The New Zealand SCI Strategy (2014-2019) endorses peer support, and identifies the need for a consistent national service. This study aimed to develop a theoretical framework for peer support services delivered as part of the inpatient rehabilitation pathway.

Methods
Realist evaluation methods were used to develop a peer support programme theory. Realist evaluation has an explanatory focus, aiming to unravel mechanisms of change within programmes by asking, which mechanism(s) cause which outcome(s) in which contexts.

Ten people delivering peer support services were interviewed to explore underlying understandings and proposed mechanisms of effect within the current peer support services. Interviews were analysed using context-mechanism-outcome (CMO configurations) analytic techniques.

The key elements of peer support were then presented to participants in two focus groups. The purpose of the focus groups was to prioritise proposed CMO configurations, and to conceptualise a theoretical framework for the service which could guide future peer support development and evaluation.

Results
Peer support in NZ actively promotes the experience and practice of belonging, autonomy and competence for people with SCI (aligned to Self Determination Theory), while also supporting their optimism and the development of adaptive coping strategies.

Conclusions.
The developed theoretical framework makes explicit the characteristics of an effective peer support service. This framework will underpin the implementation of the NZ national peer support service, and will determine key evaluation questions. It is anticipated that this theoretical framework could be applied in other contexts, either internationally or with different health conditions.
Impact of a direct admission policy to specialised centers for patients with traumatic spinal cord injuries - the New Zealand experience

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Poster Presentation Day 1, September 13, 2018

Introduction
In August 2015 new destination guidelines for spinal cord impairment (SCI) were implemented across New Zealand as part of a National SCI Strategy. This required all patients with SCI to be taken from the scene of the accident directly to one of two specialist spinal centres. The aim of the guidelines was for all SCI to receive surgery, from specialist spinal surgeons, achieve early de-compression of the SCI, and benefit from early access to specialist rehabilitation. The aim of this study was to evaluate the outcomes of this policy change.

Method
A retrospective notes review on patients admitted to both New Zealand spinal units the year before, and after the destination guidelines implementation. Demographic, ambulance information, injury and surgery data were collected. Patients were included if they were admitted to either spinal unit with traumatic SCI (AIS A-D), and required ambulance transportation to hospital. Patients were excluded who had a non-traumatic aetiology (including treatment related injury) had their injury overseas, or were admitted for rehabilitation only. There were 112 participants who met the inclusion criteria.

Results
In the year following the destination guidelines implementation, direct admissions increased from 40% to 70%. There was a decrease in the time to admission to a specialist spinal surgery centre from a median time of 9.5 hours (2.8-28.8) pre policy to 4.5 hours (1.9 – 11.5) post policy (p=0.019) and also time to decompression 18.8 hours (9.1-38.7.0) pre policy to 15.8 hours (9.4 – 27.5) post policy. The post-policy patients were also admitted to the spinal rehabilitation unit earlier.

Conclusions
National level policy changes had a significant effect in reducing the time to arrival at the specialist spinal surgery centre, the time to rehabilitation admission. There was also a reduction in the time to decompression.
Transplantation of Neural Stem/progenitor Cell Derived from Human iPS Cells with Gamma-secretase Inhibitor Treatment Promotes Motor Functional Recovery after Both Subacute and Chronic Spinal Cord Injury

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Poster Presentation Day 1, September 13, 2018

【Introduction】
The purpose of this study is to evaluate the advantage of treating neural stem/progenitor cells derived from human iPS cells (hiPSC-NS/PCs) with a clinically relevant drug gamma-secretase inhibitor (GSI) prior to transplantation in both subacute and chronic SCI.

【Methods】
Non-tumorigenic hiPSC-NS/PCs were cultured with or without GSI for 1 day before transplantation. Contusive SCI was induced at T10 level in immunodeficient mouse. hiPSC-NS/PCs with GSI treatment (GSI group), without GSI treatment (Control group) or PBS were transplanted at 9 days (subacute) and 42 days (chronic) after injury. The histological analyses of the transplanted cells were monitored with immunohistochemistry. Behavioral analyses were also performed using BMS scoring.

【Results】
In the subacute phase transplantation, the proportion of mature neurons in the GSI group increased significantly compared with the control group. There were also significantly more neuronal and serotonergic fibers. Furthermore, a significantly greater recovery in motor function was gained compared with the control group at 35 days after transplantation. With regards to transplantation in the chronic phase, the proportion of mature neurons in the GSI group also increased significantly, and we observed neuronal and serotonergic fibers. Even though we performed the transplantation in the chronic phase, we observed significant improvements in functional recovery at 56 days after transplantation.

【Conclusions】
This study indicates that treating hiPSC-NS/PCs with GSI before transplantation resulted in a significantly greater tendency for the axons to regrow in the injured spinal cord, which helps to improve motor function in both subacute and chronic SCI.
Quality of Life in Low Resource Countries: Challenges & Opportunities towards Successful Community Inclusion

Dr Divya Parashar1, Dr Ankur Nanda2, Dr Susan Charlifue3, Dr Denise Tate4

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Poster Presentation Day 1, September 13, 2018

Quality of Life (QoL) is now recognized as a key rehabilitation goal after a spinal cord injury (SCI). In low resource countries, particularly for people in the low SES it is an underexplored concept. The workshop will enumerate the domains that define QoL particularly in low resource countries, the focus on education and management of the injury at the acute stage of the injury, the role of caregivers, family and vocation, barriers and facilitators towards QoL, aging successfully with an SCI, training and utilizing peer mentors to provide continuity of care, and community based rehabilitation as opportunities to achieve an optimal QoL and inclusion.

The faculty believe that addressing the needs of individuals with SCI and their families, across health, psychological, sexual, vocational, social, and environmental from the outset of their care is significant in ensuring an efficacious reintegration into the community.

Dr. Ankur Nanda:
- Discussing the patient related factors affecting QOL which could be both medical (level of injury, AIS grading, pre-existing medical illnesses) or demographic (level of education, type of employment, importance of vocational rehab).

- Discussing the treatment related factors which could be both medical (type of surgery, levels of fixation, DVT prophylaxis, quality of bladder and bowel management program, sexual counselling) Or general (the knowledge and awareness among health professionals about management of SCI, availability of dedicated spinal injury centers)

* Discussing and suggesting possible realistic solutions and remedies to the above factors influencing QoL for the patients belonging to lower income countries

Dr. Divya Parashar:

- The consumers’ perspectives on the factors that influence QoL and the disparities between people from low income groups and high income groups.
- Barriers in the way of living an optimum QoL and ways in which those can be channelized as facilitators.
- The importance of sensitizing and training professionals working in the field of SCI to know about their role in making individuals self-reliant at each step in the rehabilitation process. Special emphasis will be placed on the important role of training peer mentors in the community to provide community based rehabilitation.

Dr. Susan Charlifue) :
- The long term nature of SCI caregiving that can lead to caregiver distress, in addition to the positives of caregiving
- The importance of social support for caregivers, and being an advocate not only for the family member with SCI but also for the caregiver herself (usually a woman)
- Cultural issues that play a role in who becomes the caregiver, and how in some cultures this is an expectation and not viewed as an “additional” role.

Dr. Denise Tate:
- Cross cultural issues in defining quality of life across developed and less developed countries vis a vis access to economic resources, quality health care, insurance coverage, and education.
- The role of peer support in enhancing quality of life of persons with SCI living in the community.
- The relative importance of participant reported issues in promoting successful quality of life across countries.
Bridging the Gap in Addressing Sexuality After Spinal Cord Injury (SCI) in Low Resource Countries: Methods & Techniques

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Poster Presentation Day 2, September 14, 2018

Early studies have indicated that sexuality after SCI remains a central motivating factor in life and that the overall rehabilitation outcome is substantially influenced by a successful sexual rehabilitation program. Regaining sexual function ranks as a top priority for persons with SCI and individuals with SCI perceive that improved sexual function would significantly enhance their QoL. Literature is sparse when it comes to sexuality and SCI in the context of low resource countries like India and is often a neglected area for individuals with SCI. This workshop attempts to understand the sociocultural factors that influence sexuality in India such as the taboos around sex, sex as “dirty,” masturbation as sin, and gender differences in sexual identity, the gaps in regaining sexual functioning after SCI (physical, psychological, and social factors), and the resources that can be made available to enhance sexual functioning and increase opportunities for fertility and reproduction which are economical for both men and women with SCI.

Dr. Divya Parashar will address the following (15 minutes):
• Identify specific factors pertaining to not just the SCI but prevailing cultural aspects that affect sexual functioning in individuals with SCI in low resource countries, and how it affects QoL;
• Her research findings on the perceptions of individuals with SCI on how and when should sexuality be addressed in the rehabilitation phase of the management, especially for women with SCI.

Mr. Shivjeet Singh Raghav) will address the following (15 minutes):
• The current scenario in sexuality counseling, recommendations and efficacy of methods and techniques to enhance intimacy, sexual functioning, and fertility.
• The use of low cost methods in assisting fertility and reproduction after SCI (such as intra-uterine insemination and intravaginal insemination) to enable individuals especially from low income groups to raise a family.

Dr. Fin Beiring-Sorensen would present on the following (15 minutes)
• Sexuality and fertility issues in men with SCI- A developed world scenario.

Dr. Marcalee Alexander) would address the following areas (15 minutes)
• Sexual concerns in women with SCI and what issues are common amongst persons with SCI related to sexuality regardless of whether they come from a low resource or high resource country.
• How best to educate and treat persons from low resource countries with regards to sexuality.

A panel discussion with participants particularly from low resource countries would be encouraged to help bridge the gap between the needs of people with spinal cord injuries regarding sexuality and fertility and the delivery of care.
Community participation after a spinal cord injury

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Poster Presentation Day 1, September 13, 2018

Objective
One of the important goals of rehabilitation for persons with spinal cord injury is to promote community participation. This study aims to study the level of participation in the community as well as the demographic and injury characteristics that may influence the participation level.

Method
Cross sectional questionnaire on 82 spinal cord injury participants was carried out on patients attending the Spinal Cord Injury Rehabilitation Clinic, University Malaya Medical Centre. Interview was done via face to face interview or telephone interview. Demographic data was collected and the level of participation was measured using Craig Handicap Assessment and Reporting Technique-Short Form (CHART-SF) which covers the aspect of Physical Independence, Mobility, Occupation and Social Integration score.

Results
The participants consist of male majority (70.7% male), with a mean age of 43.04 ± 9.33 and with level of education for primary, secondary and tertiary of 9.8%, 56.1% and 34.1% respectively. The injury characteristics showed 31.6% tetraplegics with years post injury ranging from 2-41 years (mean 15.35years ± 8.85).

The CHART-SF score for Physical Independence, Mobility, Occupation and Social Integration was compared. Comparison between the groups showed a significant differences between Physical Independence score for level of injury with participants with tetraplegia (mean 87.85 ± 5.07) having lower mean score compared to paraplegia (mean 94.07 ± 8.73, p value=0.021) . In the aspect of Social Integration (p value = 0.020) and Mobility (p value =0.000), significant differences was also noted between the participants with differing level of education.

Conclusion
Participation level of patients with spinal cord injury attending rehabilitation clinic in UMMC is high. However, as the population in this study is living in the urban area with better amenities, this may not be indicative of the general population in Malaysia.
Neuropathic pain following SCI: What does the evidence say?

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Poster Presentation Day 1, September 13, 2018

Neuropathic pain (NP) is cited as one of the most distressing and debilitating conditions following a spinal cord injury (SCI), leading to poor quality of life, depression and sleep disturbances. Many pharmacological and non-pharmacological interventions for neuropathic pain have emerged in recent years. It is important that clinicians are able to dissect the available evidence on the prevalence and trend of NP in persons with SCI as well as the effectiveness of interventions. This session will reveal and appraise the recent evidence related to neuropathic pain; four systematic review will be appraised and presented. We will start with a short introduction to systematic review and meta-analysis. This is followed by a systematic review and meta-analysis article on the prevalence of NP which reveals not only the prevalence of NP but also the characteristics of pain and demographics of those who get it. We will then present findings of three systematic reviews which looks into NP treatment: transcranial direct current stimulation, anti-convulsant mediations and non-pharmacological intervention. Finally we will summarise on and how the available evidence could be used to guide our clinical decision making.

Outline of session:
- Appraisal of systematic Review and meta-analysis in a nutshell (10mins) - William Levack
- Systematic Review and meta-analysis on the prevalence of neuropathic pain in SCI (10 mins) - William Levack
- Anti-convulsant medications for Neuropathic pain (20mins) - Nazirah Hasnan
- Non-pharmacological intervention for neuropathic pain in persons with SCI (20 mins) - Julia Patrick Engkasan
- Using the evidence in your clinical decision (15mins) - Julia Patrick Engkasan
- Q&A (15mins)- all speakers
Comparison of Rehabilitation Outcomes between Traumatic and Non-traumatic Spinal Cord Injury Patients in Thailand: Results from Thai Spinal Cord Injury Registry

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Poster Presentation Day 2, September 14, 2018

Objective: To compare outcomes of in-patients rehabilitation between traumatic spinal cord injury (TSCI) and non-traumatic SCI (NTSCI) in Thailand.

Study design: Prospective cohort study

Setting: Rehabilitation wards of tertiary facilities.

Methods: Demographic data were collected according to International SCI core datasets. Rehabilitation outcomes were evaluated using Spinal Cord Independence Measurement (SCIM) and rehabilitation efficiency index. Level of significant differences of the categorical and the continuous results between TSCI and NTSCI patients were determined with chi-square and independent t-test or Mann-Whitney U tests, respectively.

Results: Among 236 newly admitted patients, 65 persons (28%) were NTSCI patients. Focusing on the causes of NTSCI, vertebral and spinal cord tumors were the leading causes (30.8%). The NTSCI group had more proportion of motor-functioning (AIS D) patients whereas the TSCI group had more proportion of motor-nonfunctioning tetraplegic (AIS A, B or C) patients. These results corresponded with the SCIM at admission, which was significantly higher in the NTSCI (31.51 vs 28.50, p =0.039). Compared with the TSCI group, the NTSCI patients was significantly older (mean age = 54 vs 46 years, p = 0.001), and had shorter length of stay (LOS) (mean length of stay = 40 vs 50 days, p = 0.018). There were no significant differences between SCIM at discharge, SCIM gain, and rehabilitation efficiency. Urinary tract infection rate was less in the NTSCI group (p=0.05).

Conclusion: Compared with TSCI, NTSCI patients had shorter LOS, more incomplete lesion and higher SCIM at admission, with no significant effect on rehabilitation outcome.
Effectiveness of a New Automatic Mattress Turning Device in Prevention of Pressure Injury: a Pilot Study in Chronic Spinal Cord Injury Patients

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Poster Presentation Day 1, September 13, 2018

Objective: To test the effectiveness of using a new prototype of an automatic mattress turning device (AMTD) in prevention of pressure injury in chronic tetraplegic patients.

Materials and Methods: The AMTD was placed under a mattress and set to slowly turn and reposition in approximated 30-degree left side-lying, a supine and approximated 25-degree right side-lying positions. Durations of each position (minimum 30 minutes and maximum was 120 minutes) were set according to patients’ preference. Skin check at bony prominences was done every 8 hours by a rehab nurse. After giving an informed consent, six chronic tetraplegic patients without current pressure ulcer, were asked to lie in bed for 24 hours. The study ended when pressure injury occurred or after completion of a 24-hour study.

Results: Five completed the study with no pressure injury. One with complete C5 tetraplegia and low body mass index of 12.8 kg/m² developed grade 1 (non-blanchable) pressure injury at sacrococcygeal area after 15 hours of lying in bed (80-minute side-lying and 120-minute supine). All participants were satisfied with the AMTD. Four preferred the left side-lying while other two preferred the right side-lying.

Conclusion: This new automatic mattress turning device could prevent pressure injury in tetraplegic patients when lying in bed for 24 hours. However one should be aware of risk of pressure injury and duration of each position should be set appropriately to prevent pressure injury as a long duration is not suitable for those who have low body mass index.

Keywords: Pressure injury, Mattress turning device, spinal cord injury, tetraplegia, repositioning
DEVELOPING A SPINAL CORD RESEARCH HUB FOR ALL SCI RESEARCH STAKEHOLDERS

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Poster Presentation Day 2, September 14, 2018

Introduction
For decades, SCI research has been thwarted by small numbers of participants in studies that do not lead to significant results. The solution is for multi-centre studies to ensure the recruitment of large numbers to achieve scientifically valid outcomes.

Changing from a local to a global focus in research requires a culture change. Part of the solution is the Spinal Research Institute’s (SRI) development of an online collaboration platform, the Spinal Cord Research Hub (SCoRH), which will support the development of research networks. SCoRH will be underpinned by administrative support available to all stakeholders. SCoRH will provide an online space dedicated to SCI research, enabling the development of networks and partnerships for researchers, consumers, clinicians and funders to work together to undertake large-scale research projects.

Methods
Since 2016 the SRI has been working on an online web-based network dedicated to SCI research. An advisory group of experienced SCI researchers from nine countries around the world and other stakeholders advised the project group and the platform developer on functional features and governance for the online platform.

The development of mutual trust and respect amongst researchers has also been encouraged by annual travel grants and research workshops. These both working to facilitate networking and promote discussion on multi-centre research, to build actions that lead to outcomes.

Results
The SCoRH online platform is now being tested with a view to launch at ISCoS 2018. During its development the platform has been tested by an advisory group to ensure that functionality and usefulness to SCI researchers is appropriate for their purposes.

The platform is now ready for SCI researchers.

Conclusions
By encouraging a culture of collaborative SCI research, SCoRH will support the development of SCI research from a local to a global focus, ultimately improving the lives of those living with SCI.
Exploring the care trajectory for older persons with SCI in the Netherlands.

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Poster Presentation Day 2, September 14, 2018

Introduction: The mean age at onset of Spinal Cord Injury (SCI) is increasing. Whether current SCI inpatient rehabilitation programs need adjustment to better fit the needs and capacities of older people remains uncertain. This study’s objective was to evaluate the current care trajectory of older people with SCI in The Netherlands.

Methods: Hospital data were analyzed on people with SCI admitted to De Hoogstraat Rehabilitation since 2000. Also, six people with recent SCI (aged 60 to 82 years, recruited at University Medical Center Utrecht and De Hoogstraat Rehabilitation) and four physicians (hospital, rehabilitation center, nursing home) were interviewed.

Results: Mean age at admission to De Hoogstraat rose from 43.8 (95% CI 39.3 to 48.3) in 2000 up to 61.5 (95% CI 55.6 to 67.5) years in 2017. Four participants were discharged to specialized rehabilitation after triage from a rehabilitation physician. Two participants, without triage from a rehabilitation physician, were discharged home. None were discharged to geriatric rehabilitation in a nursing home. One person discharged home doubted the discharge location. The four persons in specialized rehabilitation were satisfied with the intensity of their therapy, which was ad-hoc adapted to their needs. Physicians mentioned that older people with high comorbidity are better fitted at geriatric rehabilitation, instead of specialized rehabilitation, because of lower physical capacity and cognitive inability to live independently after rehabilitation.

Conclusion: Age at onset of SCI in De Hoogstraat is rapidly increasing. Older people in specialized rehabilitation were all satisfied with their treatment. People seen by a rehabilitation physician in-hospital were discharged to specialized rehabilitation, none were discharged to geriatric rehabilitation in a nursing home. Physicians agreed that only in case of high comorbidity transfer to a nursing home should be considered. Future research should focus on identifying specific geriatric needs and exploring where these needs are best realized.
Current bowel care practice in spinal cord injury (SCI) units in Australia and New Zealand

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Poster Presentation Day 2, September 14, 2018

Background
Bowel care practices vary between SCI units internationally and locally. While guidelines exist in the USA, Canada and the UK, there are neither comprehensive nor standardized national guidelines in Australia or New Zealand.

Research question
What are the current bowel care practices in specialist SCI units in Australia and New Zealand and are there standardized local guidelines and policies to guide this?

Method
A cross-sectional survey of acute and rehabilitation SCI units across Australia and New Zealand (n=12) was conducted involving structured telephone interviews with a senior nurse clinician from each unit. Each interview took approximately 1 hour to complete. The interview consisted of 5 sections, with a total of 168 items, that comprehensively explored pharmacological and non-pharmacological neurogenic bowel interventions.

Results
All SCI inpatient units have standardized bowel care practices for upper motor (UMN) and lower motor neuron (LMN) bowels, but not all units have specific policies. In most units the determination of bowel care practices are made jointly by medical officers and registered nurses. The majority of units have target Bristol stool types for bowel management, the most frequent being 3-4 for UMN and 2-3 for LMN. There is variability in the use of the gastro-colic reflex, abdominal massage and the use of the Valsalva maneuver. Most units have a minimum daily fluid intake of 2 litres. All units routinely use oral medications in their bowel management programs, however, there is variability in the pharmacological agent used. The use of rectal medications is more varied and less frequent in the management of LMN bowels.

Conclusion
While all units have standardized bowel care practices, there is variability in these practices across units. The results of this study call for the development of consensus in adopting best practice guidelines for bowel care following SCI for Australia and New Zealand.
The result of long period rehabilitation exercise using SCI rehabilitation exercise device /invented in Mongolia/

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Poster Presentation Day 1, September 13, 2018

Introduction:
In low/low-middle-income countries’ Patient with paraplegia and tetraplegia after SCI, they have not enough supply for rehabilitation equipment also spend a lifetime in a wheelchair or bed is extremely difficult for them and their family’s economic and mental situation.

Estimate muscle weakness, blood circulation, joint contracture and life quality of People with SCI have done long period rehabilitation exercise on SCI rehabilitation sling device /Invented in Mongolia/.

Objective: To restore the weakness of the muscles and joints, improve quality of life

Methods:
Participated 144 patients with SCI. patients have done during 6-12 months period, 4 level rehabilitation exercise on SCI rehabilitation sling device /invented in Mongolia/. This device is consist of 2 kinds of device. One is lying down position exercise device and another is stand up exercise device. We use Functional Independence Movement /FIM/ Score for patients’ life quality.

Result:
63.2% [N=91] of patients stay in bed for a long time and 36.8% [N=53] living with a wheel chair and from all patients, 66.7% [N=96] had a skin problem. After long period rehabilitation exercise on SCI rehabilitation sling device /invented in Mongolia/ 54% [N=78] patients can walk with crutch wear feet and knee lock equipment.

1. After SCI as fast as for getting rehabilitation treatment result will be better. And easy for the walk with crutch wearing feet and knee lock equipment

2. This exercise with SCI rehabilitation device is needed average 8 months thus needs hardworking and patience from a patient.

Conclusion:
46% [66] patients could not walk with a crutch because their health situation was weak and spent too much time in bed. But their motor function and health got better.

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Poster Presentation Day 1, September 13, 2018

A global survey relating to Spinal Cord Injury (SCI) nurse education was undertaken in 2016 by the author. Feedback from over 17 countries highlighted the dearth of education available and/or received by nurses. Over a number of years SCI education in Low & Middle Income Countries has been provided by the author. Pre and post testing has been part of the training schedule and proved invaluable. Evidence of learning using pre and post testing for SCI training in LMICs provides proof of new knowledge relating to the fundamentals (bladder, bowel, skin integrity, risks associated with SCI) of SCI nursing care. This evidence can be invaluable proof of educational input to stakeholders and should not be overlooked. This provision of evidence needs to be available in ‘developed countries’ to ensure organisations have data to demonstrate successful staff learning.
The use of fibroblasts in pressure ulcer treatment in a person with spinal cord injury (case report).

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Poster Presentation Day 1, September 13, 2018

Introduction
Pressure ulcers (PU) are common complications in persons with spinal cord injury (SCI), usually demanding long periods of treatment while the risk of recurrence is significant. Multidisciplinary approach and patient education are a corner-stone mainly in prevention, while treatment modalities are of limited efficacy with a significant cost. The use of autologous fibroblast culture is a promising modality that has long been used in treating burn and diabetic foot ulcers accelerating the healing process, while it has not been studied in SCI yet.

Methods
Presentation of a case report. A male person with tetraplegia (AIS A, neurological level A7), age 32, 14 years after traumatic SCI, presented with a 2nd grade ischial tuberosity PU (NPUAP staging guidelines), which deteriorated to a 4th grade PU despite conservative treatment and bed rest. Through a multidisciplinary collaboration after exclusion of osteomyelitis, informed consent was received to proceed with the application of fibroblasts' culture. After surgical debridement, autologous skin fibroblasts from a small split-thickness healthy skin biopsy were cultured for three weeks and injected subcutaneously into the surrounding healthy tissue of the PU during a 3-sessions treatment period, two weeks apart each. During this period simple gauze dressings were used. Wheelchair was reassessed.

Results
Pressure ulcer size in the beginning was 5.0 x 4.2 cm, with a depth of 8.0 cm. From the first session on, healing process was accelerated impressively. After a treatment period of three months, ulcer healing is complete, which was also confirmed through ultrasound imaging and during a six month period follow-up.

Conclusions
The interest in wound regenerative medicine is rising during the last two decades, making fibroblast culture a candidate in healing acceleration of SCI PU. Adequate research and application in a larger scale is needed.
Introduction: Established in 2014 and currently only one of two in East Africa, the Orthopedic Rehabilitation Unit (ORU) at Kilimanjaro Christian Medical Centre (KCMC) offers tailored care for (Spinal Cord Injury) SCI survivors in our low-income setting. SCI care at KCMC marked two milestones in January 2018; the first ORU multidisciplinary ward round was conducted as well as KCMC’s first spinal fixation surgeries.

Most patients are therapeutically managed; with an x-ray of the spine as the only aid in localizing the skeletal level of injury. A strained health budget in a low-income country translates into minimal options for diagnosis and intervention.

We present the patient population managed by our multidisciplinary SCI care team.

Methods: A multidisciplinary team (orthopedic surgeon, neurologist, physiotherapist, occupational therapist, nurse) reviewed every in-patient (n=24) with a traumatic SCI in the KCMC Orthopedics and Trauma Ward and ORU over three weeks.

Results: Twenty-four patients were admitted over the survey period; 8 in ORU and 16 in the general orthopedic ward. The predominantly male population (n=20, 83.3%) had an average age of 39.2 years. The most common cause of injury was motor traffic accidents closely followed by falls injuries. The average duration of stay was 11.0 weeks and only 8 patients (33.3%) had insurance cover. The neurological level of injury was cervical in 14 (58.3%) patients and thoracic in 8 (33.3%). The secondary complication rate was 54.1%, most commonly pressure sores (29.2) and contractures (16.7%).

Conclusions: The average SCI in-patient profile at KCMC is a young uninsured male from an economically fragile background. A strained health care budget in a low-income country also manifests in the high secondary complication rate. SCI patients in a low resource setting have a grim prognosis, further compounded by social and financial implications of the acquired disability.
Introduction
Multi-disciplinary health surveillance is demonstrated best practice to reduce incidence of secondary complications due to SCI, and Telehealth has an identified role. To ensure sustainability in delivering Telehealth it’s important clients are well informed and engaged in the process.

Methods
Clients living in rural and regional centres were surveyed to identify barriers and facilitators to the introduction of Telehealth. Education on Telehealth was simultaneously offered. This helped inform purpose of the survey and promote engagement.

Results
109 clients completed the survey. 20% had heard of Telehealth before, and only 7% had previously participated in Telehealth. Themes around why people liked attending the current clinic included seeing a specialist SCI service, ongoing learning and keeping up to date, face to face connection, social occasion, reassurance, and locality. What was not liked included themes around how health care was delivered (e.g. ‘no follow up’, ‘not necessary to see all clinicians’), logistics (e.g. ‘not frequent enough’, ‘waiting’), and the environment (e.g. ‘parking’, ‘weather’). 40% of clients had no experience with similar forms of communication e.g. Facetime, Skype, however 72% of clients were willing to try Telehealth as a way of doing a health check.

Conclusion
Clients are prepared to try Telehealth despite majority not having had previous experience. Understanding themes about what is liked and not liked about the current clinic format helps to anticipate potential barriers, and facilitators to the uptake of Telehealth. Remaining client centred will ensure client needs are met, and promoting how Telehealth can meet these needs will be addressed.
Secondary Health Conditions following Spinal Cord Injury

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Poster Presentation Day 2, September 14, 2018

Introduction: Secondary health conditions are physical or psychological health problems resulting from an underlying impairment. These conditions are frequently experienced by people with spinal cord injury (SCI). However, limited research has investigated secondary health conditions in people with SCI over time. The purpose of this longitudinal study was to describe the secondary health conditions among New Zealanders with SCI, and the degree of bother these conditions were perceived to cause.

Methods: Between 2007 and 2009, 118 people with SCI were recruited during their first admission to one of New Zealand’s two spinal units. Participants provided comprehensive health and wellbeing information during interviews conducted 6, 18, and 30 months post-SCI. Secondary health conditions were assessed using 14 items derived from the Secondary Complications Survey. Response options included: not bothered, slightly bothered, moderately bothered, or greatly bothered.

Results: The most commonly reported secondary health condition was leg spasm, with 64%, 66%, and 59% of participants reporting bother from this condition at 6, 18, and 30 months, respectively. Back pain, pain below the level of SCI, constipation, and shoulder pain were also frequently reported. The proportion of participants bothered by secondary health conditions declined only minimally over the 30 months of follow-up. Between 40-60% of participants reported ‘great’ bother from ≥ 4 SHCs at each interview.

Conclusions: Secondary health conditions are prevalent following SCI. Further longitudinal research is needed to investigate a broader range of secondary health conditions and outcomes in people with SCI, in order to inform the development of preventive interventions.
Group manual wheelchair (MWC) skills training improved patient outcomes and efficiency in inpatient Spinal Cord Injury (SCI) rehabilitation

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Poster Presentation Day 1, September 13, 2018

Introduction -
Previous means of MWC skills training (individual basis) were identified to be inefficient and use of outcome measure was inconsistent. In 2016, Physiotherapists implemented a bi-weekly group MWC skills training session for individuals with SCI undergoing inpatient rehabilitation.

Goals were to:
- improve intensity and efficiency of MWC skills training
- implement consistent use of Wheelchair Skills Test (WST) to evaluate outcomes
- improve patient outcomes noted by change in WST score

Methods -
Pre-intervention: Retrospective review of 13 inpatients notes identifying the intensity (occasions and therapy time spent) and delivery of MWC skills training during admission. WST completed on discharge.

Intervention: 13 inpatients participated in 2 x 30min group classes/week conducted by 1 x Physiotherapist +/- 1 x Occupational therapist +/- Allied Health student (maintaining staff:patient ratio of ≤1:3). WST completed on admission and discharge, individual goals set with individualised intervention provided. Attendance was recorded.

Results –
Intervention group, compared to pre-intervention group, demonstrated:
- 59.55% improvement in discharge WST
- 74.18% improvement average change WST (admission-discharge)
- 79.07% reduction in average number of sessions
- 65.85% attendance rate

Conclusion -
Group MWC skills training improves patient outcomes following SCI and increases efficiency of therapy provision. Future plans include evaluating patient satisfaction and open group to inpatients with other diagnoses.
Introduction: Although dementia is commonly thought to be irreversible, a recent study by Bredesen suggests that a comprehensive approach can reverse cognitive decline. We applied this to a 70-year-old man with T-11-AIS-A SCI, complicated by an immobilized shoulder secondary to rotator cuff tear and cognitive decline over three years. History, observation, neuropsychological assessment and CT prior to treatment suggested aspects of both Alzheimer’s and vascular disease. His physical limitations posed significant challenges in applying the comprehensive approach, leading some to think this treatment could not be used with SCI patients.

Methods: A comprehensive approach to dementia treatment was initiated by first ruling out excessive blood concentrations of heavy metals, depleted serum concentrations of vitamins B1, B6, B12, C, D and E, and ensuring euthyroid status. An individualized program was developed incorporating exercise, sleep, and cognitive challenges unique to the patient’s needs. Wii sports using his one good arm were utilized for aerobic exercise. Difficulty initiating and maintaining sleep due to leg spasms was treated with Gabapentin 200mg 30 minutes before bed. Using video chat, he was taught to use Excel to track his supplement/medication use and trade stocks. Alternate forms of all tests were used to control for practice effects from pre-treatment testing to follow-up.

Results: Saint Louis University Mental Status (SLUMS) scores improved from 14 to 23 in nine months. At 22 months Neuropsychological Assessment Battery showed improved auditory and visual attention, story recall, judgment and abstract reasoning (categories). Immediate recall for specific tasks and naming declined. He demonstrated marked improvement in non-verbal problem solving. The patient was able to assume independent medication management and was successful in stock trading.

Conclusion: This approach can provide significant, if partial, improvement in cognitive and social functioning for spinal cord injured patients in comprehensive spinal cord injury units.
No Boundaries: Designing a personalized Pediatric Spinal Cord Injury Clinical Pathway for Acute In-patient Rehabilitation with clients and families one patient at time

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Poster Presentation Day 2, September 14, 2018

Annually, our pediatric inpatient rehabilitation center cares for on average 20 clients a year between the ages of 11 months to 18 years of age. Their length of stay averages from 6 weeks to 32 weeks— with a mean average of 24 weeks. While this is a relatively rare condition statistics indicate Pediatric SCI accounts for 20% of all Spinal cord injuries (SCI) (ASIA, 2018) and it still accounts for almost 8% of our overall unit volumes.

In searching the literature we found no suitable pediatric spinal cord injury clinical pathway which we could utilize in clinical practice. In order to create a personalized pathway we utilized a quality improvement framework to aid us in clearly understanding the needs of this population. We established a multi-disciplinary steering committee and taskforce, creating a vision together to prioritize the elements of a personalized pediatric spinal cord injury clinical pathway.

Typically, clients with SCI have multisystem needs. As a multi-disciplinary group we mapped out the client journey by performing a kaizen event including direct input from current and past clients, families and care providers to assess the current state of services they receive. This process informed the design of our future clinical pathway.

This presentation will outline the background, process improvement framework, literature review findings. It will provide an overview of the clinical pathway we have developed and our implementation strategy. We will also discuss the strategies we have established to ensure the pathway is sustainable and utilized consistently in clinical practice.
The evaluation for the muscle atrophy of patients with cervical spinal cord injury

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Poster Presentation Day 2, September 14, 2018

【Introduction】Muscle atrophy (MA) is a common complication of patients with cervical spinal cord injury (c-SCI), and induces the diabetes mellitus and stroke. We reported the MA after c-SCI using a Dual-energy X-ray absorptiometry (DEXA), and the results showed the remarkable decrease of muscle mass at 6 months after the injury. However, the DEXA that can evaluate the MA is very expensive, so the method which can more easily evaluate the MA, is needed. In this study, we evaluated the MA using both DEXA and measurement of circumference (upper and lower extremity) at 1 month and 6 months after injury, and reported about the relationship between the DEXA and circumference.

【Methods】15 cervical spinal cord injury patients were included from February 2015 to February 2017 at our institution (13 males, 2 females, mean age: 65). The patients were classified by ASIA (type A; 4, B; 1, C; 7, D; 3). The muscle mass was evaluated using the DEXA and circumference at the 1 month and 6 months after injury. We compared the muscle mass of upper and lower extremity by DEXA and upper-arm, forearm, thigh and calf by circumference. The results were analyzed by Spearman's rank correlation coefficient.

【Results】The DEXA showed the MA at the 6 months after injury compared with 1 month (upper extremity: 16% decrease, lower extremity: 16% decrease). The circumference also showed the MA (upper-arm: 3.4% decrease, forearm: 2.6% decrease, thigh: 5.1% decrease, calf: 5.5% decrease). There was no statistically significant difference in upper extremity between DEXA and circumference. However, there was statistically significant difference in lower extremity between DEXA and circumference (thigh: p=0.0037, calf: p=0.0365).

【Conclusions】Circumference was a reliable method to evaluate the change of muscle mass of lower extremity in patients with c-SCI. We need to continue this study to report the results more accurately.
Does a New Automatic Mattress Turning Devices Work with Various Types of Hospital Mattresses?

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Poster Presentation Day 1, September 13, 2018

Background and objective: A prototype of a new automatic mattress turning device (AMTD) has been tested with a high-specification mattress (Liberty neo, Lundal Corporation) for 24 hours in a laboratory setting. It could turn the mattress to a set angle (30 degrees) efficiently. Therefore, we would like to test whether it could work with other mattresses used in our hospital.

Materials and method: Six types of PU foam and 4 types of mixed foam and coconut fiber mattresses used in our hospital were identified. The AMTD was placed under each mattress and set so that its airbags were inflated and turned the mattress to a set angle of 30-degree. A volunteer with a body mass index of 20.5 kg/m² was asked to lie on each mattress. Then an angle of turned mattress was measured with a mobile phone goniometer application. Peak pressure indexes (PPI) at the bony prominences and total contact areas (TCA) were measured during supine and side-lying positions with an XSENSOR pressure mapping system.

Results: All mattresses were turned with average angle of 33.3 degrees, minimum of 22 degrees on a 10-cm and 21.7 kg hard PU foam mattress, and maximum of 41.5 degrees on a 8-cm and 4.4 kg PU foam mattress. The PPI in a supine position was highest at sacrococcygeal area (varied from 33.4 to 44.6) and in a side-lying position at greater trochanter (varied from 26.7 to 36.7). When changing from a supine to a side-lying position, the TCA increased with all mattresses.

Conclusion: Our new automatic mattress turning device was efficient in turning one side of the mattress to a required side-lying position. It is less efficient with a hard, thick and heavy foam mattress. In practice one should concern of mattress specification before using this mattress turning device.
Patient education at the Swiss Paraplegic Centre Nottwil – a holistic concept

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Poster Presentation Day 1, September 13, 2018

People with a recent spinal cord injury have to not only re-learn how their bodies function but also acquire new skills so that they can master common life situations as well. They need highly specific knowledge in order to cope with their “new life” and to be able to stay healthy long-term. To establish a new comprehensive understanding of health a multilevel learning process is required.

In the last 10 years, the nursing department at the Swiss paraplegic Centre has established a holistic patient education concept, with centralized and de-centralized educational parts. From a health professionals perspective, systematic patient education requires consolidated knowledge, practical skills and educational qualifications in order to guide patients through their learning process.

Peripheral education takes place on the wards and has to be aligned based on the individual inter-professional rehabilitation goals of each patient. The peripheral education tools are provided, such as planning tools, instructional materials as well as an integrated new manual “Living with a Spinal Cord Injury”.

The content of the manual, which every initial rehabilitation patient receives, covers the following topics: the paralysed body, successful management of complications, bladder and bowel care, body care, respiratory management and life-love-work-leisure. It is available in four languages German, French, Italian and English and is written in layman’s terms, so it is easy for non-professionals to understand and can later serve as a reference for patient and caretakers alike, when patients return home. The manual plays an essential role as an instrument in patient education as well as for planning their next nursing objectives.

One-to-one peer counselling, group seminars with SCI specific topics and learning by doing events are centrally coordinated with the goal of transferring theoretical knowledge into real life situations outside of the hospital.

The inpatient peer counselling program has been recently evaluated. The qualitative study examined the experience of peer counselling from the perspective of patients with SCI as well as from the perspective of the peer counsellors.

The results showed, that patients experienced the peer counselling sessions as solution-oriented, practical, motivating and appreciated the authentic, open demeanour of the peer counsellors. An exchange about recreational activities, hobbies and interests supported the development of interpersonal relationships. Peer counsellors found the initial visits with patients with high level quadriplegia a special challenge. Their regular presence in the hospital however facilitated an easier exchange. The findings implicate that patients feel empowered by peer counselling. Peer counsellors are occasionally confronted with stressful situations in their work. The need for support and training of peer counsellors should be further investigated.

Time table
- Establishing a new understanding of health, different aspects of learning
  20 min, Karin Roth
- A holistic patient education concept – centralized and de-centralized educational parts
  15 min, Christa Schwager
- Patient manual “Living with a spinal cord injury” – design, content, framework conditions
  15 min, Christa Schwager
- Evaluation of Peer Counselling during first rehabilitation – findings of the qualitative study
  - 20 min, Karin Roth
Correlation between pre-lesional comorbidities, some post-lesional complications in SCI patient and the functional capacity calculated using the SCI-ARMI algorithm.

Dr Ilaria Baroncini\(^1\), Dr Giorgio Scivoletto\(^2\), Dr Maria Chiara Bulzamini\(^1\), Dr Monica Torre\(^2\), Dr Giulia Giovannini\(^3\), Susanna Antolini\(^1\), Dr Maria Rosaria Porto\(^2\), Simona Caselli\(^2\), Dr Marcella Merafina\(^2\), Dr Jacopo Bonavita\(^1\)

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Poster Presentation Day 2, September 14, 2018

SCI-ARMI represents an estimate of ability realization, expressed as percentage of the maximum expected rate for a subject with the same characteristics of severity, sex and age. The rehabilitation potential is the difference between a 100 SCI-ARMI score (100% of skill achievement) and the current SCI-ARMI. Various clinical factors can modify the ability realization, and therefore of SCI-ARMI.

The etiology of the lesion, if traumatic, has a positive effect on the realization of rehabilitation potential and a similar situation occurs for the neurological lesion level (if lower) and the completeness of lesion (if less severe).

This study aims to quantify the overall effect of pre-lesional comorbidities on ability realization at discharge from the first hospitalization in a spinal unit. It also aims to analyze the correlation between SCI-ARMI and some complications.

84 patients recruited within thirty days from injury: age ≥ 18, both traumatic and non-traumatic, complete or incomplete SCI, and any neurological level.

Comorbidity was measured using the CIRS scale at admission.

Complications analyzed during hospitalization were pain and spasticity. SCIARMI was considered at admission (T0), 60 days after the harmful event (T1) and at discharge (T2).

Statistical analysis showed a slight negative correlation between the CIRS score and the SCI-ARMI delta between T0 and T2.

There was no significant correlation between pain and SCI-ARMI delta, while SCI-ARMI gain resulted lower for patients with spasticity at onset and maintained throughout hospitalization.

A strong correlation between SCI-ARMI delta and etiology was highlighted: non-traumatic patients gained overall less than traumatic ones.

The correlation between LOS and SCI-ARMI delta is complex, and different in T0-T1 and in T1-T2.

SCI-ARMI seems to be a sensitive indicator, but multivariate analyses and a greater sample will be necessary to define better if other variables affect the rehabilitation gain.
Inter-rater Reliability of the Application of the Non-Traumatic SCI Dataset to Degenerative Cases

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Poster Presentation Day 1, September 13, 2018

Introduction:
The International Spinal Cord Society published the International Dataset for Non-Traumatic Spinal Cord Injury (IDS-NTSCI) to facilitate standardization of myelopathy classification across centers. Previously, we demonstrated poor inter-rater reliability when classifying difficult neoplastic cases. At our institution, subjectivity was also involved in classification of vertebral column degenerative disorders, particularly in cases with previous falls, as it was unclear if the injury was secondary to degeneration or trauma. In addition, many cases had multiple degenerative findings making it difficult to classify the specific degenerative cause of injury. This study aims to determine the inter-rater reliability of applying the IDS-NTSCI to classify complex spinal cord injury cases secondary to vertebral column degenerative disorders.

Methods:
We summarized 15 representative challenging cases from clinical practice into vignettes including initial presentation, workup, and imaging findings when available. 23 raters, including resident and staff physicians of various specialties, independently classified each case. Intraclass correlation coefficient (ICC) was calculated to determine the agreement between raters. Inter-rater reliability was considered ‘good’ if the ICC was 0.75 to 0.9 and ‘excellent’ if the ICC was 0.9 or greater.

Results:
Overall ICC for all cases was 0.183 with a 95% confidence interval of 0.090 to 0.384. There was not complete agreement for any case. Cases with multiple degenerative findings on imaging had the most variability in classification. In cases where patients had osteoporosis with a prior fall, raters selected the least number of classifications.

Conclusions:
Inter-rater reliability among this subset of challenging degenerative cases was poor. Future revisions of the IDS-NTSCI should consider providing further directions clarifying the categorization of difficult cases. Additional inter-rater reliability analyses for different etiologies of NTSCI, including vascular, inflammatory, and more straightforward cases, as well as a larger, multi-institutional study could help guide revisions and clarifications to improve the usefulness of NTSCI Dataset.
Sleep problems in spinal cord injury patients in a Spinal Rehabilitation inpatient setting.

Dr Atif Shahzad¹, Dr Monica Ling¹
¹Prince of Wales Hospital, Sydney, Australia

Introduction:
Prince of Wales Hospital Spinal Cord Injury (SCI) Service forms part of the NSW Statewide Spinal Cord Injury Service (SSCIS) providing care to newly diagnosed SCI patients and those with established SCI. The reason for conducting a survey is that sleep disturbance is one of the most common and severe problems affecting spinal cord injured hospital inpatients. It can impact negatively on people day time function, ability to participate in rehabilitation, cognition and mood. There have been studies mostly on outpatient settings but limited in inpatient spinal cord injured hospital population.

Aim: To determine prevalence of sleep problems in a spinal cord injured inpatient setting and impact on rehabilitation.

Methods: Cross-sectional survey. A survey was administered to individuals with SCI during their inpatient stay in a spinal rehabilitation unit and their treating clinicians

Results
The results are shown in the following categories (graphs/tables):
1. Characteristic of study population (age, sex, level of injury, time since injury)
2. Risk factors related to sleep problems (patient-reported and clinician-reported)
3. Impact on rehabilitation participation (patient-reported and clinician-reported)

Discussion
Literature review shows upto 72% SCI patients reported poor sleep quality and 36% with insomnia. In comparison, incidence reported as 36% in general neurological rehabilitation population. Results from study showed multiple factors impacting on sleep and rehabilitation participation. Pain, voiding, spasms, environmental and adverse sleeping position were reported by patient for sleep problems. A higher percentage (~70%) of patients with sleep problems were observed to have immediate impact on rehabilitation participation by clinicians.
Outcomes of rehabilitation of patients with sport-related spinal cord injury.

Dr Atif Shahzad

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Introduction:
Prince of Wales Hospital Spinal Cord Injury (SCI) Service forms part of the NSW Statewide Spinal Cord Injury Service (SSCIS) providing care to newly diagnosed SCI patients and those with established SCI. Acute and rehabilitation care is provided to patients during their inpatient stay. Data is collected routinely on all SCI patients admitted to Prince of Wales Hospital is entered in Statewide Spinal Cord Injury Database (SCID). The SSCIS database collects NEW cases, for both traumatic and non-traumatic spinal cord injuries in NSW Spinal Units which forms part of the national data set, known as the National Injury Surveillance Unit (NISU).

Method:
Retrospective analysis of patients who sustained sport-related spinal cord injury and discharged from Prince of Wales Hospital Spinal Rehabilitation Unit during period 2010 – 2017 (7 years)

Results
The results are shown in the following categories (tables/graphs):
1. Characteristics of SCI for all sports-related SCI
2. Characteristics of SCI for individual sports
3. Geographical locations of diving accidents
4. Level of injury and ASIA impairment at admission
5. Level of injury and ASIA impairment at discharge
6. Discharge destinations
7. Length of stay

Discussion
Sports is considered a significant contributor in the etiology of spinal cord injury (SCI). Water-sport has the highest percentage followed by horse riding as sport related SCI. There are few challenges for young people with sport-related SCI.
SMARTPHONE APP IN SELF-MANAGEMENT OF CHRONIC LOW BACK PAIN
(FUTURE APPLICATION IN SCI PATIENTS)

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Poster Presentation Day 1, September 13, 2018

Introduction: mHealth is emerging as the most convenient way to deliver rehabilitation services remotely, and collect outcomes in real time, thus contributing to illness prevention by transferring care from hospital to home. This is of special interest in remote areas in low resource settings. It facilitates accessibility to healthcare, enhances patients’ understanding of their condition, and their willingness to engage in self-management, giving way to high-quality care to the satisfaction of both patients and care professionals.

Methods: 93 patients with chronic low back pain (CLBP) were recruited and randomly allocated to either the Conventional group (n = 48) receiving a written prescription from the Physician, containing a list of prescribed medicines and dosages, and stating the recommended level of physical activity (including home exercises) or the App group (n = 45) receiving Snapcare, in addition to the written prescription. Pain and disability were assessed at baseline and after 12 weeks of treatment.

Results: Both the groups showed significant improvement in pain and disability (p < 0.05). The App group showed a significantly greater decline in disability (p < 0.001).

Conclusion: Health applications are promising tools for improving outcomes in patients suffering from various chronic conditions. Snapcare helped to increase physical activity and brought about clinically meaningful improvements in pain and disability in patients with chronic low back pain. The App could be a very useful inexpensive method of Spinal Cord Injury patients follow up in remote inaccessible rural areas.
Spinal cord surgery patients infected with Multi drug resistant Acinetobacter baumanii isolated at a tertiary care centre

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Antibiotic resistance has become one of the most serious and growing threat to public health according to Center for Disease Control (CDC). There has been a rise in multidrug resistant Acinetobacter baumanii infections mostly in hospitalised patients. There have been no study exclusive on spinal cord surgery patients having Acinetobacter baumanii infection from India.

This was a retrospective study from August 2016 to July 2017 collected from Hospital Information System and data from microbiology laboratory.

A total of 12 patients had Acinetobacter baumanii isolated from spinal cord surgery patients over twelve months period (Aug 2016 to July 2017). Of the 12 patients 3 died. The hospital stay ranged from 18 days to 1 year. 11 patients had Acinetobacter baumanii isolated from respiratory samples and 1 patient only in urine. The total number of surgeries done were 5462 and 2246 spinal surgeries. The details of the patients are discussed at length. 89% of Acinetobacter were multidrug resistant. Risk factors were length of stay, previous antibiotics, endotracheal intubation. The mortality was significantly lower than in other studies.

Multidrug resistant Acinetobacter baumanii is not a frequent isolate from spinal surgery patients in a North India spine centre. The most significant isolations were from patients with endotracheal intubation. It will be interesting to compare our data with any other similar Hospital (<200 Beds) doing mostly Spine and Orthopedics surgery in India.
The impact of reconstructive flap surgery in spinal cord patients with pressure ulcers

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Poster Presentation Day 1, September 13, 2018

Introduction: Spinal patients are prone to pressure ulcers, in particular those affecting the sacrum, greater trochanter and ischial tuberosity. The management of these wounds is controversial. Some advocate for conservative management with dressings while others seek soft tissue coverage with local flaps. The operative approach creates extra wounds, subjects patients to strict postoperative bed-rest and wound-management protocols and places a strain on bed management. Despite this our centre frequently advocates for flap coverage of these wounds as we believe the overall psychological and physical gain generally outweighs the disadvantages.

Methods: We performed a mixed quantitative and qualitative assessment of spinal cord patients undergoing reconstructive flap surgery within our institution over a 12-month period. Part A: quantitative analysis reporting on the frequency, complications and outcomes of these procedures. Part B: interviews with patients having undergone reconstructive flap surgery to assess the type of injury, impact of the ulcer preoperatively, impact of operative management, and the recovery postoperatively. The emphasis of Part B was to assess the impact of pressure ulcers and spinal flap surgery on quality of life in this patient population.

Results: Over a 12-month period 54 patients were referred to the spinal plastics service at Royal North Shore Hospital for a pressure ulcer. Sixteen patients underwent surgical debridement and 12 patients had flap surgery including V-Y advancement and rotation flaps. Three patients returned to theatre following complications including haematoma and/or dehiscence. Three key themes were identified from patient interviews: (1) the psychological, social and financial toll of bed-rest protocols preoperatively, (2) the challenges of maintaining adequate pressure care postoperatively, (3) the emotional and psychological benefit of restoration of independence following healing.

Conclusion: Reconstruction of pressure ulcers in spinal patients is a difficult problem and although complications are not uncommon, the potential benefits afforded to the patient are significant.
Long-term outcome of skeletal complication in pediatric spinal cord injury

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Poster Presentation Day 1, September 13, 2018

Objective
Spinal cord injuries (SCI) are relatively uncommon in children and evidence about long-term outcomes is limited. Children who sustain an SCI at a young age are at high risk of a variety of complications such as scoliosis, leg length discrepancy and hip subluxation. The objective of this study is to evaluate information about the management of leg length inequality, scoliosis and hip subluxation of pediatric SCI patients.

Method
Medical records of 64 pediatric SCI patients aged 18 years old or younger, who visited the rehabilitation hospital, during year 2000-2015 were reviewed retrospectively. On the leg length discrepancy (LLD), scoliosis and hip subluxation that this study intended to identify was measured by radiography. 6 times of follow-up tests of above test were carried out at mean 13.68 months.

Result
Of the 64 individuals seen (34 males and 30 females) median age at injury 8 years. 28 were tetraplegic, 37 had a complete injury, and 35 were traumatic injury. There was a significant difference between LL mean values according to gender (p=0.0373), ASIA scale(0.0178). The scoliosis showed a significant difference in Cobb’s angle according to onset age (p=0.037), etiology (p=0.0218), level of injury (p=0.009), completeness (p=0.003). When the serial follow up was performed to Cobb’s angle by dividing into two groups depending on whether spinal orthosis is worn, there was no significant difference. In the contrary, when the serial follow up was performed to Cobb’s angle by dividing into two groups depending on whether it is operated or not, it showed significant difference depending on the level of injury.

Conclusion
This study identified the factors that should be considered when treating patients with pediatric spinal cord in the long term through follow-up study of clinical features associated with musculoskeletal system, by identifying the factors affecting the change.
The activity of “Seating Advisory team conference” (SAT-C) in our hospital: Intervention to the patient of spinal cord injury in multi-disciplinary team

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Poster Presentation Day 1, September 13, 2018

【Introduction】
Our hospital has sub-acute rehabilitation wards. The patients in hospital have various diseases including SCI. Since 2016, we have been holding “Seating Advisory team conference” (SAT-C) for adapting wheelchairs to the patients and improving their ADL. Doctor, PT, OT, wheelchair supplier and radiologist participate there. In this study, we report activity of SAT-C along with one SCI case.

【Methods】
During the period from February 2016 to December 2017, 132 SAT-C were held (SCI:64, stroke:63, other:5). The SCI patients consisted of 54 men and 10 women, 34 tetraplegias and 30 paraplegias and the average age of them was 48.4 years.

【Results】
Concerning ordinary one case, 27-year-old male had cervical cord injury (C5, AIS A). The Scapular movements were inhibited and the trunk was collapsed forward in driving used the wheelchair which had 22 inch wheels and icon deep back. Five meters driving time was 38 seconds. Thorough the discussions on SAT-C, we suggested changing into 24 inch wheels, icon middle back and increasing tilt angle. Five meters driving time was 14 seconds. Using a body pressure sensor, no concentration of pressure was checked. There is no occurring of pressure ulcers after SAT-C.

【Conclusions】
In this case, wheelchair driving ability was improved and no occurring of pressure ulcers were kept. There are also impacts to seat pressure or sitting position when the wheelchair is adjusted to improve driving. Therefore, the wheelchair has to be adjusted considering each activity. Moreover, it is necessary to have wide viewpoint and knowledge. We consider that SAT-C contributes to provide wheelchairs adapted to the patients through discussions and evaluations in multi-disciplinary.
Views on fall prevention, management and training from the perspective of administrators of Canadian SCI rehabilitation hospitals

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Poster Presentation Day 2, September 14, 2018

Introduction: Falls are a significant concern for some individuals with spinal cord injury (SCI). Neurological units experience the highest rates of hospital falls.1 Hospital administrators influence clinical practice, delivery of services, patient care and fall prevention practices. This study sought to understand administrators' perspectives on fall prevention, management and training practices of Canadian SCI rehabilitation hospitals in order to identify what is working well with current fall prevention practices and areas for improvements.

Methods: Semi-structured interviews were completed with eight administrators working in Canadian rehabilitation hospitals. Transcribed interviews were analyzed using an interpretive description methodology.

Results: Overarching categories included strengths and challenges related to the fall prevention practices. Strengths comprised of the following subcategories: 1) reduced patient harm and facility liability, 2) greater staff awareness of fall prevention, and 3) patient-staff learning opportunities. Despite these strengths, three subcategories within challenges arose: 1) Policy-related challenges included: a lack of clarity about stakeholder involvement in policy formation, a need for more practical policy tools, difficulty balancing fall prevention while improving patient mobility, and difficulties with categorizing/labelling falls for hospital metrics; 2) Challenges related to front-line staff actions included: poor documentation of falls, inconsistent delivery of fall prevention patient education, and inconsistent staff compliance with the facility's fall prevention practices; 3) Patient-related challenges included: risk-taking/impulsive behavior, and a need for more effective strategies to individualize fall prevention.

Conclusions: Results from this study may guide improvements to fall prevention practices in Canadian SCI rehabilitation hospitals and improve patient safety.

Sustaining SCI in Samoa: perspectives from an individual who is both a consumer and health professional

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Poster Presentation Day 1, September 13, 2018

Introduction:
The population of Samoa is nearly 200,000 and the primary sector (agriculture, forestry, and fishing) employs two-thirds of the labour force producing 17% of GDP. Samoa's principal exports are coconut products and fish. The main cause of Spinal Cord Injury (SCI) in Samoa is falls from coconut trees and this is how I sustained my SCI (L1 AIS A). I was admitted to hospital in Apia with limited resources available for diagnosis and treatment. Prioritising preventative programmes as well as providing acute management and rehabilitation is needed to prevent the complications that arise from SCI.

Methods:
In Samoa since the inception of the Samoan Spinal Network in 2011 we have identified 55 individuals with SCI. There is no registry of those with SCI other than the database collected by the Altus Resource Trust (New Zealand based charity). Of those identified 10 have passed away with complications related to SCI. This presentation highlights my journey as one of those 55 living with SCI in Samoa and reflects on lessons learned and future direction for SCI in Samoa.

Results:
The current database shows that the most common cause of SCI in Samoa is falls (38%) of these 61% of falls are from trees. Other causes include rugby (9%), motor vehicle accidents (11%) and unknown cause (23%). The most common complications are pressure injuries and urinary tract sepsis.

Conclusion:
Coconut products are a principal product for export in Samoa and falls (particularly from coconut trees) are the primary cause of SCI in Samoa. My journey with sustaining SCI in a low resourced country to studying as an Orthotist and working in the Samoan health system has enabled me to see the progress made with community care of SCI, however there is need for better prevention and acute management of SCI.
Concurrence between life impacts described by individuals with tetraplegia and clinical assessments for arm/hand surgical reconstruction: a mixed methods approach

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Poster Presentation Day 1, September 13, 2018

Introduction
While enhanced arm/hand function is identified as a priority for individuals with tetraplegia, the contemplation of surgical reconstruction occurs in the midst of the daily challenges of life-long disability, which are rarely explicitly addressed in the arm/hand reconstruction surgery literature. The recent advance of nerve transfer (NT) surgery performed much earlier than conventional tendon transfer (TT) procedures is yet to be explored for life impact from the lived-experience viewpoint, raising important procedural questions about ethics and person-centred decision-making.

Methods
This qualitative case series being undertaken in New Zealand forms part of a three-stage mixed method concurrent investigation of the lived experience of persons with tetraplegia undergoing arm/hand reconstruction surgeries. A pragmatic ‘real world’ lens has been adopted using the ICF as the theoretical construct. Purposive recruitment of cases will involve three groups of: participants offered NT surgery as part of the arm/hand reconstruction surgeries; more longstanding TT reconstruction recipients; and individuals who have persistently declined surgery (DS). Semi-structured interviews were audio-recorded and transcribed verbatim. Thematic analysis of data was performed identifying codes and themes. Data merging occurred using the ICF.

Results
Preliminary results from seven individuals (2 NT, 2 TT, 3 DS) suggest the greatest influences in whether to accept or decline surgery are peers, the confidence of clinicians, timing, and what has been described as a ‘deal-breaker’ in terms of functional gain. Early surgery participants favour a focus on the future not the present, with minimal focus on functional priorities.

Conclusion
Clinicians must be able to hear the expert-lived-experience voice in order to deliver truly person-centred care.
Spasticity and pain phenotypes after spinal cord injury

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Poster Presentation Day 2, September 14, 2018

Introduction: The incidence of spasticity and central nervous system (CNS) pain is well known in patients with spinal cord injury (SCI) but the simultaneous occurrence of these morbidities is less well known.

Methods: Retrospective chart review of 295 persons with SCI during 2014-2017, AIS A 87 and AIS B-D 208, SCI level cervical 128, thoracic 123 and lumbar 44. 130 persons had had their SCI before year 2000 and 165 from year 2000 to 2017. The patients were interviewed and examined during the regular follow up visits. Spasticity was considered as any involuntary muscle activity and troublesome if it interfered with daily activities and/or required medical treatment. Pain was considered as of CNS origin if it was constant and located in an area below the lesion level with decreased pain sensitivity but not following a nerve or nerve root area.

Results: 71% of the persons experienced spasticity and 42% had CNS pain. 32% of the patients had both spasticity and CNS pain and 8% of the patients had both troublesome spasticity and severe pain requiring opiates. These combined conditions were equally common regardless if complete or incomplete injury. The frequency of CNS pain was the same in cervical and thoracic injuries, but spasticity was somewhat more common in cervical injuries.

Conclusion: The large percentage of SCI patients with both spasticity and CNS pain calls for investigating treatments covering both conditions. Investigating phenotypes can give insights into the basic physiology behind the neural over activity after a spinal cord injury.
Epidemiology of non-traumatic spinal cord injury in Ireland - a prospective population-based study

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Poster Presentation Day 1, September 13, 2018

Background: As is the case for traumatic spinal cord injury (TSCI), the collection of epidemiological data on non-traumatic spinal cord injury (NTSCI) is encouraged. This data is necessary for service planning and contributes to global mapping of NTSCI. Collection of good quality data has been more of a challenge for NTSCI than for TSCI. Few countries have collected population-based data prospectively. We have previously shown that it is possible to collect complete population-based data in Ireland. The objective of this study was to carry out the first prospective epidemiological study on NTSCI in the Republic of Ireland over a 1 year period.

Methods: All cases of non-traumatic spinal cord injury, newly acquired in adults during 2017, were included in this study. Information was collected on age, gender, level of injury, ASIA impairment scale, aetiology and timeframe of onset as per the non-traumatic SCI data sets. If admitted to rehabilitation, data was also collected on SCIM, length of stay and discharge destination. Population denominator was the national census result for 2016, rolled forward.

Results: Incidence of NTSCI was 26.1 per million per year (125 cases). 49.6 % were male. Mean (SD) age at onset was 57 (17.6) years. Using ISCoS reporting guidelines, the largest proportion of study participants were in the 61-75 year age category, 32.5%; 53.6% were in the ASIA impairment scale D category, followed by 40.8% in T1-S5 A, B, C. Based on NTSCI data sets, most cases had “lengthy” onset, 52.8%; most common aetiology was degenerative conditions accounting for 50.4% of cases, followed by tumours, 27.2%. Disc prolapse accounted for half the degenerate conditions.

Conclusions: NTSCI is now more than twice as common as TSCI in Ireland. Affected individuals tend to be older and/or have incomplete injuries. This is our first such epidemiological study so incident trends cannot be determined.
'BEACH BUMS' Royal Rehab - New South Wales Beach Wheelchair Guide

Mr. Kel Smith
Royal Rehab, Sydney, Australia

Author:
Kel Smith, Senior Recreation Therapist, Royal Rehab Spinal Injuries Unit.

Introduction:
Innovations in adaptive recreation equipment such as beach and surf wheelchairs enables people with a disability to participate in beach activities including bodysurfing, ocean swim events, adaptive surfing or enjoying leisure time with family and friends over weekends and holiday periods. The Beach Wheelchair Guide aims to raise awareness of adaptive equipment options and to encourage active participation in recreation and leisure following spinal cord injury (SCI). The increased availability of equipment through councils, surf clubs and local communities represents ‘grass roots’ action that enables people with a disability to participate in activities that are very much part of our Australian culture.

Method:
Assessment of available information on beach wheelchairs and other access equipment was completed via website search of councils, surf lifesaving, tourism and other community organisations. Where necessary, equipment details were clarified via email or phone contact.

Results:
Information available was fragmented, non-existent or lacked detail to adequately inform people whether equipment was available or whether it might suit individual needs and abilities. There was no overall equipment database for council beaches across NSW.

Conclusions:
In assisting people with the challenges and adjustments after SCI, the need was identified for an online database of adaptive beach equipment to improve access to information and maximise participation opportunities. Establishing a link via Royal Rehab website with key stakeholders will further compliment the efforts of communities across NSW to enable people to live well with spinal cord injury.
Inpatient rehabilitation outcomes following spinal decompression surgery for nontraumatic myelopathy in patients with achondroplasia: a case series

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Introduction: Achondroplasia results in short stature with a disproportionate limb-to-trunk ratio and characteristic vertebral deformities, including a congenitally narrow spinal canal and thoracolumbar kyphosis. These structural abnormalities, along with age-related degenerative changes, predispose individuals with achondroplasia to the development of symptomatic spinal stenosis with neurological impairment.

Objectives: 1) Describe inpatient rehabilitation outcomes in patients with achondroplasia who underwent surgical decompression for nontraumatic myelopathy. 2) Identify factors unique to this population that influence the rehabilitation process.

Methods: This case series describes five patients with achondroplasia who underwent spinal decompression surgery for nontraumatic myelopathy and received acute inpatient rehabilitation at an academic medical center between 2010-2017. Retrospective review of medical records was performed to collect demographic and injury characteristics, functional data, length of stay, and discharge destination.

Results: Three male and two female patients between the ages of 20-71 years were identified. Four patients presented with incomplete paraplegia; one had incomplete tetraplegia. Surgical procedures included multilevel decompression of the cervical, thoracic, and/or lumbar spine with or without fusion. Inpatient rehabilitation length of stay ranged from 4-32 days. Patients faced additional challenges with balance and trunk stability, transfers and gait training, and fitting of durable medical equipment due to body habitus and comorbid musculoskeletal conditions, including thoracolumbar kyphosis, joint hypermobility, tibial bowing and obesity. Despite these factors, each patient made significant gains in mobility and function. The mean improvement in Functional Independence Measure from admission to discharge was 42. All patients were discharged to home.

Conclusions: After surgical decompression for nontraumatic myelopathy, patients with achondroplasia may benefit from inpatient rehabilitation to enhance functional independence and mobility. In addition to neurological impairment, musculoskeletal complications and body habitus may impact the rehabilitation process. A multidisciplinary team approach is especially effective in addressing these challenges and implementing innovative strategies for optimization of functional outcomes.
Contrasting fortunes in 'paradise' Mauritius between acute care and neuro-rehabilitation

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Poster Presentation Day 2, September 14, 2018

Introduction
It occurred to us that Mauritius, one of the emerging economies in Africa, now has the pathologies of the West: Obesity, Metabolic diseases, Ischaemic Heart Disease and Stroke. We wanted to establish how we could identify the needs and contribute to improving conditions on the ground as we feared that the focus would be mainly on acute management to the exclusion of post-acute care. Our focus is now to apply corrective measures.

Methods
From 2008 to 2012 we carried out a research study to identify the rehabilitation needs of Mauritius. Following the publication of our findings we carried out field trips to see patients and interacted with rehabilitation professionals to further assess the needs on the ground. Further actions were taken in June 2017, September 2017 and February 2018. Goals have now been set to address the issues identified six years ago.

Results
Our research publication in July 2012 led to the conclusions that the focus was on acute health care with bypass surgery or neurosurgical facilities being offered in addition to spinal surgery. By contrast the lack of structured rehabilitation was obvious. Our assessments led us to the conclusion that there was little knowledge of medical or interdisciplinary rehabilitation and the country (houses or roads) was inaccessible to wheelchairs. In a country that sees one stroke for 400 patients and 500 per million catastrophic injuries each year, the absence of rehabilitation facilities is concerning. We have taken measures to address these concerns: teaching of health professionals, bringing awareness on these issues by organising an International Conference in May 2018 and setting up of a mobile rehabilitation unit within one year and a rehabilitation centre in three years.

Conclusions
The target is to offer neuro-rehabilitation facilities, within 3 to 5 years, to complement those of acute care.
The use of the robotic device Hunova® as a rehabilitation tool for functional balance in individuals with Spinal Cord Injury

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Poster Presentation Day 1, September 13, 2018

Introduction
Postural control is a very important and basic requirement in daily human life. The robotic device Hunova® allows to evaluate and practice postural control using different exercises both in upright stance and in seated position. While most functional tasks are not isolated to the trunk, the ones that challenge balance and sitting postural control require a high level of trunk control. When trunk control is impaired the development of less effective compensatory strategies is required. Impaired trunk control functional implications are most evident in neurological conditions, such as spinal cord injury.

Methods
This is a preliminary study to explore the possibility of using Hunova® as a tool in Spinal Cord Injury rehabilitation. Thanks to the opportunity to grade exercises complexity we were able to use the device with subjects with different level of lesion and different functional abilities. We trained patients with acute/subacute lesion admitted to our Spinal Cord Unit as well as persons with a stabilized lesion and paralympic athletes.

Results
Preliminary data show that Hunova® is appreciated by users and, at the same time, can be a versatile instrument for balance rehabilitation in Spinal Cord Injury. In individuals affected by incomplete lesion it promotes the use of leg residual muscles activity. Moreover it is interesting to see how athletes show high level of functional balance even in presence of complete lesion.

Conclusions
Hunova® can be considered as a tool for rehabilitation in individuals with Spinal Cord Injury. The device allows to set up focused exercises performed in a pleasant way. The performance of paralympic athletes may lead to the design of sport associated training meant to introduce acute patients to sport activities.
Is adherence the end-goal? Using the Person Based Approach to develop a web-based exercise programme to support people living with spinal cord impairment

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Poster Presentation Day 2, September 14, 2018

Introduction
Effectiveness and uptake of many real-world interventions is problematic. Living well with a chronic condition often relies on adhering to recommendations made by a health care provider yet evidence and experience suggests that long-term adherence is difficult to achieve. This is true of strategies to manage chronic shoulder pain after SCI. If we are to improve outcomes for people with SCI, we may need to re-think the way interventions are developed. Approaches which aim for increased engagement rather than adherence may be worth considering. The Person Based Approach (PBA), is a framework that engenders this approach and will be used to create a self-guided web-based exercise intervention to support the self-management of shoulder pain in people living with SCI.

Method
The PBA involves iterative phases informed by a deep understanding of the needs and psychosocial context of the users. It will capture usability and acceptability and support the behavioural elements of the intervention. The intervention will be based on key elements identified through participant input, to ensure the intervention addresses participants’ identified needs and increases the likelihood for successful future uptake. The prototype will be iteratively refined through focus groups and ‘think aloud’ sessions. Acceptability, feasibility and engagement in the full Shoulder Pain Intervention delivered over the InterNet (SPIN) programme will then be evaluated using a mixed methods design on a sample of people living with SCI who experience shoulder pain.

Conclusion
This approach will result in a depth of understanding of the psychosocial context of the people who will ultimately use the intervention (people living with SCI who experience shoulder pain) and therefore increases the likelihood the intervention will result in successful implementation.
Posttraumatic syringomyelia and its potential impact on quality of life.

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Poster Presentation Day 2, September 14, 2018

**Introduction**
Syringomyelia is one of the most invalidating complications in spinal cord injury. In the literature around 0.2% to 8% of SCI patients develop this condition. The aim of this presentation is to emphasize the need for a long term follow up of SCI people. A delayed recognition and treatment of patients with initial neurological symptoms will have a detrimental impact on their quality of life.

**Methods**
We reviewed our data from 2012 until 2017 of our spinal unit. We found 21 patients with symptomatic syringomyelia. Of all those patients we were able to analyse the data of 17 patients. All were assessed clinically and SCIM, ISNCSCI and MRI were performed. All the 17 patients were in regular follow up in our clinic.

**Results**
The onset of symptoms was between 1 and 20 years after injury. The main symptoms presented were: fasciculations, muscle atrophy, worsening of the spasticity, pain, sensitivity disturbance. All the patients showed an impairment in their neurologic exams.

**Conclusions**
There is an urgent need for a regular follow up of post traumatic SCI patients with the aim to early recognize the onset of a symptomatic syringomyelia (because the onset of PTS can occur as early as two months and as late as 30 years after injury). A very close cooperation with SCI doctors, OT, physio and neurosurgeons is needed to prevent a deleterious progression of these complication.

1) Schurch B J, J Neurol Neurosurg Psychiatry, 1996 Jan; 60(1): 61-7
Utility of the lower extremity muscle score to predict independent walking ability and to determine its optimal timing in patients with cervical spinal cord injury

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Poster Presentation Day 1, September 13, 2018

Background
According to our previous multivariate analysis, the lower extremity motor score (LEMS) was a significant factor of the walking ability in patients with cervical spinal cord injury (CSCI). The purpose of this study is to clarify whether the LEMS has predictive ability of the walking independence, and indicates the optimal timing of the prediction in patients with CSCI.

Methods
Between 2005 and 2012, we retrospectively reviewed 422 patients who were retrieved from our database. Patients who met following criteria were eligible; 1) admission within the first 2 weeks and follow-up 6 months or more after injury, 2) traumatic CSCI, 3) Frankel grade C or D at the time of discharge. The LEMS was evaluated at the time of the admission, 2 weeks, 4 weeks, 6 weeks, 3 months, and 6 months after injury. We defined the independent walking ability as whether a patient needed a wheelchair or not at the time of discharge. Receiver operating characteristics curve analysis was used to calculate the area under the curve (AUC) for determining the cutoff values, and the sensitivity and specificity of the LEMS to predict for the walking independence on each time point.

Result
Sixty patients were included in analysis. Of these, 31 patients (51.7%) had ability to walk independently. Values of the AUC were 0.78, 0.92, and 0.94 at the time of the admission, 2 weeks, and 4 weeks after injury, respectively. Although the sensitivity was 80.6% at 2 weeks after injury, a high sensitivity of 90.3% was obtained at 4 weeks after injury. The specificity was 89.7% at 4 weeks after injury. At the time of 4 weeks after injury, the cutoff value of the LEMS was 32 points.

Conclusions
The LEMS can be utilized to predict the independent walking ability with a high sensitivity even at the time of 4 weeks after injury in patients with CSCI.
Spinal cord injury rehabilitation in Cambodia

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Poster Presentation Day 1, September 13, 2018

Spinal cord injury rehabilitation in Cambodia

Introduction and methods:
There is only one center in Cambodia dedicated to rehabilitation of spinal cord injuries located in the province of Battambang. We report the experience from a collaboration project between Sunnaas Hospital in Norway and People With Disabilities’ Foundation in Cambodia.

Results / main findings:
During 2017, a total of 42 patients were admitted for rehabilitation. There were both acute and chronic cases. Nine were female (21%), and 33 male (79%). Average age was 34 years (range 6-64 years). Etiology was traumatic in 81% and non-traumatic in 19 %. Eleven were tetraplegic, and 30 paraplegic. A total of 48 % were AIS grade A, grade B 17%, grade C 14% and D 19%. One subject could not be classified. Most common cause was fall from trees or buildings (47%), followed by motor vehicle accidents (24%), crush injuries (6%) and gun shots (6%). Severe complications are common with pressure sores grade 3-4 being present in 62% of the patients, many with osteomyelitis and necrosis. A total of 86% had significant bladder dysfunction with incontinence and recurrent infections. Bowel dysfunction with reduced control and incontinence were present in 86 %.

Conclusion:
Improving services for persons with spinal cord injury is a tremendous challenge. Long-term and sustainable interventions are needed, and we report some recommendations / key areas to focus on for the future from our 3-year project:
Capacity building for local health personnel is essential. Supporting equipment and medication must be part of a realistic and sustainable plan. Advocacy groups and peer-support is an effective way to improve knowledge, respect and understanding. Improving prevention and treatment of pressure sores and urinary tract management are still major concerns for persons with spinal cord injury in Cambodia.
Neural stem cell mediated recovery is enhanced by Chondroitinase ABC pretreatment in chronic cervical spinal cord injury

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Poster Presentation Day 2, September 14, 2018

【Introduction】Traumatic spinal cord injury (SCI) interrupts sensory and motor tracts resulting in severe, lifelong functional impairments for patients. Despite the need, one of the greatest challenges in developing an effective therapy for chronic SCI has been the inhibitory microenvironment of the injured spinal cord. Aspects of chronic spinal cord injury (SCI) environment such as formation of glial scars and Chondroitin sulfate proteoglycans (CSPGs) act as barrier to repair and regeneration. To address this environment Chondroitinase ABC (ChABC) is used to breakdown CSPGs and facilitate a permissive environment for the transplantation neural stem cells (NSCs) derived from induced pluripotent stem (iPS) cell in cervical SCI mouse model.

【Materials and Methods】Six weeks after cervical SCI we had continuously injected ChABC into subarachnoid space for a week using an osmotic pump. After which NSCs derived from iPS cells (iPSC-NSC) are intraspinally transplanted rostral and caudal to the injury site. We examined neurobehavioral tests in BMS score, grip strength meter, inclining test and CatWalk analysis. In addition 8 weeks after transplantation, we performed histological and electrophysiological analysis.

【Results】The administration of ChABC reduces elements of the glial scar and result in greater iPSC-NSC survival and engraftment. Fig.1 is the Schematic representation of experimental design. The combinatory treatment of iPSC-NSCs and ChABC significantly promoted forelimbs neurobehavioral recovery in grip strength meter and CatWalk analysis. The iPSC-NSCs integrate into the chronically injured spinal cord (Fig.2) and differentiated into neurons, astrocyte and oligodendrocyte without evidence of tumorigenesis. There is evidence that exogenous cells that differentiate to oligodendrocytes contributing for remyelination, while other exogenous cells become motor neurons. These motor neuron make new functional synaptic connections between host and grafted neurons via glutamate and acetylcholine receptors in patch clump analysis and electron microscope.

【Conclusion】By altering the glial scar in cervical SCI prior to delivering iPSC-NSC, we demonstrate that even the chronic injury environment remained therapeutic relevant for iPSC-based treatments. This is the first report that we obtained the functional recovery in chronic SCI with solid scientific evidence. This results suggested that we can expect a good results in clinical trials in the patients with chronic SCI.
The Outcomes of a Pilot Meditation Program in Individuals Living with SCI

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Poster Presentation Day 1, September 13, 2018

Introduction: Pain, stress, sleep disturbances and decreased well-being are common in individuals living with SCI. Non pharmacological interventions may help to address these problems. Meditation has been shown to improve certain chronic conditions, but its effect in SCI has not been determined. This study aims to explore the health and well-being outcomes of a pilot meditation program in a sample of individuals living with SCI.

Methods: With support from the Craig H. Neilsen Foundation, a six-week meditation program was introduced. One-hour meditation sessions were performed twice a week with a meditation instructor and 10 outpatients with SCI. Standard evaluations, meditation logs, and the Brief Pain Inventory were administered to assess pain severity and interference and well-being variables before and six weeks following meditation. Descriptive statistics and independent sample t-tests were conducted using SPSS.

Results: Seven of 10 participants completed the program. A majority of the participants were male (9, 90.0%) with 4 (40.0%) reporting an injury level of T6-T12. Three (30.0%) experienced pain and 3 (30.0%) documented more than one health issue pre-meditation. No statistical significant differences were found in pre- and post-pain severity and interference scores. Participants reported improved sleep and one claimed to have controlled his leg spasms. There was a common interest to learn more about meditation.

Conclusions: There is an increased awareness and acceptance of complementary therapies to manage chronic conditions in SCI. Further studies are needed to assess the effectiveness of such interventions in larger sample of individuals living with SCI
A Study on Reliability of Trunk Balance Using Dynamic Sitting Balance device

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Poster Presentation Day 1, September 13, 2018

【Introduction/Aim】
In Japan, the aging is progressing, and in recent years spinal cord injury has occurred frequently due to falls of elderly people. Falling of elderly people is closely related to lowering of balance ability. In order to evaluate dynamic body trunk balance strictly, we have developed a dynamic sitting balance device and reported on it. The aim of this study is to examine its accuracy and evaluation method.

【Materials and Methods】
Healthy 4 males (mean age 30 years), who can be a normal walking, participated in this study. We measured the trunk balance in a dynamic sitting balance device. The total trajectory length of the pressure center point was evaluated three times by two independent raters. The intra-class correlation coefficient(ICC) was used to examine the intra- and inter-rater reliabilities between the two raters.

【Result】
The intra-rater reliabilities were excellent: ICC(1, 1)=0.815. The inter-rater reliabilities were also excellent: ICC(2, 1)=0.789. Spearman-Brown formula indicated that the measurements should be done three times (k=2.04). Adverse events such as falling did not occur.

【Discussion/Conclusion】
Dynamic body trunk balance measured by our dynamic sitting balance device provided consistent results when conducted by different examiners and when measured several times. Therefore, this method is a useful way of deriving objective and quantitative measurement values. Since this device was measured at the sitting position, it was possible to measure safely. In the future, 2e would like to apply it to patients with low balance ability like Spinal cord injury patients.
Post-trauma bladder management influences lower urinary tract dysfunction after spinal cord injury

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Poster Presentation Day 2, September 14, 2018

Introduction
Spinal cord injury (SCI) eliminates voluntary control of voiding, leading initially to areflexic bladder (spinal shock). However, a few month later, detrusor overactivity (DO) appears and causes urinary incontinence, which affects quality of life (QoL). In our hospital, we previously believed that bladder over-distension (OD) in the period of spinal shock could prevent the recovery of involuntary bladder contraction, which may reduce urinary incontinence. In the present study, we examined the effect of bladder OD on lower urinary tract function after SCI.

Methods
We included 31 patients with OD (OD group) and 19 patients without OD (non-OD group). All patients were hospitalized within 14 days after SCI and confirmed complete paralysis. In OD group, intermittent catheterization was performed 2 times/day with 600-1000ml urine volume on each occasion, whereas in non-OD group intermittent catheterization was performed 4-5 times/day with less than 400ml of capacity on each occasion. These managements were continued until self-catheterization was initiated. Mean over-distension periods were 27.6 days. Urodynamic assessment was performed 1-, 3- and 5-years after injury and QoL was assessed using Qualiveen-30.

Results
In urodynamic evaluation, significant difference was not observed in maximum bladder volume between OD group and non-OD group. However, maximum bladder pressure was significantly lower and the bladder compliance was significantly better in non-OD group. The incidence of DO tended to be lower in non-OD group, but there was no significant difference. The prescription frequency of anticholinergic drugs was significantly lower in non-OD group. No significant difference was observed in Qualiveen-30 score between these two groups.

Conclusions
These results suggest that post-trauma bladder over-distension worsen storage function after SCI, as evidenced by increase in maximum bladder pressure and lower bladder compliance. Thus, it is assumed that well-planned initial management strategy would be important for the control of lower urinary tract dysfunction.
Clinical radiographic evaluation of postoperative kypho-deformity of cervical fractured dislocation with compressive flexion injury

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Poster Presentation Day 1, September 13, 2018

Introduction
The pathophysiology of cervical fractured dislocation with compressive flexion injury based on Allen-Ferguson classification demonstrates local kyphosis, and usually treated surgically. There are few reports described about the clinical radiographic evaluation of postoperative kypho-deformity in this pathophysiology.

Patients & Methods
From 2005 to 2014, 32 patients with cervical fractured dislocation with stage IV or V of compressive flexion injury based on Allen-Ferguson classification were treated surgically at our facility. Twelve patients were treated by anterior spinal fusion (ASF), 10 patients were treated by posterior spina-process wiring fixation (PWF), 5 patients were treated by posterior instrumentation (screw) fixation (PSF), and 5 patients were treated anterior-posterior spinal fusion (A-PSF).

We evaluated postoperative kypho-deformity by means of Cobb method using lateral radiographs at 12 months postoperatively. The risk factors of more than 10 degrees of deterioration of local kyphosis were evaluated using univariate analysis.

Results
There was no significant difference of postoperative kypho-deformity between ASF and PSF surgical methods, however, when compared with PSF and PWS methods, PWS subjects severely deteriorated the local kyphosis.

Discussion
All of the subjects treated anteriorly or posteriorly showed bony fusion at 12 months postoperatively, and there were no significant differences of clinical outcomes between all of the surgical methods. However, with respect to keep the relevant cervical alignment, ASF or PSF methods were recommended.
Patient Decision Making in Relation to Managing Neurogenic Bowel and Bladder after Spinal Cord Injury

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Poster Presentation Day 2, September 14, 2018

Introduction: Neurogenic bladder and bowel dysfunction (NBB) is a critical issue for persons with spinal cord injury (SCI). Loss of independence, community participation, respect, feelings of shame, lack of intimacy and sexuality are just some of the issues associated with NBB. Often decisions have to be made by patients regarding these issues. This presentation describes factors, mechanisms and outcomes on decision making related to NBB.

Method: Over 400 abstracts and articles were reviewed addressing NBB management and complications, healthcare decisions and patient centered decisions. Forty participants were interviewed about management issues, complications and impact on quality of life. Interviews were analyzed using NVivo software. Qualitative analysis included the construction of matrices to display coded text of narratives, facilitating pattern finding and thematic analysis. Participants also completed a number of other related questionnaires.

Results: Factors associated with the enactment of decisions leading to changes in health and methods of management included the inability to predict complications: incontinence and recurrent infections. Those receiving caregiver services reported fewer constipation (41.9% vs. 66.7%), more hemorrhoids (54.8% vs. 33.3%) and more complication (65.5% vs. 44.4%). The most common method of bowel management was digital stimulation (65%) followed by digital evacuation (47.5%). For bladder management, intermittent catheterization by self was the most frequently used method (57.5%). Access to healthcare providers and resources also played a role in the decision making process. Many older participants with longer time since choose surgeries to address their problems. A major reason for these decisions was the impact of complications and methods of management on their personal freedom and participation in life activities.

Conclusions: Many factors influenced decisions related to NBB management and complications. These include health, personal life style, coping strategies, and resources including insurance coverage and caregivers. Further studies are needed to expand our understanding of decisions making factors.
Construct validation of the SCI Quality of Life Basic Dataset: Using Cognitive Interviews as a Method of Cross Cultural Comparisons

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Poster Presentation Day 1, September 13, 2018

Introduction: Measuring quality of life (QOL) is an important factor in assessing the value of rehabilitation interventions from a patient’s perspective. The International Quality of Life Basic Dataset (SCIQOL-BDS) consists of 3 easy-to-administer questions. To establish its cross-cultural validity, we conducted cognitive interviews testing these questions with SCI participants from Australia, Brazil, the Netherlands and the US (two sites). This presentation describes this process and study results.

Methods: Mixed method design with qualitative interviews and quantitative analyses. Cognitive interviewing and probing were used to define QOL. Participants (n=38) were also asked to rate QOL for each of the items. They were asked to explain each rating in relation to their understanding of these items. Data were audio-recorded and transcribed by each site and coded by 2-3 independent raters for common themes, overarching themes and word frequency. The identified themes reflected different ways QOL was defined. Differences in coding were discussed and conciliated until consensus was reached. Quantitative data were analyzed using independent T tests and ANOVAs.

Results: Qualitative differences in interpreting QOL were noted with US and Australia participants defining QOL more abstractly and general. Brazilian and Dutch participants provided more specific interpretations, giving concrete examples of how SCI affects their lives. Differences were also noted in their ratings of physical health with Australia and one of the US sites rating it lower compared to other sites (p<.0005). No differences in ratings of psychological well-being and life as whole were noted. Several SCI participants expressed difficulty using numerical ratings and suggested additional aspects of life to be included such as social participation.

Conclusions: Results show the importance of examining differences in subjective interpretations of QOL in order to establish cross-cultural validity of measures and international SCI datasets. Quantitative analyses results are limited by the relatively small sample sizes used here.
Locomotor Training after Spinal Cord Injury: Are We Harnessing Health, Happiness and Mobility?

Dr. Candy Tefertiller, Dr. Susan Charlifue, Dr. Leslie Morse
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Poster Presentation Day 2, September 14, 2018

Recent advancements in rehabilitation technology have provided more opportunities for individuals with spinal cord injuries (SCIs) to participate in upright mobility training after their injury. There are many different types of locomotor training being offered to individuals with SCI that include treadmill systems with body weight support, over ground training with and without BWS and exoskeleton training. The literature to date has shown some benefit for improving walking related outcomes for individuals with motor incomplete SCIs, but this literature in terms of comparative effectiveness studies has been inconclusive. There is also a paucity of literature supporting improvements in quality of life and health related outcomes associated with these types of interventions. Exoskeleton technologies are also being utilized in SCI rehabilitation centers with limited evidence supporting efficacy; while at the same time, consumers are demanding access to these types of interventions after SCI. Therefore, the goal of this instructional course will be to provide an overview of the literature in these areas while at the same time discussing the challenges and opportunities associated with integrating these technologies when the literature is not conclusive.

Course Outline:
Susan Charlifue, PhD (25 minutes): Dr. Charlifue will provide an overview of the research to date evaluating psychosocial and health outcomes after participation in locomotor training programs for individuals with SCI. Various forms of locomotor training will be addressed including treadmill training with body weight support (BWS), exoskeleton training and over ground training. The focus of this overview will be on quality of life, community participation, and health outcomes achieved in locomotor training studies for individuals who have both acute and chronic SCIs.

Dr. Leslie Morse, DO (25 minutes) will provide an overview of the research to date evaluating mobility outcomes achieved after participation in locomotor training programs for individuals with SCI. Various forms of locomotor training will be discussed including treadmill training with BWS, exoskeleton training and over ground training. The focus of this overview will be on walking-related outcomes achieved in locomotor training studies in both acute and chronic SCI.

Candy Tefertiller, PT, DPT, NCS (25 minutes) will discuss program development associated with integrating locomotor training throughout the SCI continuum of care during inpatient rehabilitation, outpatient rehabilitation and a community wellness center in light of the current evidence base. Challenges and opportunities associated with implementing locomotor training programming after SCI will be discussed in conjunction with reviewing case studies of individuals with motor complete and incomplete SCIs who participated in these various locomotor training programs. A discussion surrounding patient and family expectations will also be reviewed in each specific area of care.

15 minutes: All three speakers will facilitate an audience discussion focused on the current state of the evidence in relation to the locomotor training options currently being provided in rehabilitation throughout the SCI continuum of care. This discussion will also include the financial impact associated with these interventions on rehabilitation centers and consumers. Audience members will be encouraged to share their experiences and perspectives in this current area of rehabilitation and research.
Establishing safe nurse staffing levels: a qualitative study focused on nurses’ perceptions of the Safer Nursing Care Tool in Spinal Cord Injury Centres.

Mrs Lizzie Thomas-Davies

NSIC, Buckinghamshire NHS Trust., Stoke Mandeville, Aylesbury, United Kingdom

Poster Presentation Day 2, September 14, 2018

Establishing safe nurse staffing levels: a qualitative study focused on nurses’ perceptions of the Safer Nursing Care Tool in Spinal Cord Injury Centres. (MSc Dissertation submitted 11th June 2015).

Lizzie Thomas-Davies RN MSc

National Spinal Injuries Centre, Stoke Mandeville Hospital, UK.

Introduction

At the Guttmann Conference in June 2014, senior nurses from Spinal Cord Injury Centres (SCICs) in the United Kingdom (UK), discussed their concern that the Safer Nursing Care Tool (SNCT) (The Shelford Group, 2013) used nationally for nurse staffing establishment was not suitable for use in SCICs.

This dissertation aims to look at approaches available for establishing evidence-based safe nurse staffing levels in SCICs, and to ascertain whether they are suitable for this purpose.

Methodology

A qualitative methodology was used incorporating a literature review, policies and guidelines and a focus group service evaluation. This was held in a UK SCIC to discover nurses’ perceptions of current methods used to establish safe nurse staffing levels.

Results

Policies and guidelines gave a foundation against which staffing establishment tools could be measured. Tools and methods were not spinal cord injury (SCI) specific. Benchmarking was difficult, with no comparison for SCICs. From the focus group it was evident that the current method of establishing staffing levels is inadequate for SCI patient care.

Conclusion

The literature review and focus group gave evidence that there is not an adequate method apparently available to establish safe staffing levels in SCICs. NHS Trusts do not report their staffing review uniformly; therefore comparison is not possible across SCICs. Further work will be undertaken to produce a satisfactory tool for use in SCICs.
Discharge after inpatient rehabilitation from a specialised spinal injuries centre in England: a cross-sectional evaluation

Dr Sankaranarayanan Hariharan, Dr Pradeep Thumbikat, Dr Rohit Bhide

1 Princess Royal Spinal Injuries Centre, Sheffield, United Kingdom

Poster Presentation Day 2, September 14, 2018

Background
The NHS in England has seen extensive changes in the clinical care pathways. Associated with it, similar changes have occurred to the discharge process. These have resulted in shorter length of stay and discharge to interim facilities, among other changes. Furthermore, determination of the discharge package is often carried out by non-specialist staff, who may not appreciate the complex nature of SCI. This study explored the effectiveness of the discharge process and related outcomes.

Methods
This quality improvement project involved analysis of the discharge process of those SCI patients who have undergone inpatient rehabilitation at the Princess Royal Spinal Injuries Centre, Sheffield in 2017-18.

Results
This is an ongoing evaluation. 89 patients were admitted between 1st January and 31st December 2017. Early results suggest that patients are less frequently discharged directly to their homes. There is an increasing trend to discharge patients to district general hospitals and nursing homes. Difficulties in organising discharge is more marked in those who are older and those with multiple co-morbidities.

Conclusions
The results highlight the challenges faced due to the changed demographic of spinal cord injured patients being treated- older patients with tetraplegia with more medical comorbidities and care requirements compared to the younger paraplegic few decades ago.
Staged management of complex pressure ulcers with hip joint involvement – Excision Arthroplasty, Muscle Flap into the acetabular cavity and post-op traction

Dr Sankaranarayanan Hariharan, Dr Pradeep Thumbikat, Dr Rohit Bhide

Princess Royal Spinal Injuries Centre, Sheffield, United Kingdom

Poster Presentation Day 2, September 14, 2018

Introduction
Pressure ulcers communicating with the hip are among the most complex ulcers that can be difficult to treat. Girdlestone procedure (excision arthroplasty) or its modifications have been described as an effective treatment approach. Single stage closure and multi-stage procedures have been described in the literature. This study describes our experience with a multi-staged approach.

Methods
A retrospective analysis of all SCI patients who underwent Girdlestone arthroplasty at the Princess Royal Spinal Injuries Centre between 2013-2018 was performed.

Results
Nine patients were identified from the theatre registry. The site and chronicity of the wounds, number of surgical interventions, duration of antibiotic therapy, frequency of complications and length of hospital stay were analysed. All patients had a muscle flap transposed into the acetabular cavity. Two patients developed significant collection in the residual cavity necessitating further surgical interventions. All wounds went on to heal satisfactorily and remained healed at 6 months’ follow-up. In a sub-group, MRI scans confirmed maintenance of position and viability of the flap.

Conclusions
In our experience, staged closure combined with excision arthroplasty proved effective in pressure ulcers communicating with the hip. The use of a muscle flap in the acetabular cavity complemented by appropriate antibiotic therapy reduced chances of post-operative collections and yielded good outcomes. The use of post-operative traction, by reducing telescoping of the proximal end of the femur, assisted wound healing.
A scoping review of the relationship between exercise, pain, and psychosocial outcomes among people with a spinal cord injury: Can exercise ease the pain?

Ms Kendra Todd, Mr. Matthew Stork, Dr Kathleen Martin Ginis

1University of British Columbia, Kelowna, Canada

Poster Presentation Day 1, September 13, 2018

Introduction: Chronic pain impacts approximately 70% of individuals with a spinal cord injury (SCI), with many reporting pain to severely impact their mood, daily function, and quality of life. Despite these negative psychosocial outcomes, little is known about the potential role exercise may play in influencing pain perceptions. Thus, the purpose of this scoping review was to catalogue extant literature and determine whether exercise may be used to improve psychosocial outcomes and pain sensations among persons with SCI.

Methods: Embase, PubMed and SportDiscus databases were systematically searched to identify relevant articles. Data was extracted from articles and charted based on key themes observed during the extraction process.

Results: 23 articles met the inclusion criteria and were included in the review. Of these articles, 16 were published after 2011, highlighting the emerging nature of this research area. A total of 668 participants with SCI (C1-L5; AIS A-D) were included in the studies. Participants’ physical activity levels ranged from completely inactive to elite sport competition. Quasi-experimental designs, randomized controlled trials, and cross-sectional designs were the most common study designs. Studies included measures of a diverse range of exercise activities, psychosocial outcomes, and “tiers” of pain. Importantly, exercise participation was associated with more positive psychosocial outcomes in 22 studies (88%) and reduced pain in 18 studies (75%).

Conclusion: Despite a lack of consistency in the types of pain and exercise being measured, the extant data suggest that exercise participation is related to more positive psychosocial outcomes and reduced pain sensations for persons with SCI. Although exercise may offer such therapeutic benefits, the specific mechanisms that cause these benefits remain unknown. Additionally, further intervention-based research is recommended in order to determine which FITT (frequency, intensity, time, type) principles of exercise lead to more positive psychosocial outcomes and reduced pain.
The result of long period rehabilitation exercise using SCI rehabilitation exercise device /invented in Mongolia/

Dr Temuulen Erdenebat1,2, Dr Myagmartsogt Purevdorj1,2
1National Trauma Orthopaedic Research Center, Ulaanbaatar, Mongolia, 2Advice Society for People with Spinal Cord Injury, Ulaanbaatar, Mongolia

Introduction:
In low/low-middle-income countries’ Patient with paraplegia and tetraplegia after SCI, they have not enough supply for rehabilitation equipment also spend a lifetime in a wheelchair or bed is extremely difficult for them and their family’s economic and mental situation.
Estimate muscle weakness, blood circulation, joint contracture and life quality of People with SCI have done long period rehabilitation exercise on SCI rehabilitation sling device /Invented in Mongolia/.

Objective: To restore the weakness of the muscles and joints, improve quality of life

Methods:
Participated 144 patients with SCI. patients have done during 6-12 months period, 4 level rehabilitation exercise on SCI rehabilitation sling device /invented in Mongolia/. This device is consist of 2 kinds of device. One is lying down position exercise device and another is stand up exercise device. We use Functional Independence Movement /FIM/ Score for patients’ life quality.

Result:
63.2% [N=91] of patients stay in bed for a long time and 36.8% [N=53] living with a wheel chair and from all patients, 66.7% [N=96] had a skin problem. After long period rehabilitation exercise on SCI rehabilitation sling device /invented in Mongolia/ 54% [N=78] patients can walk with crutch wear feet and knee lock equipment.
1. After SCI as fast as for getting rehabilitation treatment result will be better. And easy for the walk with crutch wearing feet and knee lock equipment
2. This exercise with SCI rehabilitation device is needed average 8 months thus needs hardworking and patience from a patient.

Conclusion:
46% [66] patients could not walk with a crutch because their health situation was weak and spent too much time in bed. But their motor function and health got better.
Prognostic factors of Frankel-C cervical incomplete spinal cord injury

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Poster Presentation Day 2, September 14, 2018

Introduction: Although the prognosis of Frankel-C cervical incomplete injury is generally favorable, some cases result in unfavorable state remaining motor paralysis. In this presentation we investigated the prognostic factors of Frankel-C cervical spinal cord injury (SCI) related with outcomes.

Methods: We analyzed 73 cases with cervical modified Frankel-C1/C2 SCI transported and hospitalized in our center from 2006 to 2015 (60 males, 13 females, average age: 66.9 ± 13.7 years-old, range: 19 to 87 years-old). We defined "improved" group as the cases with final follow-up modified Frankel grade D2/D3/E (ambulatory without requiring a wheelchair in daily life), and "not-improved" as the cases with C1/C2/D1 (not ambulatory, or wheelchair required in daily life). The survey items are as follows; age, sex, smoking/drinking habit, BMI, energy of injury, presence or absence of cervical fracture and diffuse idiopathic systemic hyperostosis on X-ray and CT, past medical history (diabetes, hypertension, respiratory disease, cerebrovascular disorder, cardiovascular disease, connective tissue disease, malignant tumor), and physical findings at initial examination such as DAP (Deep Anal Pressure), VAC (Voluntary Anal Contracture), anorectal tone, anal reflex, bulbocavernous reflex, several pathological reflexes (Babinski/ Chaddock/ Hoffman/ Tromner/ Wartenberg reflex), motor score of upper and lower limbs, and MRI findings (the presence or absence of T2 high intensity immediately after injury/ T1 low intensity area in 2 weeks post-injury). We performed univariate analysis between the two groups ("improved" and "not-improved"), and then conducted multivariate logistic regression analysis by the factors which were significant in univariate analysis.

Results: As results of univariate analysis, the absence of DAP/ VAC/ Anorectal tone/ anal reflex, the lower motor score of upper/lower limb, the past cerebrovascular disorder possessing were significant factors related with bad prognosis. We conducted multiple logistic regression analysis using these factors and found that DAP absence/old age/past cerebrovascular disorder/ lower motor score were significant poor prognostic factors.

Conclusions: On the initial assessment of Frankel-C cases, besides the thorough medical history taking, detailed neurological examination of the sacral region was relevant even for the cases with incomplete cervical SCI. Within Frankel-C patients, new therapeutic interventions such as stem cell transplantation should be considered if possessing these poor prognostic factors.
Telehealth Workshop- Technologies Meet Health Care- Reaching the Unreached Lives

Miss Nishu Tyagi, Dr Marcalee Alexander, Dr Nan Liu

Poster Presentation Day 2, September 14, 2018

This workshop will be an interactive session focused on helping professionals like Occupational Therapists, Physiotherapists, Nurses, Physicians, Researchers and Consumers to prepare for the shift to telehealth, to explore ideas and the changes that will be necessary to deliver health care services in a rural setting or the technological adaptations useful for the SCI individuals living in low resource countries. Although SCI specialized centres across the globe are limited and post discharge complications are very high, new approaches are needed to improve healthcare options for SCI individuals, especially in the remote areas, where there is lack of education and awareness about the importance of SCI healthcare. Hence, this collaborative session brings executive leadership team together to learn about the key considerations when developing and implementing a telehealth strategy in SCI healthcare. Also, will discuss the Scope, Practice, Feasibility, Assessment Standards, Cost Effectiveness, Ideal Issues to treat via telehealth, its potential to serve geographically isolated individuals and extend the reach of scarce resources while emphasizing the quality and value in the delivery of SCI health care at outskirts of countries. Each presentation will bear particular reference to how these countries provide support through telehealth apps; how they tailor support to the needs of persons in rehabilitation care; what other common concerns lend themselves to treatment via telehealth; how telehealth serves as a cost effective model; opportunities & challenges in data set; and finally, how developed and emerging countries may create the telehealth network and inspire future projects, activities and need of telehealth service delivery in SCI. Later, panel discussion would be on future vision of how telehealth can be used to break down barriers related to provision of care and is useful to help persons in low resource countries or in areas of disaster have access to specialized care. The audience will be encouraged to participate in the video based demonstration of case studies and panel discussion.

Learning Objectives:

i. To identify ways to reduce readmissions, extend care to remote populations, improve care coordination, and increase patient engagement.

ii. Examples of telehealth solutions, Importance of Digital Literacy and Learn how other countries are addressing the opportunities.

iii. Low cost innovations & its impact on telehealth service delivery in rural areas and low resource countries.

Program:

1 Trends of WhatsApp Based and Cost effectiveness SCI health care model in India. 15 minutes - Nishu Tyagi
Telehealth Unit, ISIC, India (Speaker & Moderator)

2 The feedback of App-based Telehealth for the usefulness of sacral sparing self-report questionnaire and SCIM-SR in individuals with spinal cord injury: The encouraging progress from China. 15 minutes Nan Liu
Associate Professor and Deputy Director, Peking University Third Hospital, China (Speaker)
3 Ideal Issues to Treat via Tele-spinalcordInjury and Treatment of sexual dysfunction after SCI via telehealth. 15 minutes Marcalee Alexander Physician, Spinal Cord Injury Medicine, Birmingham, VA Medical Centre USA (Speaker & Chairperson)

4. Videos Based Demonstration of telehealth practice in SCI 15 minutes (All Speakers & Audience)

5. Panel Discussion: Future vision of telehealth 30 minutes - All speakers
Meaning of work participation after spinal cord injury in Bangladesh

Mr Mohammad Mosayed Ullah, Prof Ellie Fossey, Dr Rwth Stuckey

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Poster Presentation Day 2, September 14, 2018

Introduction:
Spinal cord injury (SCI) is one of the work-related cause of disability for working-aged people in Bangladesh. This study aimed to explore the meaning of work participation after SCI in Bangladesh.

Method:
A narrative inquiry methodological framework was used to explore the meaning of work participation after SCI through face-to-face interviews with twenty adults: ten living in the community and ten inpatients at a rehabilitation centre. Sixteen participants were male and four were female. All participants received rehabilitation services following their injury, and all had previously worked in paid employment or homemaking. The worker role interview (WRI), a semi-structured interview tool was used to gather data. The narrative thematic analysis was undertaken to generate the findings.

Result:
Six themes were identified from the interviews involving people with SCI. These themes are work-life before injury; the experience of working after injury; anticipating and thinking about work; motives for working; enablers for work participation; and, challenges for work participation.

Conclusion:
These findings illustrate the importance of work participation to people with SCI, and the usefulness of the WRI to assess work participation in the Bangladeshi rehabilitation services. It also highlights the importance of enabling people with SCI to tell their work stories and to think about the meaning of work, as well as the value of early engagement in vocational rehabilitation, support from peers and family.
A qualitative review of participants’ perceptions of physical rehabilitation after spinal cord injury: implications for person-centered care

Ms Janelle Unger1,2, Ms Hardeep Singh1,2, Dr Avril Mansfield2,3,4, Dr Sander L Hitzig1,2,3,5, Ms Erica Lenton6, Dr Kristin E Musselman1,2,4

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Poster Presentation Day 1, September 13, 2018

Introduction: After spinal cord injury (SCI), people receive many hours of physical rehabilitation (PR). During rehabilitation, efforts should focus on an individual’s needs and goals. Person-centered care (PCC) emphasizes the preferences of the individual receiving care. Synthesizing existing qualitative research surrounding PR experiences of people with SCI can improve the quality of person-centred PR programs for this population.

Methods: Searches were conducted for qualitative findings about experiences of people with SCI during PR. Two independent reviewers screened articles for inclusion. Study and participant characteristics were extracted. Findings from eligible studies were coded and synthesized using thematic synthesis methodology. One reviewer coded and a second independent reviewer verified the findings.

Results: Following screening procedures, 31 articles were included representing 26 individual studies and 263 participants. Causes of SCI were both traumatic and non-traumatic, and all neurological levels, injury severities, and levels of chronicity were represented. Four themes emerged: 1) Benefits of PR; 2) Challenges of PR; 3) Need for support; and 4) Issue of control. These findings were used to create recommendations for PR programs. To ensure benefits, rehabilitation professionals can promote self-confidence by providing opportunities for success, and can motivate individuals through verbal affirmations. To combat challenges, rehabilitation professionals can engage in meaningful communication with participants about recovery expectations and strategies for community reintegration. Support can be offered through peers and by including participants as a rehabilitation team member. Allowing individuals to have autonomy over choices during PR provides them with control.

Conclusions: Emerging themes describe the experiences of people with SCI in PR. Recommendations for PR programs were developed from the perspectives of people with SCI; therefore implementation would augment PCC for this population.

DOI: 10.1080/09638288.2018.1425745
A New Automatic Mattress Turning Device: a Study on Interface Pressure at Bony Prominences in Normal Subjects

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Poster Presentation Day 2, September 14, 2018

Objective: To study an interface pressure at bony prominences when using a prototype of an automatic mattress turning device (AMTD).

Materials and Methods: The AMTD consists of four airbags (two large ones in the middle and two lateral small ones), microcontrollers, air pumps and solenoid valves controlling inflation and deflation of each airbag. It was placed under a 4 inches foam mattress and curved it so that a body turned from supine to an approximated 30-degree side-lying position. Using an XSENSOR pressure mapping system, the peak pressure indexes (PPIs) at occipital area, scapula, sacrococcygeal area and greater trochanter of 20 normal volunteers were recorded and compared between supine and 30-degree left side-lying positions.

Results: In a supine position, the average PPIs was highest (33.76) at the sacrococcygeal area and lowest (21.53) at the occipital area. When the AMTD lifted the right side of the mattress up, the volunteers were turned into the left side-lying with highest PPI (27.65) at the greater trochanter and lowest (14.93) at the occipital area. Comparing between supine and side-lying, the PPIs recorded were decreased significantly at occipital (p<0.001), scapular (p=0.011) and sacrococcygeal areas but increased significantly in greater trochanter (p=0.001).

Conclusion: Our new automatic mattress turning device can turn a body from supine to side-lying and the peak point pressures change significantly. In side-lying position, there is an increasing of peak point pressure at greater trochanter but still in acceptable range.
Costs and predictors of high treatment costs for patients with traumatic spinal cord injury in acute care settings

Mr Bharat Phani Vaikuntam1, Dr Lisa Sharwood1, Prof James Middleton1,2

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Introduction: Traumatic spinal cord injuries (TSCI) have significant consequences both for the patient and the healthcare system as they often result in life-long disabilities. Treatment costs for patients with TSCI in an acute care setting have been shown to be very high in the international context. However, updated estimates of treatment costs for patients with TSCI in the present-day configuration of acute care settings and specialist services in Australia are needed. In this context, the drivers of higher treatment costs and association with clinical variation for these patients nationally and inter-jurisdictionally is also lacking.

Methods: A total of 499 patients were identified from a record linkage study combining patient health records and costs and data from an observational study of patients with acute traumatic spinal cord injury between Jun 2013 and Jan 2016 in New South Wales. The acute care treatment costs for this patient population will be estimated using hospital administration databases. Subgroup analyses will describe the costs of secondary complications.

Results: The median cost of treatment in acute care settings per patient was estimated at around $23,071 AUD and the median length of stay was estimated at around 17.5 days. The GLM regression with a log link and gamma error will be be performed on the costs to determine independent predictors of acute care costs. Variables for the severity of injury, level of injury (cervical, thoracic or lumbar) will be included for variability between patients.

Conclusion: Significant variations in policy and practice may exist among health care providers based on differences in perceptions of precisely what constitutes the ‘best-practice’ specialist care, including referral patterns to specialist centres and the timing of surgical intervention. This study will provide evidence on the degree to which variations in clinical practice and institutional performance affect patient outcomes and acute care costs.
Geo-mapping of Traumatic Spinal Cord Injuries in New South Wales, Australia

Mr Bharat Phani Vaikuntam\textsuperscript{1}, Dr Lisa Sharwood\textsuperscript{1}, Prof James Middleton\textsuperscript{1,2}
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Poster Presentation Day 2, September 14, 2018

Introduction: Expeditious transfer of a patient with Traumatic Spinal Cord Injury (TSCI) within 24 hours to specialist spinal cord injury unit and early surgical decompression is recommended for optimal clinical outcomes. This study aimed to assess the geographical distribution of TSCI relative to Spinal Cord Injury Units (SCIUs) in New South Wales, mapping triage and admission patterns (direct vs indirect) of patients within the stipulated 60-minute transfer radius to SCIU for adherence to state-based guidelines for major trauma.

Methods: This study included a subset of 100 patients for whom the injury location (global information system) data is available from a prospective observational study of patients with acute TSCI in NSW between Jun 2013 and Jan 2016. The primary outcome was admission patterns (direct vs indirect) to definitive care for patients injured within 60-minutes transfer time of a SCIU.

Results: Initial analysis revealed that in the 50 patients injured within 60 minutes transfer time, only 30% were transferred directly to a SCIU, with 68% transferred to a non-SCIU (Major Trauma Service - MTS) and 2% to a Regional Trauma Service (RTS). In 97 patients with data on first hospital admission, 36%\textsuperscript{(n=35)} were admitted to SCIUs, 37%\textsuperscript{(n=36)} to MTS, 13.5%\textsuperscript{(n=13)} to RTS and 13.5%\textsuperscript{(n = 13)} to other hospitals. For patients \textsuperscript{(n = 71)} injured within the 60 minutes transfer radius of either a SCIU or MTS, 40.3% were admitted to SCIUs, 49.2% were admitted to MTS and 10.5% were admitted to RTS or other non-trauma facilities.

Conclusion: The initial analysis indicated a direct admission rate to SCIU between 30% to 40% within the 60-minutes transfer time guidelines for major trauma. Further analysis into the clinical and logistical factors contributing to indirect admissions will provide further evidence of impact to changes in admission patterns.
Self-management and self-efficacy in patients with acute spinal cord injuries: Protocol of a longitudinal cohort study

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Poster Presentation Day 2, September 14, 2018

Background: People with recently acquired spinal cord injury (SCI) experience changes in physical, social and psychological aspects of their lives. In the last decades, attention has grown for aspects of self-management and self-efficacy in SCI research. However, we still do not know what the self-management and self-efficacy outcomes of first rehabilitation are and whether utilizing these skills may prevent secondary health conditions (SHCs) and increase participation and psychological adjustment early after SCI.

Objective: To describe the course and determinants of self-management and self-efficacy during and after first SCI rehabilitation; and to determine theory-based associations between self-management and self-efficacy with SHCs, participation and psychological adjustment.

Methods: Multicenter prospective longitudinal cohort study. All people with a newly acquired SCI admitted to one of the 8 specialized SCI rehabilitation centers in the Netherlands were considered for inclusion in this study. Main assessments took place during the first and last week of admission and 3, 6 and 12 months after discharge. A total of 285 participants signed an informed consent, of which 263 filled out the questionnaire at admission and so far 214 at discharge. The primary outcomes are self-management (knowledge and execution of self-care) and self-efficacy (confidence in the ability to manage the consequences of SCI and of self-care). Secondary outcome measures are SHCs, participation and psychological adjustment to SCI. The first results with the complete set of data are expected in June 2019.

Results: Description of the participants and the measurements done so far.

Discussion: The SELF-SCI cohort study will show the course of self-management and self-efficacy of initial inpatient SCI rehabilitation. Second, associations will be investigated with SHCs, participation and psychological adjustment early after onset of SCI, until 1 year after discharge. The results will be used to test theories about motivation to perform health-promoting behaviors and adjustment to SCI.
Introduction: As decreasing mortality rates and increasing life expectancy after SCI is observed with improved care, more secondary problems are seen. These include medical health, psychological and social problems. Follow up routine after SCI is very different all over the world. It has been identified that there are several problems that challenge a safe, workable aftercare program. Accessibility, knowledge and / or socio-economic factors may influence care and prevention of secondary complications.

Methods: To get information about the daily practice of the aftercare program in the ASCoN countries at the present time, a questionnaire was send to representatives of ASCoN countries before the 16th ASCoN Conference in Chiang Mai University, Thailand (December 2017).

Results: 8 ASCoN countries answered the questionnaire. In 75% the rehab centers organize aftercare. During the first year after primary rehab the patients are seen between not at all and 6 times, after this year between 0 and 2 times. Infrastructure and socioeconomic problems are the main reasons why aftercare is not organized. As well a patient as a family education program does not exist in 50 %. An educational SCI handbook will be given to every patient in 2 countries.

Conclusion: A life-long aftercare program seems in the majority of the ASCoN countries something to develop. Because of the different healthcare systems, socioeconomic and cultural differences between the countries various possibilities may be necessary. At the next ASCON meeting 2018 in Myanmar the project will be continued to build up a customized, functional and practical follow up program for each ASCoN country.
Inspiring Hope: The role of assistive technologies as a restorative factor of hope for individuals with spinal cord injury wishing to return to work – Case Study

Mrs Marjan Verbeek
Royal Rehab, Ryde, Australia

Introduction/ background:
Early intervention vocational rehabilitation services are well incorporated within the three Spinal Injury Units in NSW, Australia. Specialist vocational rehabilitation services support improved outcomes for individuals wishing to reconnect to work after sustaining a spinal cord injury. Although, some individuals post injury no longer perceive meaningful and productive work participation as part of their future.

Purpose:
The objective of this case study was to examine the relationship between assistive technologies and hope for meaningful and productive vocational participation.

Method:
An extensive literature review was conducted to explore current ‘hope’ theory and current assistive technology practice models and approaches in supporting a person to return to work. A clinical case study was analysed using the Person-Environment-Occupation-Performance (PEOP) Model (Baum & Christiansen, 2005) to determine factors that may impede or enhance meaningful work attainment.

Results:
The case study analysis enhances a synthesis of current assistive technology methods and approaches, hope theory and vocational rehabilitation. The analysis and clinical case example demonstrated that assistive technology is a component of generating hope in the return to work journey. It was found that assistive technology restored hope for meaningful and productive work participation.

Conclusion:
Early intervention vocational rehabilitation opportunities coupled with assistive technology exposure may restore hope that meaningful and productive work participation is attainable.
Assistant Technologies: Enabling workplace inclusion for individuals with spinal cord injury – In-Patient Unit Project.

Mrs Marjan Verbeek¹, Mrs Rachel Harper¹
¹Royal Rehab, Ryde, Australia

Poster Presentation Day 1, September 13, 2018

Introduction/ background:
The process of supporting an individual’s return-to-work journey after spinal cord injury is multidimensional and complex. The application of assistive technologies in the workplace can optimise work task performance and productive role fulfilment. However, negotiating assistive technology during the early stages of the vocational rehabilitation journey can be daunting and difficult.

Purpose:
The purpose of this project was to develop an efficient assistive technology package, offering individuals the opportunity to (1) explore various assistive technology that can facilitate work task independence; (2) trial assistive technology equipment in a safe and supportive environment, and: (3) develop assistive technology awareness and confidence.

Method:
An extensive literature review was conducted to determine current assistive technology practice models and approaches. The project extended to develop short videos to illustrate assistive technology use from novice to competent user level in key office based work tasks.

Results:
The project resulted in (1) a theoretical synthesis of vocational rehabilitation practice and current assistive technology practice models and approaches; (2) the development of an assistive technology program focusing on successful matching of individual assistive technology needs and work tasks.

Conclusion:
The project supports the path to greater independence and workplace integration, through utilising effective client centred assistive technology exposure strategies. The project has strengthened assistive technology competence and skill for vocational rehabilitation consultants.
Problem solving and social support patterns among family caregivers of adults with spinal cord injury

Dr Susan Ryerson Espino1, Ms Kerry ORourke1,2, Dr Erin Kelly2,3, Dr Alicia January2, Dr Azadeh Ghaifari4, Dr Gerald Harris1,2, Dr Michael Richardson5, Dr David Chen5, Dr Ray Lee6, Dr Lawrence Vogel

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Poster Presentation Day 2, September 14, 2018

Title: Problem solving and social support patterns among family caregivers of adults with SCI

Objective: Assess profiles based on social problem solving (PS) skills and social support among caregivers of adults with SCI and associations between profiles and caregiver quality of life (QOL) and well-being.

Design: Mixed-methods study of 41 dyads of U.S. caregivers and adults with SCI from 3 rehabilitation hospitals and 1 Veterans Administration hospital.

Methods: Dyad members participated in qualitative interviews exploring caregiver QOL and well-being and standardized surveys exploring caregiver PS, social support, QOL, and well-being. Qualitative patterns were identified involving social support and PS, leading us to explore these constructs quantitatively using cluster analysis and MANOVA. Caregiver PS included: positive problem orientation (PPO), negative problem orientation (NPO), rational style (RS), impulsive/compulsive style (ICS), and avoidant style (AS). Adults with SCI were most commonly male (73%) and had tetraplegia (68%); mean age at injury was 22 years (range=17-37), and current age was 39 years (range=25-57); 51% reported being white; and 34% were veterans. Caregivers were most commonly female (81%), ethnic minority (56%), with post-secondary education (61%); and mean current age was 50 years (range 22-81). Just under half of caregivers were partners (46%), 39% parents, and <5% siblings, close friends, or extended relatives.

Results: Cluster analysis revealed 3 profiles distinguishing caregivers in terms of PS skills and social support (F (12,66)=10.48, p<0.01; Wilk’s lambda=0.12, partial eta squared=0.66): Profile 1 – higher social support (vs. profiles 2 and 3) higher PPO and RS (vs. profile 3); Profile 2 – higher NPO, ICS, and AS (vs. profiles 1 and 3) and lower social support (vs. profile 1); Profile 3 – lower social support and PPO (vs. profile 1) and lower RS (vs. profiles 1 and 2). The 3 profiles also distinguished dyads by caregiver QOL and well-being. Profile 1 reported fewer challenges and higher well-being. Specifically, caregivers in profile 1 reported higher satisfaction with leisure and social integration and fewer concerns related to depression (vs. profiles 2 and 3) as well as higher satisfaction with QOL and lower physical complaints (vs. profile 2). Profile 2 caregivers reported more burden, depression, and anxiety (vs. profiles 1 and 3 and more physical health complaints (vs. profile 1). Profile 3 fared slightly better than those in profile 2 with fewer reported concerns relating to depression. Qualitative data sheds light on differences between profiles in terms of poverty, adjustment to disability, family support, and coping. Qualitative data further demonstrated that profile 2 caregivers experienced greater poverty and challenges with disability adjustment. Profile 1 caregivers most commonly talked about the importance of family support and active coping.

Discussion: Findings suggest that effective PS and strong social support may be protective factors offsetting stressors associated with caregiving and bolstering caregiver well-being. Assessing PS, social support, and
caregiving challenges and triaging caregivers into supportive interventions when depicting risk may hold promise for the prevention of physical and mental health distress in caregivers.

Support: Department of Defense, Qualitative Research Award (Grant #SC130279)
Health promotion in spinal cord injury rehabilitation – an example of knowledge translation to Do-It-Yourself (DIY)

**Introducation:** Scientific research emphasizes the need for spinal cord injury (SCI) care providers to incorporate programmes of health promotion and lifestyle coaching in order to support individuals to improve or maintain general health, fitness and function. At the spinal unit (Spinalis) at Rehab Station Stockholm such a programme – with the curriculum in Swedish - is long established and previously reported. New Zealand’s presentation from their ICF Core Sets for SCI data at ISCOS 2007 on the self-identification of ‘looking after one’s health’ for chronic SCI, resulted in a Swedish/New Zealand shared priority. The collaborative work culminated in 2015 with the publication of the English adaption of the book: Livsstilsboken into The Art of Healthy Living with Physical Impairments.

**Methods:** This DIY book, written specifically for persons with SCI, keen to get in better shape is also intended for health professionals. It incorporates both scientific evidence, lived-experience and clinical practise from a knowledge translation perspective. The chapter topics are motivation, food and weight management, physical activity/exercise and mindfulness.

**Results:** The book has been well received in the field. As a textbook it is used in educational programs for health professionals in Sweden and elsewhere. It is also used in lifestyle programs for persons with SCI. An example of such in Sweden is a recurrent lifestyle course for individuals with longstanding SCI. The books, in Swedish as well as in English, are available in hard cover, as e-books and are also downloadable for free as pdf from www.spinalis.se.

**Conclusions:** Knowledge translation of research findings into clinical practice is essential. Not least within new research areas. This book is an example of where such knowledge required literal translation into a universally accepted language which has only strengthened the emphasis and facilitated implementation of an important topic in the SCI field.
Sedentary and physical activities relation to peak oxygen consumption for persons with motor-complete spinal cord injury

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Poster Presentation Day 2, September 14, 2018

Introduction: The recently launched SCI specific guidelines for physical activity have great potential. To facilitate the clinical application of these guidelines it’s still, of interest to classify PA like, activities of daily living, such as non-exercise physical activities (NEPA), and exercise activities into percentages of absolute VO\textsubscript{2peak} to meet moderate and vigorous. This knowledge may act as motivational tool to enable the guidelines into practice. Methods: A total of sixty-three persons, were thirty-seven with a motor-complete paraplegia T7–T12 (27 man 10 women) and twenty-six persons (9 women and 17 men) with motor-complete tetraplegia (C5–C8) were included. Two sedentary, three NEPA and six exercise activities were compared to VO\textsubscript{2peak}. All activity VO\textsubscript{2} was measured with indirect calorimetry. Results: Persons with a motor-complete paraplegia had a significant higher VO\textsubscript{2peak} 1.36 L·min\textsuperscript{-1} p<0.001. vs. 0.75 L·min\textsuperscript{-1} for motor-complete tetraplegia. The standardized activities, expressed as % of VO\textsubscript{2peak}, showed intensity level for sedentary activities around 18 % (paraplegia) vs.35 % (tetraplegia) of VO\textsubscript{2peak}. Non-exercise physical activities was between 37 -50 % VO\textsubscript{2peak} for paraplegia and between 60 – 70 % for tetraplegics. The exercise activities relation to VO\textsubscript{2peak} was around 70 to 80 % for motor-complete paraplegia and 70 – 90 % for motor-complete tetraplegia. Conclusion: The main scoop of this study is that we have identified activities that possibly fit into intensity levels such as light, moderate and vigorous expressed as % VO\textsubscript{2peak}, Borg RPE and % HR\textsubscript{peak}. Moreover, we found that VO\textsubscript{2peak} significant differed between the two groups and that activity of daily living and NEPA are performed at a level close to VO\textsubscript{2peak} for persons with motor-complete tetraplegia. The result of this study can contribute to more directed information about intensity levels for motor-complete paraplegia and tetraplegia and the importance of increase the span of VO\textsubscript{2} for persons with a motor-complete tetraplegia.
Introducing intermittent catheters (IC) into the school setting.

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Poster Presentation Day 2, September 14, 2018

Introduction
The gold standard for bladder management in children with a spinal cord injury (SCI) is, when appropriate, to implement a clean intermittent catheter regime. This promotes continence, dignity and full bladder emptying. As a specialist spinal cord injury centre (SCIC) we manage a number of children and young people (CYP) requiring IC support in school. Engagement with the schools is imperative to ensure its success and to promote independence without the need for parental reliance. In our experience getting non health care professionals to take on IC in school was a challenge and often very time consuming. I decided to do a reflection in the form of a case study to look at our practice and how this could be improved in the future.

Method
Case reports of 2 girls were matched for age, gender, type and level of injury of SCI. Initially IC training was carried out in the home environment with support from community paediatric and continence teams, prior to implementation in school. The school programme involved LSCIC joint working with school, family and community professionals.

Results
Both girls achieved independence with IC at home with parental support. One continues with the IC regime with assistance from school staff, whilst ongoing support is being explored for the other. The long term aim is to support both girls to achieve full independence with their own bladder management.

Conclusion
Collaborative working between specialist SCI nurses, local community teams, the child and their family, can offer effective implementation of a safe bladder management programme within a school environment. Limitations identified were, the lack of willingness, confidence and ability of the school staff, to take on the responsibility for this invasive procedure.
Introduction: Lower limb powered exoskeleton can improve the mobility for people with movement deficits by providing mechanical support and facilitate the gait training. FREE Walk is a wearable, lower limb powered exoskeleton robot designed to assist individuals living with paralysis due to spinal cord injuries (SCI) to walk.

Methods: Individuals with SCI, who could not walk independently without assistive devices, were recruited. All participants received at least 2 sessions (1-hour/session) of exoskeleton training per week. The following evaluations were performed: 1) Injury reports and the incidence of falls were recorded to evaluate the safety of the device, 2) The timed-up-and-go test, 10-meter walk test, and 6-minute-walk test were performed to evaluate the mobility performance, and 3) The time taken by the user to don and doff the robot were recorded to evaluate the practicability of using the device.

Results: Ten individuals with SCI (age: 20-69 years, T1-T11) participated and could successfully perform functional activities including stand-up, sit-down, and walk with supervision or minimal contact assistance after 9 to 24 sessions of training. Specifically, individuals with lower thoracic injury could manage to walk 10-m with supervision in less than 20 hours of training; those who with higher thoracic or cervical injury might require additional training sessions to perform functional activities independently. The walking velocity for 10-meter walk ranged from 0.2m/sec to 0.3m/sec. Notably, after exoskeleton gait training, an individual with T11 (AIS D) injury demonstrated substantial changes in gait pattern with better knee/ankle control and faster walking speed resulted from increased cadence. All participants could don and doff the robot with supervision or minimal assistance after 1-2 times of practice.

Conclusions: The findings demonstrated that FREE Walk lower limb exoskeleton is safe, easy to use, and can assist individuals with SCI to efficiently accomplish daily functional activities.
Effects of orthotic therapeutic electrical stimulation in the treatment of patients with paresis-associated with acute cervical spinal cord injury: A randomized control trial

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Poster Presentation Day 2, September 14, 2018

Abstract
Study Design
A randomized controlled trial.
Objectives
To determine the effects of orthotic therapeutic electrical stimulation (TES) on the hand in patients with paresis associated with acute cervical spinal cord injury.
Setting
Spinal Injuries Center, Fukuoka, Japan.
Methods
The study included patients treated for spinal cord injuries (Frankel classification, grades B and C) at our institution within 1-week post-injury between May 2011 and December 2014. The patients were allocated randomly to TES and control groups at the time of admission and underwent TES + conventional training or conventional training alone, respectively. Both hands of each patient were treated in the same way. The primary outcome was total passive motion (TPM) of the fingers (degrees). The secondary outcomes were edema (cm), and the upper extremity motor scores of the International Standards for the Neurological Classification of Spinal Cord Injury (ISNCSCI). After randomization outcomes were assessed at 1 week, 1 month, and 3 months post-injury in both groups.
Results
Twenty-nine individuals were assessed at 3 months (15, TES; 14, control). There were no significant between-group differences for TPM of the fingers, edema and upper extremity motor scores at 1 week, 1 month and 3 months after injury although TPM of the fingers tended to be lower in the control group.
Conclusions
It is unclear from the results of this study whether TES has a therapeutic effect on TPM, edema or the upper extremity motor score of the ISNCSCI. The results of this study provide useful data for future meta-analyses.
An Unusual Presentation: Vascular spinal cord injury in young patients-dxation and work up

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Poster Presentation Day 1, September 13, 2018

Introduction: 24 year old gentleman presenting with C1 spinal cord injury with brainstem involvement post-coitus of unknown cause. Given the abnormal presentation, we discuss findings, issues related to this level of injury and diagnostics regarding mechanism of injury.

Spinal cord injury causes significant morbidity and mortality. It is most frequently in young patients caused by high impact trauma, and with older patients through low impact traumas on a background of underlying stenosis or vascular injury. This case is unusual in that it is such a high level injury in a young patient most likely caused by vascular insult.

Initial investigations included CT/MRI spine which showed medulla- T1 level of vascular injury. Patient required ventilation but never any cardiovascular support. Further investigations showed only one positive of a potential thickened valve leaflet on initial transthoracic echocardiogram- which was disputed in the follow up transoesophageal echocardiogram.

Conclusions: Although often spinal cord injury is split into two distinct age groups with different modalities of injury, it is important to consider alternate causes in unusual presentations. Management of these patients in the acute setting is lifesaving, however unfortunately the morbidity associated remains significant.
Detecting malnutrition risk after spinal cord injury: a quality improvement project and systematic review

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Poster Presentation Day 1, September 13, 2018

Introduction: Malnutrition is a major concern after spinal cord injury (SCI). There is limited information available for prevalence of malnutrition and nutrition-screening compliance outside the audit period. The aim of this study is to (1) determine whether the quality improvement initiative is successful to improve nutrition-screening; (2) to systematic review the literature on prevalence of malnutrition in SCI patients.

Methods: The quality improvement project was conducted during November 2013 to October 2017. Nutrition-screening data (presence of a correctly completed SNST within 24 hours of admission) were collected weekly. Literatures on disease-related malnutrition prevalence in adult SCI patients published from inception to 17th March 2017 were included in systematic review.

Results: 2,462 SCI (49.3% tetraplegia; 47.6% complete SCI) patients (mean age: 76.7+ 16.2, 70.6% men) were included during the study period. Nutrition-screening compliance increased significantly overtime [2013-4: 49.3%; 2014-5: 69.7%; 2015-6: 80.7%; 2016-7: 76.7%, p<0.01]. Eighty-four articles were identified from systematic review, of these, 9 studies with 9,265 SCI patients were included. There was considerable variability in methodology and prevalence of malnutrition risk (Three nutrition-screening tools were reported: body mass index (BMI); Malnutrition Universal Screening Tool; Spinal Nutrition Screening Tool), prevalence of undernutrition was in the range of 40-50%. Three different BMI cut-offs were reported as over-nutrition’s cut-off (>22 kg/m2; >23 kg/m2; >25 kg/m2). The prevalence of obesity was in the range of 45-69.2%.

Discussion: Malnutrition is a highly prevalent condition after SCI. Further research is necessary to characterise screening practices and identify evidence-based interventions to this persistent and costly clinical and public health issue.
The prevalence, possible risk factors, consequences and treatment options of hypovitaminosis D in spinal cord injury patients: a systematic review and analysis of 3 years data from Stoke Mandeville Hospital.

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Poster Presentation Day 2, September 14, 2018

Literature reports that the prevalence of hypovitaminosis D is increased amongst spinal cord injured (SCI) individuals. Due to enforced inactivity secondary to paralysis and prolonged institutionalisation, hypovitaminosis D has become a cause of concern as it not just affects individual’s bone quality but is also associated with poor clinical outcomes and increased healthcare costs. There is limited high quality evidence available to address vitamin D deficiency after SCI. The aim of the present course is to (1) report a systematic review on prevalence, possible risk factors, consequences and treatment options of hypovitaminosis D in SCI patients; (2) evaluate 25-hydroxyvitamin D concentrations in SCI patients admitted to a UK SCI centre over three years with emphasis to assess whether seasonal factors contribute to hypovitaminosis D and to establish risk factors; (3) discuss further plan for research.

A literature search on hypovitaminosis D (prevalence, risk factors, consequence) after SCI was performed from Medline, Embase, CINAHL, AMED, BNI, SCIRE and PubMed using the PICO questions and CASP checklist. Articles published in 1990 to 2015 were included. 305 articles were identified from systematic review, of these, 13 studies with 1,046 SCI patients were included. There was considerable variability in methodology and prevalence of hypovitaminosis D. The prevalence of hypovitaminosis D was in the range of 32-93%.

During April 2012-June 2015, 416 adults with SCI (55.1% tetraplegia; 45.3% complete SCI) were studied prospectively. Vitamin D levels (nmol/l) <25; < 50; <80 and >80 were defined as severe deficient; deficient; insufficient and normal, respectively. Almost all (90.9%) SCI patients were vitamin D insufficient, 64.2% had vitamin D deficiency and 15.6% were severe deficient. Hypovitaminosis D (<50 nmol/L) was associated with undernutrition risk (p<0.01) and, non-summer seasons (p<0.01). Hypovitaminosis D was found to be less common in summer when compared to Autumn, Winter and Spring. (47.8%, 62.3%, 69.6%, 73.8%, p<0.01)

The present study shows hypovitaminosis D is common after SCI. Strategies for implementing systematic screening, efficacy and safety of vitamin D supplementation in SCI population need to be reviewed. Given the severe loss of quality of life for these patients, a cost-effective, reliable therapy would appear to be highly desirable. Further study of the efficacy of vitamin D supplementation on bone mineral density and body composition in SCI patients is warranted.

Through the completion of this course, it is expected to provide a greater awareness of hypovitaminosis D after SCI and a better understanding of it’s risk factors and management, providing optimal and cost effective interventions as a result. The audience feedback will be recorded as part of the consultation feedback which will be used to guide the clinical and research strategies in hypovitaminosis D research before an official launch in Q4 2018.

First presentation
Systematic review of prevalence, possible risk factors, consequences, and treatment option of hypovitaminosis D in patients with spinal cord injury

Irina Gainullina

Second presentation
Prevalence and possible risk factors of hypovitaminosis D in UK SCI patients.
Samford Wong

Third presentation
Current clinical pathway at Stoke Mandeville and possible future plans for hypovitaminosis D research.
Allison Graham
Providing an effective outreach service for children and adolescents with acquired spinal cord injury.

Mrs Deb Woodforde1, Ms Erin Rooke1, Mrs Anne Price1, Mrs Isabel Chapman1, Ms Monique Beutum1, Mrs Kirsty Kinch1
Northcott, Sydney, Australia

Poster Presentation Day 1, September 13, 2018

1. Introduction:
Acquired spinal cord injury (SCI) in childhood (0-18) is often complex and its impact lifelong. Effects of SCI can be devastating on development as needs and skill requirements change constantly with growth, maturation and evolving roles in society.

NSW is a vast geography extending 809,444 square Kms with a low population of 7.5 million. Outreach is an established method here to provide specialised multidisciplinary service to children, adolescents, their families and local communities.

This paper will explore a number of key resources and protocols utilised and / or developed by the NSW Paediatric Spinal outreach service (PSOS) to achieve efficacious and meaningful service delivery to this population.

2. Methods:
Key resources and protocols have been identified through the process of systematic file reviews, aggregation of service needs identified, formal discussions with key stake holders and collaboration within the PSOS team. Outcomes from these activities have informed key priorities to better meet the needs of SCI affected children and adolescents, their families, local therapists, carers and school staff.

3. Results:
Three key resources were developed:

i. The Paediatric SCI Health passport
ii. Supporting my adjustment bookmark
iii. Paediatric spinal cord injury fact sheets (for families, local therapists and schools)

Direct therapy, education and support (face to face and remotely) have been used by PSOS to enhance the utility and effectiveness of the above resources.

4. Conclusion:
Service delivery to those affected by this rare but complex condition over a vast geography provides both opportunity and challenge. The NSW Paediatric Spinal Outreach Service has developed a number of practical tools to compliment usual outreach practice, to enhance service efficacy and build capacity in local communities.
Ultrasonographic findings and acromiohumeral distance in manual wheelchair users: pilot study

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Poster Presentation Day 2, September 14, 2018

Background
The acromiohumeral distance (AHD) is considered an indicator of the size of the subacromial space outlet, and narrowed AHD is considered one of the causes of rotator cuff pathology. The occupation ratio (OR), which is defined as the supraspinatus (SSP) tendon thickness expressed as a percentage of AHD, is also reduced in patients with rotator cuff pathology. The purpose of this study was to evaluate shoulder ultrasonographic findings and to find out the difference in AHD and OR according to various types of rotator cuff pathology in manual wheelchair users with SCI.

Methods
Paraplegia patients over 19 years old with injury onset of more than 6 months, who actively perform activities of daily living with manual wheelchair for at least 40 hours per week were included. Five subjects were enrolled and total 10 shoulders were evaluated by ultrasonography. Shoulder ultrasonography was performed by a single physician.

Results
Average age of participants was 45 years. Abnormal shoulder ultrasonographic findings were as follows; SSP tendon tear from 2 shoulders, biceps brachii tendinopathy from 2 shoulders, subscapularis (SSC) tendon tear from 2 shoulders, calcification in SSP tendon, and SSC tendon from 1 shoulder each. Average AHD of the subjects was 11.3mm. Three shoulders with rotator cuff tears showed average AHD of 11.7mm, OR of 54.06%, while nine shoulders without rotator cuff tears showed average AHD of 11.1mm, OR of 49.47%.

Conclusion
This pilot study showed a greater tendency of rotator cuff tears in individuals with greater length of time since injury and longer daily wheelchair usage. Able-bodied individuals with rotator cuff tears are known to have narrow acromiohumeral space, but in SCI individuals in this study, the result was contradicting.
Barriers in Accessing Adult Healthcare for Transitioning Youth with Spinal Cord Injury

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Poster Presentation Day 2, September 14, 2018

Objective: To better understand barriers to adult healthcare transition in youth with spinal cord injury (SCI). Research states that youth with SCI and their caregivers face numerous challenges when navigating healthcare transition. The goal of this work is to identify common obstacles that hinder youth with SCI from experiencing a satisfying transition to adult healthcare by studying the perspectives of youth and caregivers.

Method: Surveys were administered to 54 youth [adolescents: n = 15, M(SD) age = 24.10, 1.79, range = 13-18; young adults: n = 39, M(SD) age = 24.10, 1.79, range = 22-27] and 38 of their caregivers. The sample included youth who currently or previously received SCI care through a large, multi-site pediatric SCI rehabilitation program. The majority of youth had paraplegia (79%) and complete injuries (56%). The majority of caregivers were mothers (94%). Semi-structured interviews were conducted in 12 youth-caregiver dyads. Using mixed-method design, thematic elements from Systematic Coding and Interpretive Phenomenological Analysis were validated by statistical evidence. Validity included exploring convergence between qualitative findings and quantified responses to a measure assessing overall satisfaction with adult healthcare services.

Results: Analyses showed that both youth and caregivers believe that (1) adult providers lack knowledge of pediatric-onset SCI, (2) there is a shortage of comprehensive, interdisciplinary care in adult setting, (3) communication among providers is limited due to specialists being located at various sites, as compared to centralized pediatric care, and (4) they would benefit from more information regarding the transition process, timeline, and referrals. Notably, 44% participants reported satisfying transition experiences. Overall, both youth [M(SD) satisfaction = 3.72(1.06)] and caregivers [M(SD) satisfaction = 3.19(0.63)] reported average levels of satisfaction with their transition to adult care on a Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree). The most valuable resources identified included reliable referral information, clear communication, and financial stability.

Discussion: In general, youth and caregivers reported that adult services were resource-limited and challenging to navigate, suggesting that families would benefit from more communication and knowledge regarding future care options well before pediatric services end. Adult providers’ increased knowledge of pediatric-onset SCI in communication among SCI subspecialists could contribute to more equitable transitions. The transition experience could be improved with development of a concise and comprehensive overview of the youths’ medical history and more integrated and accessible care facilities for adults with SCI. Individuals with SCI have wide-ranging, lifelong healthcare needs that, if continually met, could reduce stress and medical complications, thus leading to higher general life satisfaction.
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