

CONFERENCE WORKSHOPS

5th National Spinal Cord Injury Conference *Translating Neural Engineering and Novel Therapies* October 18–20, 2012 Hilton Toronto, Toronto, Ontario

Kapadia Desai Naaz, Zivanovic Vera, Popovic Milos, Verrier Molly, Lo Lorna, Gagnon Dany, Ditor David, Brosseau Rachel, Totosy de Zepetnek Julia, Gainforth Heather, Latimer-Cheung Amy, Athanasopoulos Peter, Martin Ginis Kathleen, Flett Heather, Brown Jacquie, Kras-Dupuis Anna, Laramée Marie-Thérèse, Lemay Valérie, Scovil Carol, Hsieh Jane, Verrier Molly, Guy Kristina, Noonan Vanessa, Walden Kristen, McMillan Colleen, Milligan Jamie, Bauman Craig, McDonald Sarah, Hagen Chris, Campbell Karen, Houghton Pamela, Fraser Chris, Keast David, Titus Laura, Smith Joanne, James Kylie, Krassioukov Andrei, Walden Kristen, Townson Andrea, Le Nobel Gavin, Whiteneck Gale, Gassaway Julie, O'Connell Colleen, Burns Anthony, Buren Rob, Andrion Jeffrey, Swaine Jillian, Craven Catharine, Cherban Erin, Hsieh Jane, Noonan Vanessa, Rasheed Amir, Verrier Molly, Wolfe Dalton, Figley Sarah, Karadimas Spyros, Salewski Ryan, Satkunendrarajah Kajana, Wilcox Jared, Fehlings Michael, Popovic Milos, Aissaoui Rachid, Duclos Cyril, Gagnon Dany, Nadeau Sylvie, Preuss Richard & Verrier Molly

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Abstracts

CONFERENCE WORKSHOPS

5th National Spinal Cord Injury Conference

Translating Neural Engineering and Novel Therapies

October 18–20, 2012

Hilton Toronto, Toronto, Ontario

PreW1

FUNCTIONAL ELECTRICAL STIMULATION THERAPY FOR RESTORING VOLUNTARY GRASPING FUNCTION FOLLOWING INCOMPLETE SCI

Kapadia Desai, Naaz, Toronto Rehabilitation Institute – UHN; Zivanovic, Vera, Toronto Rehabilitation Institute – UHN; Popovic, Milos, Toronto Rehabilitation Institute – UHN, IBBME University of Toronto; Verrier, Molly, Toronto Rehabilitation Institute – UHN; Lo, Lorna, Toronto Rehabilitation Institute – UHN

Learning Objectives:

1. Define FES.
2. Identify parameters of FES as appropriate for individual patient/patient populations.
3. Understand the clinical application of FES.
4. Identify indications and contraindications.
5. Describe upper extremity outcome measures that are able to detect change post FES therapy.

Background/Objectives: Functional electrical stimulation (FES) therapy has been shown to be one of the most promising approaches for improving voluntary grasping function in individuals with cervical level spinal cord injury (SCI). The objective of the current randomized control trial was to determine the effectiveness of FES therapy for the improvement of voluntary hand function in persons with chronic (≥ 24 months post injury) SCI. We hypothesized that individuals with chronic, incomplete C4 to C7 SCI, who receive FES therapy, will have greater improvements in voluntary hand function as compared to individuals who receive a similar volume and duration of conventional occupational therapy (COT).

Method/Overview: Eight subjects with chronic traumatic incomplete SCI (C4-C7, AIS B-D) participated in the study. They received 39 hours of therapy over 13–16 weeks. Subjects were randomized to receive FES therapy ($n = 5$) or COT ($n = 3$). The primary outcome measure was Toronto Rehabilitation Institute Hand Function Test (TRI-HFT) and the secondary outcome measures were Graded Redefined Assessment of Strength, Sensibility and Prehension (GRASSP), Functional Independence Measure (FIM) Self-care Sub-score and Spinal Cord Independence Measure (SCIM) Self-care Sub-score. Outcome assessments were performed at baseline, discharge and 6 months follow up.

Results: At discharge, the FES group showed an improvement of 4.4 points ($p = 0.14$) on the TRI-HFT's Object Manipulation Task, whereas the control changed by 0.1 point ($p = 0.75$) only. Similar changes were recorded on the secondary outcome measures including: i) the mean FIM Self-care Sub-score for the FES group improved by 4.6 points ($p = 0.08$) versus 0 for the COT group ($p = 1.0$); ii) the mean SCIM Self-care Sub-score for the FES group improved by 2.2 points ($p = 0.07$) versus 0.7 for the COT group ($p = 0.41$); and iii) the mean scores on the Strength Component of the GRASSP measured by manual muscle testing improved by 3.4 points ($p = 0.014$) for the FES group versus 1.5 ($p = 0.174$) for the COT group.

Conclusions: Among individuals with chronic incomplete tetraplegia (≥ 24 months post injury), FES therapy results in greater improvements in voluntary hand function when compared to a similar volume and duration of conventional occupational therapy (COT).

Funding Sources: Rick Hansen Institute SCISN Grant # 2009-36.

PreW2

MEASURING CARDIOVASCULAR AND PULMONARY FUNCTIONS IN INDIVIDUALS WITH SCI: BRIDGING THE GAP BETWEEN RESEARCH AND CLINICAL PRACTICE

Gagnon, Dany, Institut de réadaptation, Université de Montréal; Ditor, David, Brock University; Brosseau, Rachel, University of Montreal; Totossy de Zepetnek, Julia, McMaster University

Learning Objectives:

1. Summarize the effects of SCI on the cardiovascular and pulmonary systems.
2. Review the suitability of various measurement techniques available to assess cardiovascular and pulmonary function for individuals with SCI.
3. Discuss the various exercise interventions that have been shown to enhance cardiovascular and pulmonary function in individuals with SCI, as evidenced by such measures.
4. Discuss further research into the application, interpretation or refinement of such measures to optimize their use in individuals with SCI.

Background: Measures of heart rate variability have been used as an index of autonomic cardiovascular control in both the able-bodied and SCI-populations. While this technique is non-invasive and easily administered there is some debate as to the suitability and interpretation of the data it generates. Traditional cardiovascular risk factors fail to identify plaque vulnerability, and therefore, cardiovascular events may be better predicted by measures sensitive to plaque rupture, such as endothelial dysfunction and arterial stiffness. Many individuals with a spinal cord use on a manual wheelchair as their primary source of mobility. For these individuals, cardiorespiratory fitness testing and training is often neglected during intensive functional rehabilitation. Such a situation may be explained by the fact that rehabilitation professionals have restricted access to specialized cardiorespiratory measurement instruments or, when measurement instruments are available, do not fully master standardized cardiorespiratory testing protocol tailored for this population or lack the time needed to perform the tests.

Objective: To highlight the current uses and concerns regarding heart rate variability as it applies to the SCI-population and future research that may optimize its utility.

Conclusion: Safe, inexpensive and rapidly-administered cardiorespiratory tests that may help overcome these limits may be of high interest in clinical practice.

Funding Sources: Dany Gagnon holds a Junior 1 Research Career Award from the Fonds de la recherche en santé du Québec (FRSQ). Simon Darcy received a Summer Research Award in Health Sciences from the Faculty of Medicine, University of Montreal. Financed in part by the FRSQ. The Pathokinesiology Laboratory was supported in part by the Canada Foundation for Innovation.

PreW3

CREATING AN IMPACT: EXAMINING THE ORGANIZATIONAL IMPACT OF AN EVENT-BASED KNOWLEDGE TRANSLATION INITIATIVE TO PROMOTE PHYSICAL ACTIVITY TO PEOPLE WITH SCI

Gainforth, Heather, Queen's University; Latimer-Cheung, Amy, Queen's University; Athanasopoulos, Peter, CPA Ontario; Martin Ginis, Kathleen, McMaster University

Learning Objectives:

1. Discuss the process used to develop the event-based KT initiative.
2. Explain the effectiveness of the event-based KT initiative at an organizational level.
3. Identify the process and framework used to evaluate the effectiveness of the event-based KT initiative at an organizational level.

4. Identify specific steps taken to ensure that staff supported the KT initiative protocol, delivered as intended and maintained in future initiatives.
5. Recognize the importance of research-community partnerships for KT.

Background/Objectives: Few studies have investigated knowledge translation (KT) initiatives that aim to translate research into practice. Even fewer studies have examined effective KT initiatives at an organizational level (Estabrooks, Bradshaw, Dzewaltowski, & Smith-Ray, 2008). One framework that offers insight into organizational factors that may improve the sustainable adoption and implementation of effective KT initiatives is the RE-AIM framework (Glasgow, Boles & Vogt, 2011). Specifically, RE-AIM states that in order for an initiative to be successful in practice, the initiative must be able to be successfully adopted, implemented, and maintained in real-world settings. Therefore, the purpose of this research project was to evaluate the effectiveness of an event-based KT initiative promoting the new physical activity guidelines for people with SCI at an organizational level.

Methods/Overview: We evaluated how the KT initiative was adopted, implemented and maintained using the RE-AIM framework. The KT initiative, protocol, and evaluation were developed through a partnership between a SCI research-based organization (SCI Action Canada) and the Canadian Paraplegic Association (CPA) of Ontario. The KT initiative consisted of twelve separate events about the new guidelines held within CPA Ontario regional service areas. In total, 244 people attended the events. At each event, a SCI Action Canada researcher; a peer with a SCI; and CPA Ontario staff conducted presentations promoting physical activity for people with SCI. Data were collected using observational checklists at events and through interviews with CPA Ontario staff.

Results: Findings from the RE-AIM analysis indicate that the KT initiative had a strong organizational impact. Adoption of the KT initiative was high with 88% of regions within CPA Ontario hosting an event. In terms of implementation, overall fidelity to the event protocol (e.g., topics covered) was high among both SCI Action Canada researchers (100.00% ± 0.00), peers (65% ± 33.74) and CPA Ontario Staff (70.00% ± 34.96). Regarding maintenance, follow-up interviews with CPA Ontario staff indicate future KT initiatives will likely adopt a similar protocol.

Conclusions: Event-based KT initiatives may be an effective strategy for service organizations to ensure that KT initiatives are supported by staff; delivered as intended; and future initiatives maintain similar protocols.

Funding Sources: Research supported by a Community-University Research Alliance grant from SSHRC. Research team members supported by a Mentor-Trainee Award from the Ontario Neurotrauma Foundation (KAMG and AEL), the Canada Research Chair (CIHR) program (AEL) and a CIHR Canada Graduate Scholarship (HLG - #GSD104504).

PreW4

STRATEGIES FOR SUCCESSFUL IMPLEMENTATION AND SUSTAINABILITY OF BEST PRACTICES IN SCI REHABILITATION

Flett, Heather, Toronto Rehabilitation Institute – UHN; Brown, Jacquie, National Implementation Research Network; Kras-Dupuis, Anna, St. Joseph's Health Care London, Parkwood Hospital; Laramée, Marie-Thérèse, Institut de réadaptation Gingras-Lindsay de Montréal; Lemay, Valérie, Institut de réadaptation en déficience physique de Québec; Scovil, Carol, Toronto Rehabilitation Institute – UHN; Hsieh, Jane, Lawson Health Research Institute, SCI KMN

Learning Objectives:

1. Recognize implementation science through NIRN frameworks and tools used by SCI KMN.
2. Recognize the balance between standardized best practice implementation on a national level and variations between sites reflective of their local context.
3. Apply selected implementation frameworks to participants' best practice implementation experiences.

Background/Objectives: The Spinal Cord Injury Knowledge Mobilization Network (SCI KMN) is a 6 site network of rehabilitation centres working together to implement best practices in the treatment of secondary

complications of Spinal Cord Injury. This is a 2½ year multi-site collaborative initiative sponsored by the Ontario Neurotrauma Foundation, Rick Hansen Institute and Alberta Paraplegia Foundation. The National Implementation Research Network (NIRN) frameworks for Implementation Science have been adopted to enable a systematic way of achieving sustainable best practice implementation. While the project has focused on the SCI population, the frameworks and the learnings from the planning and implementation processes can be applied to other populations. The main objectives are as follows: Provide an introduction to the science of implementation Provide a description of the NIRN frameworks for implementation Promote an increased understanding of the key strategies for successful implementation

Methods/Overview: A panel consisting of speakers from the NIRN (University of North Carolina) and the Toronto, London, Montreal and Quebec SCI Rehabilitation programs, will describe the approach and the frameworks used to implement change and best practices using systematic and rigorous methods. We define the 'implementation science', discuss the benefits of such approach and outline the multidimensional and fully integrated implementation frameworks within this context. Our main focus is Implementation Teams, Implementation Drivers and Stages of Implementation.

Results: The SCI KMN's experiences with implementation in the area of pressure ulcer prevention and management include practical examples of how specific practices were selected and operationalized within the context of implementation science across sites.

Conclusions: We anticipate that participants will be able to appreciate that using an intentional process that includes multi-dimensional, fully integrated implementation frameworks leads to effective adoption, delivery and sustaining of the practices and achievement of the planned outcomes.

Funding Sources: Ontario Neurotrauma Foundation 2010-RHI-ONF-BPI-832 2010-RHI-ONF-BPI-865 2010-RHI-ONF-BPI-834 2010-RHI-ONF-BPI-833 2010-RHI-ONF-BPI-866.

W1

COLLECTION OF WALKING MEASURES FOR BEST PRACTICES IN REHABILITATION AND INCLUSION IN THE RICK HANSEN SPINAL CORD INJURY REGISTRY (RHSCIR)

Verrier, Molly, Toronto Rehabilitation Institute – UHN; Guy, Kristina, Toronto Rehabilitation Institute – UHN; Noonan, Vanessa, Rick Hansen Institute; Walden, Kristen, RHSCIR, Rick Hansen Institute

Learning Objectives:

1. Discuss the approach and protocols for assessing walking function across the continuum of care.
2. Explain how to utilize a data collection approach in the clinical setting that will allow for capture of a user friendly population of the RHSCIR rehabilitation walking data set.
3. Explain how to utilize this information to enhance therapeutic interventions and improve patient outcomes.

Background/Objectives: Determining the status of patients' ability to walk on admission and discharge from rehabilitation is an important indicator for establishing rehabilitation programming during inpatient rehabilitation. The Toronto Rehabilitation Institute-University Health Network (TRI-UHN) has developed a strategy for measuring walking ability during rehabilitation to inform physiotherapy intervention and determine patient outcomes. The Rick Hansen Spinal Cord Injury Registry (RHSCIR) is incorporating a more robust national rehabilitation data set into the existing registry to better capture the rehabilitation process of care and outcomes. One of the major data components is the inclusion of walking measures that will determine the status of patients ability at an impairment, activity and participation level. Having rehabilitation centres in Canada working together to implement best practices in the measurement of walking recovery using a standard protocol is a common goal for physical therapists and research scientists in the field. A first step is to ensure that we are developing a common approach that will be meaningful for all and benefit patient care. The main objectives of this workshop are as follows: 1) Provide an opportunity for physical therapists/rehab providers to learn the approach and protocols for assessing walking function across the continuum of care; 2) Provide opportunity to utilize a data collection approach in clinic/routine care that will allow for user friendly population of the RHSCIR rehabilitation walking data set; and 3) Provide an opportunity to understand and utilize the information to enhance therapeutic interventions and improve patient outcomes.

Methods/Overview: Participants will be provided with a reading list of pertinent literature and relevant background documents prior to the workshop. Participants should come prepared to assess patient's walking abilities, learn how to document and interpret findings and utilize RHSCIR for longitudinal data capture and outcome reporting. We will describe the approach and the frameworks used to implement best practices in assessment and data capture using systematic and rigorous methods based on the clinical practices developed at TRI-UHN and the informatics approach used by RHSCIR. Our main focus is hands on assessment and actual data capture through active participation and demonstration by front line clinicians.

Results: Clinicians from each site will share their experience regarding walking assessment and rehabilitation in order to develop consensus regarding best practices in therapeutic interventions directed towards meeting international standards. We anticipate that at the end of the workshop we will have a trained a group of physical therapy clinicians from rehabilitation centres in Canada who will have the knowledge and expertise to participate in future clinical research regarding walking rehabilitation.

Conclusions: Participants will achieve an increased understanding of how evidence, clinical assessments and informatics can be used to inform changes in therapeutic practices. We anticipate that participants will be able to connect across the country through the RHSCIR process to exchange innovations in physical therapy for patients with SCI.

Funding Sources: ONF/REPAR Grant # 520; Craig H Neilsen Foundation Award # 164422; Rick Hansen Institute.

W2

SCI PATIENT-CENTERED PRIMARY HEALTH CARE – BEST PRACTICES IN THE COMMUNITY

McMillan, Colleen, University of Waterloo; Milligan, Jamie, The Centre for Family Medicine Mobility Clinic; Bauman, Craig, The Centre for Family Medicine Clinic; McDonald, Sarah, The Centre for Family Medicine; Smouter, Sarah; Hagen, Chris, Wilfrid Laurier University

Learning Objectives:

1. Identify the unique clinical challenges of SCI presented in primary health care.
2. Describe how to address these challenges in a collaborative way.
3. Identify a consumer and physician collaborative model of health care.

Background/Objective: Family Health Teams are positioned to make significant inroads into how providers respond to SCI patients with best practices that are patient centered and informed. Using a Participatory Action Research Model (PAR), the Centre for Family Medicine, Kitchener, conducted two studies with the goal of better responding to the physical and psychosocial needs of the SCI population. SCI patients collaborated with different health care professionals to pilot and develop programs specific to the unique challenges experienced by the SCI patient.

Methods/Overview: Two concurrent studies were funded by the ONF over the course of one year. The first study supported the development of a Community Advisory Board composed of health care professionals from the Centre for Family Medicine, members of community agencies including the Canadian Parapalegic Association, patients living with SCI, and medical and social work learners from McMaster and Wilfrid Laurier University. The focus of the Community Advisory Committee was to identify ways in which to build capacity that was sustainable for the SCI population in the Kitchener Waterloo community. Complementing this goal of building capacity was a second study that piloted a primary care toolkit for SCI patients. The goal of the SCI Toolkit was to support and encourage patients with the knowledge and the tools to take ownership in managing their health care needs after being discharged into the community. Both studies emphasized the philosophy of empowerment of the patient as well as collaboration between the patient and his inter disciplinary health care team.

Results: Both studies illustrated that by involving SCI patients in service design and delivery, outcomes are specific, collaborative in nature and facilitate a culture of compassionate care. Patient feedback on the toolkit resulted in more meaningful revisions, based upon the lived experiences of the SCI patient. This kind of knowledge was absent in the literature that was reviewed. Knowledge translation activities, such as conferences and workshops, involved SCI patients who participated in the two studies, adding a type of credibility that is too often absent in research studies.

Conclusions: By sharing ownership of study design and implementation with SCI patients, knowledge creation and translation was found to be more sustainable. The SCI toolkit was found to be more useable, resulting in more productive office visits.

Funding Sources: Ontario Neurotrauma Foundation, Grant Number: ONF Grant 2010-SCI-TOOLKIT-864.

W3

CANADIAN BEST PRACTICE GUIDELINES ON PREVENTION AND TREATMENT OF PRESSURE ULCERS IN THE INDIVIDUALS WITH SPINAL CORD INJURY

Campbell, Karen, Lawson Research Institute, St Joseph's Health Care London; Houghton, Pamela, Western University; Fraser, Chris, St Joseph's Health Care London; Keast, David, Lawson Research Institute, St Joseph's Health Care London; Titus, Laura, University of Western Ontario

Learning Objectives:

1. Review of the process for development of the Canadian Clinical Practice Guideline (CPG).
2. Brief overview of new recommendations within the CPGs, previously not included in other CPGs on pressure ulcers within the spinal cord population.

Background/Objective: The overall objective of this project was to produce the first ever Canadian Clinical Practice Guidelines for the prevention, assessment, and treatment of pressure ulcers for people with spinal cord injury (SCI). This workshop will provide an over view of the development and content of these Canadian Guidelines.

Methods/Overview: An inter-professional expert panel was formed included representatives from consumer advocacy, nursing, physiotherapy, occupational therapy, dietetics, rehabilitation engineering, medicine (experts in wound care, physical medicine and rehabilitation), surgery, and the Spinal Cord Injury Network. The steering committee with the assistance of a medical librarian, developed a comprehensive literature search strategy that was used to locate relevant research using 6 electronic databases. Copies of relevant articles were sent to panel work groups and a consensus conference of an expert panel (n = 15) that represented clinicians, consumers, and policy makers from across Canada was convened. The interdisciplinary panel discussed the recommendations for new guidelines and reached a consensus on the wording and the level of evidence, using the Registered Nurses Association of Ontario (RNAO) grading system. Where no spinal cord injury-specific research was identified, the recommendation was based on existing pressure ulcer guidelines, such as those prepared by the RNAO, the Canadian Association of Wound Care, and the National Pressure Ulcer Advisory Panel, and expert opinion.

Results: A draft document was generated that represents a consensus on the new guidelines and supporting levels of evidence. The panel determined there was a need for additional recommendations dealing with utilization of support surfaces and optimization of functional mobility. Three new sections were written to address these topics in more depth. They have been reviewed and revised by both the steering committee and then by the working groups. A final complete document is will be sent for review by the expert panel and also a large group of external stakeholders for review and endorsement. We anticipate a final document by September.

Conclusions: The Canadian Practice Guidelines for the prevention assessment and treatment of pressure ulcers in persons with spinal cord injury has been developed. A plan for the next steps have been developed and approved by ONF and RHI and will bring this unique Guideline to life through both the knowledge mobilization network and other dissemination practices.

Funding Sources: Ontario Neurotrauma Foundation and the Rick Hansen Institute, Grant Number: 2010-RHI-Guide-813.

W4

EAT WELL, LIVE WELL WITH SCI: ADDRESSING SECONDARY HEALTH COMPLICATIONS THROUGH NUTRITION

Smith, Joanne, Fruitful Elements, Neuro Nuts; James, Kylie, Neuro Nuts

Learning Objectives:

1. Explain the important role nutrition plays in the long-term health of people with SCI.
2. Describe nutritional strategies for maintaining overall health, preventing bladder infections, boosting immune health, addressing stress and supporting cardiovascular health.

Background/Objectives: A thorough needs assessment identified that there is limited information available regarding specific nutrients and their impact on preventing & managing the secondary health complications people with SCI are at high risk of developing. The extensive hormonal, metabolic, digestive and physical changes that occur after SCI can cause nutrient deficiencies, which in turn may lead to illness and other health complications. However, when the body is given the essential nutrients it needs, it is able to function at its optimum, thus helping individuals with SCI live to their fullest potential.

Methods/Overview: There is a need to research and develop knowledge and education material in the area of nutrition. Moreover, SCI consumers need practical information that addresses the role that nutrition plays in their recovery, health and overall function. Two nutritionist, specializing in SCI and brain injury, have completed a literature search on nutrition and SCI specific conditions (which included; nutrition/medical journals, nutrition books, patient education materials and information gathered through clinical practise) and written the first nutrition book/website dedicated to the unique health needs of SCI consumers.

Results: This nutrition book/website entitled *Eat Well, Live Well with SCI* covers the most common SCI secondary health issues. Chapters include; Digestion, Detoxification/Liver Function, Neurogenic Bladder & Bowel, Bone Health, Weight Loss, Pressure Sores, Depression, Anxiety, Stress, Pain, Fatigue, Sleep, Cardiovascular Disease, Respiratory and Immune Health. Each chapter details the altered body systems, how and why conditions develop, the role specific nutrients (foods, supplements and herbs) play in preventing & managing these health issues and recipes.

Conclusions: *Eat Well, Live Well with SCI* (reviewed by SCI consumers, nutritionist, and physiatrist) provides an innovative and preventative approach towards the health care of individuals with SCI. Nutrition interventions can help reduce the incidence and severity of secondary health issues and reduce their financial burden on our health care system. The material offered in this book/website helps empower individuals with SCI to have greater control over their own health, and enable them to live a more fulfilled and independent life.

Funding Sources: Paralyzed Veterans of America

W5

THE INTERNATIONAL STANDARDS FOR AUTONOMIC FUNCTION: PRACTICAL “HOW TO” INFORMATION AND REVIEW OF GUIDELINES

Krassioukov, Andrei, ICORD, Department of Medicine, Division of Physical Medicine and Rehabilitation, University of British Columbia; Walden, Kristen, Rick Hansen Institute; Townson, Andrea, ICORD, Department of Medicine, Division of Physical Medicine and Rehabilitation, University of British Columbia; Le Nobel, Gavin, Department of Medicine, University of Toronto

Learning Objectives:

1. Review the recommended guidelines and train participants on a standardized approach to collecting the autonomic standards data in clinical practice.
2. Review the standardized assessment form and walk through the clinical decision-making process and sources of information required to complete each question.
3. Demonstrate hands-on application of the assessment tool through an interactive presentation of clinical case studies. Participants practice scoring and ask questions that arise throughout the exercise.

Background/Objective: The International Standards for the Neurological Classification of Spinal Cord Injury (ISNCSCI) are utilized worldwide for documenting motor and sensory impairments after spinal cord injury (SCI) and also increasingly for assessing changes in spinal cord function in SCI clinical trials. Despite its international adoption, a deficiency remains in the standards with regards to evaluating other major physiological consequences following SCI, in particular changes in autonomic function. Autonomic dysfunction following SCI can be characterized by several devastating conditions including abnormal blood pressure, heart rate

abnormalities, temperature dysregulation, loss of bowel and bladder control, as well as sexual dysfunction. Given the paucity in the study of autonomic dysfunctions following SCI, there has been a relatively limited recognition of the need to standardize the evaluation of such consequences. In 2009, a working group of the American Spinal Injury Association and the International Spinal Cord Society was formed and proposed an addition to the well established motor and sensory evaluation to include autonomic function. These International Standards to document remaining Autonomic Function after SCI (ISAFSCI) are in use at numerous SCI centers around the world. In 2012, the standards were further modified based on clinical feedback and experience.

Methods/Overview: Review the history of the ISAFSCI development and specific guidelines on how to collect the autonomic standards data in clinical practice. Review the Autonomic Standards Assessment Form highlighting clinical decision making and providing attendees with specific sources of information required to complete individual sections of the form. The majority of the workshop will then be dedicated to interactive audience participation, where attendees will be provided with the opportunity to utilize the Autonomic Standards Assessment form through sample clinical case studies, as well as ask questions and engage in discussion with members of the expert panel. Finally, the future directions for the ISAFSCI, including upcoming validation studies on the psychometric properties associated with its use, will be discussed.

Funding Sources: Health Canada.

W6

SCI REHAB REVEALS RELATIONSHIPS OF SCI TREATMENTS WITH PATIENT OUTCOMES

Whiteneck, Gale, Craig Hospital Englewood, Colorado; Gassaway, Julie, Institute for Clinical Outcomes Research, Salt Lake City, Utah USA

Learning Objectives:

1. Articulate how discipline-specific treatment information adds to explained variance (*beyond that explained by patient characteristics alone*) for functional participation, and quality of life outcomes for patients with traumatic SCI.
2. Explain how making study populations (*subsets*) more homogeneous and outcomes specific to the homogeneous subsets demonstrate a greater influence of treatment on functional outcomes.
3. Analyze associations of community outings/interventions with outcomes.

Background/Objective: SCIRehab is a 6-center research effort to determine which SCI rehabilitation interventions are associated with positive outcomes at one year post injury.

Methods/Overview: Treatment data were collected at service provision by clinicians providing regular care. Patient characteristics and FIM items were abstracted from the medical record. Patient interviews (SCI Model Systems Form II and project-specific) were performed at 1-year post injury. Hierarchical regression modeling was used to predict outcomes. To differentiate FIM improvements due to treatment from natural recovery, homogeneous subgroups of patients that showed no neurologic recovery from admission to discharge were identified: C 5-8 AIS A/B, T 1-9 A/B and AIS D.

Results: Over 1,100 clinicians documented details for 255,236 treatment hours provided to 1378 patients enrolled in the SCIRehab project. Patient characteristics are strong predictors of discharge motor FIM ($R^2 = 0.65$). The addition of treatment time by each rehabilitation discipline increased the predictive power only slightly ($R^2 = 0.70$). More time spent in physical therapy (PT) and therapeutic recreation (TR) was associated with higher scores but more time in occupational therapy (OT) was associated with lower scores. This negative OT relationship became positive and the explanatory power of the OT treatment variables increased significantly when subject groupings became more homogenous. For patients with motor complete low tetraplegia and no neurologic recovery, the addition of OT treatments increased the R^2 to 0.39 for patient characteristics alone to 0.61. The explanatory power of treatment variables increased even further as the outcome became more specific. The amount of variation explained in the FIM self-care items increased from 44% for patient characteristics alone to 69% with the addition of OT treatments. Similar patterns of increasing predictive power were seen when examining PT treatments within subpopulations for patients with complete thoracic and for patients with AIS D injuries. More time spent in TR outings is associated with more discharge to home and, at the time

of the 1-year anniversary: higher CHART Social Integration and Mobility scores, more residing at home, less rehospitalization, and less reporting of pressure ulcers.

Conclusions: When examining outcomes for patients with SCI, it is important to consider specific treatments provided by all rehabilitation disciplines, which add much explanatory power to variation explained by patient variables alone.

Funding Sources: NIDRR Grant Numbers: H133A060103 and H133N060005.

W7

YOUR INTERNATIONAL SPINAL CORD INJURY COMMUNITY: GETTING INVOLVED

O'Connell, Colleen, MD FRCPC, Staff Physiatrist/Research Chief, Cassidy, Stan, Centre for Rehabilitation, Fredericton; Adjunct Professor, Division of Physical Medicine & Rehabilitation, Department of Medicine, Dalhousie University and Faculty of Kinesiology, University of New Brunswick; Burns, Anthony, Department of Medicine Toronto Rehabilitation Institute - UHN, University of Toronto

The World Health Organization estimates that of the 20 million people with spinal cord injury (SCI), the majority live in the low resource countries. Over the past decade there has been an increasing awareness of the aftermath of natural disasters, including provision of care to those with catastrophic injuries. International response efforts has resulted in a greater recognition of disaster related SCI and the state of SCI care in general in low-resource regions. There now exists tremendous opportunity for the international SCI community to collaboratively work towards identifying the challenges and critical successes in delivery of SCI care in low resource areas, including disaster preparedness and response, capacity building within acute and rehabilitation care settings, and establishment of sustainable training programs in SCI care.

This workshop will provide participants with an opportunity to explore personal motivations for working/volunteering in international efforts. Planning and preparation exercises will compliment sessions on key considerations in field work, including health and safety, ethics, and appropriate development in global health work as it relates to SCI. Practical tips for initiating or continuing in international work will be presented, and participants will have an opportunity to share experiences.

Background/Objectives:

1. Recognize personal motivation factors in pursuing international field work in spinal cord injury.
2. Describe potential ethical issues that can arise during international health work.
3. Identify opportunities in Canada to participate in international efforts to reduce disparities in SCI care globally.
4. Apply a checklist approach to initiating and international work/volunteer experience.

W8

CHANGING MINDS, CHANGING LIVES (CMCL) – HEALTHCARE PROFESSIONALS AS KEY INFLUENCERS

Buren, Rob, University of Victoria, Canadian Paralympic Committee;
Andrion, Jeffrey, Sunnybrook Holland Orthopedic and Arthritic Centre

Learning Objectives:

1. Identify the benefits of sport participation for clients engaged in a clinical rehabilitation program.
2. Explain the importance of making sport a central component of a rehabilitation plan.
3. Help clients make sport a part of 'life after rehab' by exploring community-based options and strategies for engagement.

Background/Objective: CMCL is an outreach program presented by the Canadian Paralympic Committee that educates healthcare professionals and other key influencers about the Paralympic Movement, the associated social and health benefits of sport activity and the potential that resides in all Canadians living with a physical

disability. The goal is to create advocates on the 'frontline' who will use sport as a vehicle for rehabilitation and reintegration of persons with a physical disability into the community, and onto the playing field. Presentation objectives are: – To discuss the benefits of sport participation for clients engaged in a clinical rehabilitation program – To encourage healthcare professionals and key influencers to make sport a central component of a rehabilitation plan – To suggest ways to help clients make sport a part of "life after rehab" by exploring community-based options and strategies for engagement.

Methods/Overview: In addition to the peer-to-peer nature of this presentation, the awareness-building component is complemented by a "show and tell" of parasport equipment by an athlete with a disability, along with personal insight to the value of sport participation. Discussions are accompanied by a demonstration of CPC's new 'Get Involved' online portal and video clips that focus on issues of concern to the conference audience.

Results: Sport participation has contributed significantly to the field of clinical rehabilitation. Introduced by Dr. Ludwig Guttmann in 1944 as a rehabilitation tool, sport for persons with a disability has evolved into an increasingly integrated and competition oriented activity. Recognizing the value of sport from a rehabilitation perspective and the evolution of Paralympic and adapted sport, there is an abundance of literature documenting its significance and development.

Conclusions: Through the experience of an athlete with a disability and the insight of a medical professional who uses sport and physical activity as a therapeutic intervention, this presentation demonstrates the power of sport as a rehabilitation tool, a community involvement mechanism and a means to personal development. The audience will better recognize the potential for people with a spinal cord injury to become involved in and excel at sport, and will learn about strategies for connecting/collaborating with stakeholders in the sport/disability sector.

Funding Sources: Canadian Heritage – Sport Canada (core funding).

W9

SITTING ACQUIRED PRESSURE ULCERS AND INDIVIDUALIZING RISK

Swaine, Jillian, University of Western Australia; Stacey, Michael, University of Western Australia, Perth, Australia

Learning Objectives:

1. Define sitting acquired pressure ulcers (SAPUs).
2. Discuss the risk factors and the significant knowledge gaps.
3. Review new evidence on the etiology of SAPUs using fresh frozen cadaver dissection, ultrasound imaging, CT imaging, digital inclinometer postural measurement and interface pressure mapping.
4. Translate the evidence into *AusCAN Individual Risk Profiles* for the development of SAPUs.

Background/Objective: Pressure ulcers (PUs) are one of the most common secondary complications of SCI and have significant negative impact on the individual, family and caregivers. Sitting acquired pressure ulcers (SAPUs) are a subset of PUs that can develop in five locations on the load bearing pelvis and on the posterior femurs. The etiology of SAPUs is a relatively new area of research. Pelvic anatomy, pelvic posture and the biomechanical responses of the buttock's soft tissues in a sitting position have not been well defined and conflicting evidence exists regarding which muscles and soft tissue layers are loaded while sitting. This workshop will present studies from this research group.

Methods/Overview: This research group first focused on the anatomy of the buttocks in loaded sitting. The study aimed to determine the anatomy in the loaded region of the ischia in simulated sitting in a fresh-frozen cadaver. In subsequent studies, ultrasound of the soft tissues was used to determine the soft tissue layers overlying the loadbearing region of the pelvis in both able bodied and individuals with spinal cord injuries. One cross sectional study involved 13 participants with SCI (5 paraplegic, 6 tetraplegic; 8 complete, 3 incomplete) who had no open pressure ulcers on their pelvis. Two senior musculoskeletal sonographers followed an ultrasound protocol to measure soft tissue layers over both ischia of participants who lay supine in a simulated sitting position with hips and knees supported at 90° flexion. The pelvis is a complex bony structure with overlying soft tissues and the landmarks used to measure pelvic tilt (YZ plane), pelvic obliquity (XZ plane), and pelvic rotation standardized protocols, demonstration and hands-on practice.

Results: During dissection, it was observed that the tissues most likely loaded during sitting include the skin, fat, the medial border of gluteus maximus and the conjoint tendon of biceps femoris and semitendinosus. Semimembranosus may be loaded during sitting but would depend on the degree of pelvic tilt in the sagittal (YZ) plane. The muscle belly of gluteus maximus was not loaded.

Ultrasound studies of the soft tissue overlying the ischium have demonstrated that the total thickness of tissue in individuals with spinal cord injury is significantly less than in able bodied volunteers. In the cross sectional study using ultrasound, three of the 13 participants (23%) had abnormal tissue under intact skin.

In a study of posture in 18 individuals with spinal cord injury, a posture self-report of postural problems was significantly more likely to co-exist with a measure pelvic obliquity of >4 degrees. In a further study of an individualized interface pressure mapping (IPM) education session, there was a significant increase in IPM knowledge, competence and self-esteem.

Using these tools and other data, individualized risk profiles for SAPUs have been used in our research group and will be presented.

Conclusions: New and existing research findings can be translated into standardised individualized risk profiles. These *AusCAN Individual Risk Profiles* will be evaluated in a randomized controlled trial.

Funding Sources: National Health and Medical Research Council (NHMRC Australia), Australian Wound Management Research Foundation, Fremantle Hospital Medical Research Foundation, Neurotrauma Research Foundation (Western Australia), Western Australia Health and the Warren Jones/UWA Postgraduate Scholarship.

W10

CAPTURING CAPACITY IN SCI REHABILITATION IN CANADA: E-SCAN ATLAS

Craven, Catharine, Toronto Rehabilitation Institute – UHN; Cherban, Erin, Rick Hansen Institute; Hsieh, Jane, Ontario Neurotrauma Foundation; Noonan, Vanessa, Rick Hansen Institute; Rasheed, Amir, Rick Hansen Institute; Verrier, Molly, Toronto Rehabilitation Institute – UHN; Wolfe, Dalton, Lawson Health Research Institute

Learning Objectives:

1. Review current pan-Canadian rehabilitation capacity and care delivery models.
2. Gain insight into the strengths and limitations of the E-Scan methodology and Atlas results.
3. Describe the broader implications of the study results for service delivery, our research network and health policy in Canada.

Background/Objective: The Rehabilitation Environmental Scan (E-Scan) project is the first-ever national survey of Canadian SCI-related rehabilitation practice. The purpose of the E-Scan project is to obtain a snapshot of current SCI rehabilitation service delivery, care providers and capacity. The inaugural product from the project team is an atlas of SCI rehabilitation, "Capturing Capacity in Canadian SCI Rehabilitation". This workshop aims to provide attendees with an introduction to the Rehabilitation Framework and E-scan report card to:

- facilitate an enhanced understanding of the current rehab service delivery in Canada;
- provide insight into the E-Scan methods; and
- facilitate discussion of the Atlas content and its implications for future service delivery and the national health policy and research agenda.

Methods/Overview: A framework for rehabilitation service delivery was developed to support and inform the E-Scan study design. Thirteen of fifteen Canadian tertiary academic SCI rehabilitation sites participated in the study. Data were gathered via a web-based questionnaire at the site level from clinicians, administrators and scientists, and entered into a central on-line data repository. The web-based questionnaire included 3572 elements regarding patient utilization, availability and adequacy of staff resources, capital equipment and services. Data regarding relevant policies, care maps and CPG's were also collected. Data cleaning was done prior to data analysis. Analysis and reporting of the collected data were anchored to specific rehab goals articulated within the rehabilitation framework. Scoping review methods were used to inform and validate the data obtained.

Multiple expert stakeholders contributed to data triangulation and articulation of the report card scores and 2020 priorities.

Results: Each E-Scan Atlas chapter includes:

- Articulation of specific rehab goals including the related resources and processes necessary to obtain that goal;
- A spotlight best practice organization that others may want to emulate;
- A visual summary or report card describing current the state of practice through three lenses: knowledge generation, clinical application, and a policy change on a scale of insufficient to optimal.
- Specification of a 2020 priority to enable advancement of practice.

Conclusions: The E-Scan Atlas highlights current capacity and SCI rehabilitation services, while identifying current gaps in service and regional disparities in care. Data contained within the Atlas is intended to support future best-practice initiatives, inform future health policy and research agendas and enable pan-Canadian advancement of SCI rehabilitation practice and service delivery.

Funding Sources: Rick Hansen Institute.

W11

FROM BENCH TO BEDSIDE: A SCIENTIFIC UPDATE FROM THE LABORATORY

Figley, Sarah, Institute of Medical Science, University of Toronto;
 Karadimas, Spyros, Institute of Medical Science, University of Toronto;
 Salewski, Ryan, Institute of Medical Science, University of Toronto;
 Satkunendrarajah, Kajana, Toronto Western Research Institute – UHN;
 Wilcox, Jared, Institute of Medical Science, University of Toronto;
 Fehlings, Michael, Division of Genetics & Development, Toronto Western
 Research Institute – UHN

Learning Objectives:

1. Identify basic science research and methodology in neuroscience and neurotrauma research.
2. Highlight novel research in Toronto, including the development of relevant animal models and beneficial outcomes of SCI therapies.
3. Discuss the challenges within basic science, caveats of current translational research, and identify the obstacles preventing successful translational therapies.

Background/Objective: Workshop Learning Objectives: 1) Provide clinicians with a general understanding of basic science research and methodology in neuroscience and neurotrauma research. 2) Highlight novel research in Toronto, including the development of relevant animal models and beneficial outcomes of SCI therapies. 3) Discuss the challenges within basic science, caveats of current translational research, and identify the obstacles preventing successful translational therapies. 4) Bring clinicians and basic scientists together to determine the future of translational research and what will be needed to effectively implement therapeutic strategies in the clinic.

Methods/Overview: While clinicians and researchers work together regularly to develop and optimize translational therapies, the methodology, time-course, advances and challenges that occur in the research laboratory may not always be clear or well communicated to the clinical team. In this workshop we will explain the theory, methodology, caveats and successes behind some of the neurotrauma research that is currently being explored in the field, drawing on expertise from Dr. Michael Fehlings' lab.

Results: Recently, the lab has been involved in the development of new animal models including a model of cervical spinal cord injury (SCI) and a model of cervical spondylotic myelopathy (CSM), which have been designed to more accurately mimic the human conditions of SCI and CSM. Additionally, the lab continues to examine a number of promising therapies for SCI, including induced pluripotent stem cells, neural progenitor cells, and vascular endothelial growth factor.

Conclusions: In this workshop we aim to educate clinicians regarding on-going and novel neuroscience research. Moreover, as a learning opportunity for us (post-doctoral fellows and graduate students), we wish to engage the clinical audience in a discussion about the clinical obstacles dealt with in human cases.

Incorporating suggestions from the clinical team into our basic research may allow us to develop better translational therapies, and design more accurate animal models. Ideally, this workshop would be a symbiotic discussion amongst clinicians and basic scientists; allowing each of us to better understand and conduct meaningful translational research.

Funding Sources: Ontario Neurotrauma Foundation; Sangamo Biosciences Inc; Canadian Institute of Health Research – Operating Grant; Canadian Institute of Health Research – Training Program in Regenerative Medicine.

W12

TRUNK CONTROL AND ITS IMPLICATIONS ON SPINAL CORD INJURY REHABILITATION

Popovic, Milos, Toronto Rehabilitation Institute – UHN, IBBME, University of Toronto; Aissaoui, Rachid, Université du Québec; Duclos, Cyril, Montréal Rehabilitation Institute; Gagnon, Dany, Université de Montréal; Nadeau, Sylvie, Université de Montréal; Preuss, Richard, McGill University; Verrier, Molly, Toronto Rehabilitation Institute – UHN

Learning Objectives:

1. Describe the relevance of trunk control in individuals with SCI and its implications on sitting, standing and walking functions.
2. Identify experimental setups and techniques for measuring and evaluating trunk postural control.
3. Describe kinematic and dynamic behaviour of the trunk and trunk muscles during quiet and perturbed sitting and during reaching.
4. Describe kinematic and dynamic behaviour of the trunk during transfers.

Background/Objective: The purpose of this workshop is to present recent findings in the field of trunk control as it pertains to spinal cord injury (SCI) rehabilitation. Until recently trunk control and its implications on improving sitting, standing and walking functions in individuals with SCI have been largely neglected. Furthermore, the clinical assessment of trunk control sensorimotor status has not been well documented in the SCI population. The reason for this can be found in the fact that trunk control is maintained and regulated by a complex biomechanical and neuromuscular system.

Methods/Overview: In order to maintain proper trunk posture, an able-bodied individual has to continuously engage a number of neuromuscular subsystems and precisely regulate their performance. These subsystems are redundant and mutually dependent, which creates a considerable challenge if one attempts to determine the contributions of individual subsystems towards overall postural control. This problem is further exacerbated by the fact that there are different postural control objectives depending on what task a person's body is performing. For example, if a person is reaching for a cup during sitting, or standing in a bus, or walking up a hill, the trunk control strategies for each of these three tasks would be very different.

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