



62nd ANNUAL SCIENTIFIC MEETING ABSTRACTS

June 18–21, 2014

Sheraton Hotel Newfoundland, St. John's, Newfoundland, Canada

These abstracts are scientifically evaluated by the organizing committee and not by the journal.

ORIGINAL RESEARCH

PMR – 101

INCREASING CARDIAC REHABILITATION REFERRALS AMONGST STROKE PATIENTS: A QUALITY IMPROVEMENT PROJECT

Kimberly Coros, MD, Catherine Ho, MD, Christian Fortin, MD, Beverly Moylan, MD, Ali Novin, MD, Jeremy Fennell, MD, Alex Lo, MD, FRCPC

University of Toronto, Department of Medicine, Toronto Rehabilitation Institute, University Health Network

Context: Cardiovascular disease is the leading cause of death worldwide. There is evidence for reduced mortality in patients with cardiovascular risk factors who participate in cardiac rehabilitation programs, yet few post-stroke patients are referred. **Objective:** To increase the number of referrals made by stroke physiatrists at Toronto Rehabilitation Institute to the Rumsey Cardiac Rehabilitation Program by 50%. **Design:** Time-series. **Setting and Participants:** Three stroke physiatrists working within an outpatient stroke clinic at a university-affiliated teaching hospital. **Intervention:** Fishbone and process mapping tools were used for root cause analysis. Interventions included an education session for stroke physiatrists to increase awareness of the cardiac rehabilitation program, collaboration with the Rumsey Cardiac Rehabilitation Program to simplify referral forms and eliminate the requirement for an ECG as part of the referral, and ensuring referral forms were available in clinic. **Outcome measures:** We evaluated the number of new referrals per month to the cardiac rehabilitation program from targeted stroke physiatrists. **Results:** After our interventions, referrals increased to an average of 2.75 referrals per month over four months from the pre-study baseline of 0.5 referrals per month. **Conclusion:** Through the process of quality improvement, we were able to work with two separate, motivated groups of providers to improve rates of referral and patient care. Further work will need to be done to ensure that all referrals are completed appropriately and that patient referrals translate into actual participation in a cardiac rehabilitation program. Future work may focus on increasing referrals directly from acute care hospitals.

PMR – 102

MILD COGNITIVE IMPAIRMENT INCREASES LENGTH OF STAY BUT DOES NOT AFFECT FUNCTIONAL GAINS DURING REHABILITATION FOLLOWING TOTAL JOINT REPLACEMENT: A RETROSPECTIVE COHORT STUDY

Amelia Barry, Scott Wiebe

University of Ottawa

Objective: To determine the influence of cognition on length of stay (LOS) and functional gains during post-arthroplasty rehabilitation. **Design:** Retrospective cohort. **Setting:** Tertiary care academic affiliated hospital. **Participants:** One hundred and twenty-six elective hip and knee arthroplasty patients over the age of 60 who underwent routine post-operative in-patient rehabilitation. **Intervention:** Routine post operative rehabilitation. **Outcomes:** Rehabilitation outcomes, including LOS, admission and discharge Functional Independence Measure (FIM) scores, change in FIM scores, FIM efficiency, and discharge destination and service needs, were compared between patients who scored as cognitively impaired on the Montreal Cognitive Assessment (MoCA) and those with no evidence of cognitive dysfunction. **Results:** Mean MoCA score in the cognitively impaired group was 21.1. Mean LOS was 3.9 days longer in the cognitively impaired group than in the cognitively intact group. FIM efficiency and discharge cognitive FIM scores were higher in the latter group. There were no differences between groups in discharge motor FIM scores, FIM change, or discharge destination and service needs. **Conclusions:** Patients with mild cognitive impairment made similar

functional gains as their cognitively intact counterparts but required a longer stay to do so. Even in elective surgical cases, this has cost and resource implications for in-patient rehabilitation funding. **Key words:** Arthroplasty, Rehabilitation, Cognitive Impairment.

PMR – 103

BARRIERS TO EMPLOYMENT FOR ADULT SPINA BIFIDA

David Berbrayer

Sunnybrook Health Sciences Centre

Objective: to determine the ability-related, social, or environmental factors identified by adult spina bifida as barriers to employment. **Design:** This cross-sectional survey described demographics, performance (independence, social isolation and mobility), and attitudes and opinions about environmental factors of spina bifida related to barriers to employment. **Setting:** Academic teaching hospital. **Participants:** Nine Adult (>18) spina bifida. **Intervention:** Interviews had both quantitative and qualitative components, with equal priority. Besides their age, sex and type of spina bifida, participants were asked employment in the open market or a sheltered workplace and hours per week. If no paid employment, they were asked whether: 1) attending a day centre, 2) full-time education, 3) looking for employment, 4) volunteer work, 5) inactive. CHART assessed cognitive independence, physical independence, mobility and social integration. CHIEF assessed environmental barriers, support/attitudes at home/community, transportation, medical care, availability information, education, and government policies. **Results:** Qualitative component was audio recordings of interviews transcribed into separate documents. 3/9 employed – 1 in sheltered workplace, 1 part-time in open market, and 1 full-time open market. 2/9 looking for work, 2/9 in full-time education (2/9 university, 1/9 high school) 1/9 inactive. Barriers to employment were: personal, transportation, employer, physical / social environment, and programs/services. **Conclusions:** Age 40 were employed. 2/9 working in the open market have the lowest CHIEF scores. Participant working in a sheltered workplace had lower CHART score than two working in open market. Barriers include apprehension about work, transportation problems, wash-room accessibility, and role of Disability assistance programs. **Key words:** adult, employment, spina bifida.

PMR – 104

FACTORS INFLUENCING THE CHOICE OF COMPLEMENTARY AND ALTERNATIVE THERAPY IN CEREBRAL PALSY ADULTS

David Berbrayer

Sunnybrook Health Sciences Centre

Objectives: to examine the predicting factors that contribute to the use of CAM (Complementary and Alternative) therapies in Adult Cerebral Palsy (CP). **Design:** cross sectional study. **Setting:** academic teaching hospital. **Participants:** 21 adult CP (>18 years). **Intervention:** A written survey asked questions in three main areas: 1) Clinical history-type of CP/complications; 2) Demographics- gender, age, education, income, and culture; and, 3) Use of CAM-definition of CAM offered by the National Center for Complementary and Alternative Medicine (NCCAM). **Outcomes:** The main outcome variable in the analysis was CAM use versus no CAM use. Possible predictive factors assessed were age, gender, level of education, income level, type of CP, area of body affected, symptoms/complications of disease, severity of disease. **Results:** 21/23 participants completed the survey; a response rate of over 91%. 10/21 had used one or more CAM techniques within past year (48% respondents). Most common form of cerebral palsy was spastic (12/21). Analysis of our data was unable to detect a link

between use of CAM and severity of disease. Mobility responses were: moves with assistance or non-ambulatory. Complications of CP were spasticity, communication issues, and pain. *Conclusions:* 47% CAM therapy use was manipulative and body-based method (massage therapy, acupuncture, chiropractic manipulation, aqua-therapy, and hippotherapy). Analysis of data was unable to detect a link between CAM and culture. The general use of CAM in adults did not identify income as a predictive factor. No link found between use of CAM and education or use of CAM and gender. *Key words:* adult, cerebral palsy, complementary and alternative medicine.

PMR – 105

PREVENTING FURTHER AMPUTATION IN ADULT DIABETIC AMPUTEE

David Berbrayer

Sunnybrook Health Sciences Centre

Objective: To identify strategies used by diabetic amputees to prevent further amputation. *Design:* A cross-sectional survey was conducted on diabetic amputee >18 years. *Setting:* academic teaching centre. *Participants:* 10 adult diabetic amputees. *Intervention:* A 26-question self-administered questionnaire was used to obtain information on demographic and clinical characteristics as well as foot care, lifestyle modifications, and compliance with medication and blood glucose monitoring. *Outcomes:* Questions were selected from Summary of Diabetic Self-Care Activities Measure. *Results:* Ten type 2 diabetes mellitus -mean age was 61 years. 80% male. 50% single. 80% living with family. 80% annual income of 0–\$19,999. 60% college or university education. Mean body mass index was 32 kg/m. Participants were diagnosed with diabetes 17 years ago, and received a lower limb amputation 3 years ago. Mean time between diagnosis and amputation was 14 years. 90% had below knee amputation, and 10% above knee amputation. 50% checked feet daily within the past week. 50% wore special shoes. 40% wore socks. 20% compliant with blood sugar monitoring. 40% walked 30 minutes/week. *Conclusions:* Compliance with foot care poor among diabetic amputees. Adherence to eating plan and regular physical activity poor. Providers should improve self-care among diabetic amputees through education. Healthcare professionals should discuss foot care and general diabetes self-management after an amputation, and repeat discussion of self-care at follow-up. Literature suggests face-to-face education of self-care is more effective than delivery methods, and use of booster sessions improved clinical outcomes. Interactive education methods are highly effective on patient behavior comparing to didactic. Diabetics had equally poor foot care after and before amputation. *Key words:* adult, amputation, diabetes.

PMR – 106

BRIDGING THE GAP: THE ROLE OF PHYSIATRISTS IN CARING FOR ADULTS WITH CEREBRAL PALSY

Caitlin Cassidy¹, Nerissa Campbell², Mona Madady², Michael Payne¹

¹Western University, Department of Physical Medicine and Rehabilitation, ²Lawson Health Research Institute

Context: Individuals with Cerebral Palsy (CP) experience a significant gap in care as they move from interdisciplinary pediatric programs to limited or non-existent care in the adult sector. A lack of knowledgeable, interested adult care providers has been identified as a limitation to the development of improved transitional services. *Objective:* The goal of this study was to determine the extent to which Physiatrists currently provide care to adults with CP, and to identify barriers to their further engagement with this population. *Design:* The study was conducted through a survey of physician members of the Canadian Association of Physical Medicine and Rehabilitation. *Results:* Approximately 70% of physiatrists reported providing care on a regular basis to ten or fewer adults with CP,

while over 80% felt that physiatry is the most appropriate specialty to provide disability related care for adults with CP. The most frequently identified barriers to caring for this population were lack of accessible resources (ie. social work, funded therapy), lack of referrals and lack of financial compensation for seeing such complex patients. *Conclusions:* Canadian physiatrists currently provide care to a small proportion of adults living with CP despite being experts in the management of many of the health and rehabilitation challenges faced by this population. Efforts to remove identified barriers to further physiatric engagement in the care of adults with CP may result in improved access to needed care for these patients, but further research is required. *Key words:* cerebral palsy, physical and rehabilitation medicine, transition to adult care.

PMR – 107

CARING FOR ADULTS WITH CEREBRAL PALSY: PERSPECTIVES OF PHYSIATRY TRAINEES

Caitlin Cassidy¹, Nerissa Campbell², Mona Madady², Michael Payne¹

¹Western University, Department of Physical Medicine and Rehabilitation, ²Lawson Health Research Institute

Context: Physical Medicine and Rehabilitation may be an ideal specialty to care for adults with CP, who are currently underserved. *Objective:* The objective of this study was to describe attitudes and beliefs among Physical Medicine and Rehabilitation trainees about caring for this complex population. *Design/Setting:* The study was conducted through a survey. It was distributed to trainee (medical student, resident and fellow) members of the Canadian Association of Physical Medicine and Rehabilitation. *Results:* 59.4% of trainees reported having been exposed to less than 20 adults with CP in an outpatient setting, while 90.6% reported having seen less than ten adults with CP as inpatients. 71% plan to include adults with CP in their future practice. When asked to identify barriers to caring for adults with CP, over 50% of trainees reported a lack of mentorship and a perceived lack of interest in caring for this population among practicing physiatrists. *Conclusions:* There is a large population of adults with CP who are underserved, and initiatives to increase the services available to these patients are being developed across Canada. The results of this study demonstrate that physiatry trainees are largely open to becoming involved in the care of adults with CP. Efforts to increase trainee exposure to patients with CP and to increase mentorship in this area may have an effect on improving access to physiatric care for adults with CP in the future. *Key words:* cerebral palsy, education, medical, physical and rehabilitation medicine.

PMR – 108

EVIDENCE-BASED PHYSICAL EXAMINATION: THE QUADRANT TEST IN FACETOGENIC LOWER BACK PAIN

Jonathan C. L. Chia¹, K Ming Chan¹, Nigel Ashworth¹, Darren Gray², Dhiren Naidu¹

¹University of Alberta, ²University of British Columbia

Objective: To determine if the lumbar quadrant test (QT) is effective in diagnosing facetogenic chronic mechanical low back pain (CMLBP). *Design:* Single-blinded prospective cohort. *Setting:* Multidisciplinary chronic pain centre. *Participants:* Thirteen adult subjects (7 females and 6 males; age 45.7 years, SD 14.2; body mass index (BMI) 30.6, SD 8.6) with clinically diagnosed facetogenic CMLBP, referred for bilateral L4/L5 and L5/S1 medial branch blocks (MBBs). *Diagnostic Performance Evaluation:* The QT, consisting of lumbar extension, ipsilateral side bending and ipsilateral rotation was performed before and after MBBs. QT pain scores were recorded on a 10 cm visual analog scale (VAS). *Outcome Measure:* Percentage pain relief after MBBs. *Results:* Subjects' initial QT pain score, averaged between left and right sides (iQT), showed a significant positive correlation with percentage pain relief after MBBs (Pearson correlation 0.568,

$p=0.043$). Univariate analysis of variance showed that neither age, sex, nor BMI significantly influenced the outcome measure. Furthermore, the QT pain score decreased by 5.07 after MBBs (95% CI: 3.30–6.83; $p<0.001$). Using $\geq 8/10$ iQT pain as a positive test and $\geq 80\%$ pain reduction after bilateral MBBs as a successful response, we obtain a test sensitivity of 83.3% and specificity of 85.7%. However, because of the small sample size, chi-square did not reach significance ($\chi^2=2.236$, $p=0.135$). **Conclusions:** The QT is clinically useful in predicting facetogenic CMLBP. **Key words:** back pain, physical examination, zygapophyseal joint.

PMR – 109 AWARD WINNER

IS SELF-REPORT OF NEUROLOGICAL IMPAIRMENT AMONG PERSONS LIVING WITH CHRONIC SPINAL CORD INJURY SUFFICIENTLY ACCURATE FOR RESEARCH STUDIES?

B. Catharine Craven¹, Lisa Zeng¹, Farnoosh Farahani¹, Sander Hitzig²

¹Toronto Rehabilitation Institute-University Health Network, ²University of Toronto

Context: Self-reported impairment is commonly used in spinal cord injury (SCI) research studies (i.e., survey) or to prescreen individuals for clinical trial eligibility. Self-reported impairment is less intrusive than medical assessments or chart abstraction. **Objective:** We sought to determine the accuracy of self-reported neurological impairment among Ontarians with chronic SCI. **Design:** Accuracy study. **Participants/Setting:** Community-dwelling adults ($n=258$; 69% male), with chronic SCI (C1-T12 AIS A-D), age 24–85 years, mean 19.7 years post-injury. **Interventions:** Participants were read a lay description of the neurological level of injury (NLI) and ASIA impairment scale (AIS) categories from the International Standards of Neurological Classification of Spinal Cord Injury (ISNCSCI) via telephone survey. Participants were asked to select the most appropriate description of their impairment. Date of injury (DOI), etiology, NLI and AIS as per ISNCSCI obtained via self-report were cross-validated with medical charts. **Outcome Measures:** Cohen's kappa and intraclass correlation coefficient (ICC) statistics were used to calculate percent agreement between the survey and chart abstraction data. **Results:** Cohen's kappa for type, severity and cause of injury between the two data sources ranged from 0.738–0.992 (p -value <0.001). Patient self-report and medical record NLI, AIS scale and date of injury were compared using ICC (95% confidence interval, one-way random, absolute agreement) and were 0.896, 0.789 and 0.887, respectively, $p<0.001$. **Conclusions:** There is good agreement between the SCI patient's self-reported impairment and abstracted medical record data regarding type, severity, and cause of SCI, NLI, AIS and DOI. The observed level of agreement between impairment self report and chart abstraction among participants with a post secondary education is appropriate for ongoing use in observational surveys or prescreening research study subjects. **Key words:** self report, spinal cord injury, neurological impairment.

PMR – 110

EVALUATING PRACTICE PATTERNS IN THROMBOEMBOLISM PROPHYLAXIS IN ADULTS WITH SPINAL CORD INJURY: PRACTICE OF CANADIAN SPINAL CORD INJURY REHABILITATION PHYSIATRISTS

George Deng¹, Karen Ethans¹, Andrea Townson², Géraldine Jacquemin³, Christine Short⁴, Colleen O'Connell⁴, Karen Smith⁵, Sussan Askari⁵, Chester Ho⁶, Denise Hill⁷, B. Catharine Craven⁸

¹University of Manitoba, ²University of Vancouver, ³Université de Montréal, ⁴Dalhousie University, ⁵Queen's University, ⁶University of Calgary, ⁷University of Calgary, ⁸University of Toronto

Context: According to current practice guidelines presented in Chest Medicine in 2012, the Paralyzed Veterans Guidelines in 1997, and a review by Teasell in 2009, the practice for venous thromboembolism (VTE) prophylaxis in spinal cord injury (SCI) includes low molecular weight heparin in combination with a mechanical prophylaxis. These guidelines are based on research done in the late 1990s and early 2000s. No previous study has evaluated the practice of Canadian physiatrists on the use of VTE prophylaxis among patients with acute SCI. **Objective:** The objective of this study is to ascertain practice patterns of thromboembolism prophylaxis by Canadian SCI Rehabilitation Physiatrists in adults admitted to a spinal cord injury rehabilitation center. **Design:** A poll was distributed to Canadian SCI Rehabilitation Physiatrists through the “SCI Hallways”, an online forum for consultation between Canadian physiatrists. **Results:** A total of 10 physiatrists from eight of thirteen (62%) Canadian Spinal Cord Injury Rehabilitation units participated. All participants stated that their practice involved using low molecular weight heparin and a form of mechanical VTE prophylaxis initially for 8 to 12 weeks depending on the presence of additional VTE risk factors. **Conclusions:** Current Canadian practices match current guidelines for VTE prophylaxis in spinal cord injury. **Key words:** data collection, spinal cord injuries, venous thromboembolism.

PMR – 111

THE FAMILY CONFERENCE RATING SCALE: DELINEATING THE ESSENTIAL FAMILY CONFERENCE COMMUNICATION AND COLLABORATION SKILLS FOR HEALTH CARE PROFESSIONALS

Sue Dojeiji¹, Anna Byszewski², Tim Wood³, Meridith Marks¹

¹The Ottawa Hospital Rehabilitation Centre, ²The Ottawa Hospital Civic Campus, ³University of Ottawa

Context/Objective: There is a paucity of evidence-based literature on the essential communication and collaboration skills to guide health care teams in conducting and assessing their performance in the family conference (FC). The authors developed and validated a rating scale of team FC performance, the Family Conference Rating Scale (FCRS). **Design/Setting/Participants:** In phase 1, essential FC communication and collaboration skills were identified through a review of existing communication tools and literature on team functioning; a draft 34-item scale was developed. In phase 2, the scale was narrowed to a 6-item, 9-point scale with descriptors of expected behaviours through an iterative process: testing of the scale on 10 FC transcripts by two experts, soliciting feedback from a focus group of seven health care providers, and testing by non-experts on 49 live FCs. In phase 3, the revised scale was validated by 10 health care providers from different disciplines by rating three videos of FCs of variable quality. **Outcome Measures:** Validity evidence was collected through factorial analysis of variance assessing inter-video variation, and generalizability analysis for FRCS reliability and inter-rater reliability. **Results:** Raters were able to detect inter-video variation in FC quality. The reliability of the FCRS was 0.95 and the inter-rater reliability, 0.68. **Conclusions:** The FCRS will enhance the ability of health professions educators to teach and assess interprofessional patient-centred communication and collaboration competencies. **Key words:** rating scale, family conference, interprofessional team.

PMR – 112

LOW VITAMIN B12 IN PATIENTS UPON ADMISSION TO AN AMPUTEE REHABILITATION UNIT: A RETROSPECTIVE CHART REVIEW

Eric Earl

Schulich School of Medicine and Dentistry

Objective: To determine the prevalence of low vitamin B12 (VB12) in patients on admission to an amputee rehabilitation unit and identify specific populations at risk. **Design:** Retrospective chart review. **Participants:** 127 subjects comprised of patients with major lower limb amputations admitted to a Regional Amputee Rehabilitation Program between January 1, 2011 and December 31, 2012. **Methods:** Electronic medical records were reviewed for demographic data, amputation data, medication history, serum VB12 levels and other related blood work. A literature-based cutoff of VB12 <260 pmol/L was used. **Results:** The prevalence of low VB12 was 59.8%. Serum VB12 levels were significantly lower among patients 55 years and older ($p<0.05$), and among patient with a mean corpuscular volume >97 fL ($p<0.01$). Patients 55 years and older were found to have an increased prevalence of low VB12 ($p=0.05$). No other differences in prevalence were determined among different demographics, etiologies or comorbidities. **Conclusions:** Patients with an amputation have a much higher prevalence of low VB12 levels compared to the general population. Low VB12 status may impact rehabilitation outcomes through anemia, cognitive decline, and neuropathy. No reliable indicators for which patients should be screened were found and therefore a universal approach to screening and treatment is needed. **Key words:** vitamin B 12, rehabilitation centre, mass screening.

PMR – 113

FACTORS ASSOCIATED WITH RETURN-TO-WORK FOLLOWING WORK-RELATED FOOT AND ANKLE INJURIES

Rajiv Gandhi, Amelie Yak, Sandra Wong, Andrea Veljkovic, Johnny Lau

Altum Health, University Health Network

Context/Objective: Sick leave following workplace foot and ankle injury is a major challenge as it is costly, negatively impacts workplace productivity and can lead to loss of self-esteem and stress in family relationships. Our study examined the association between modifiable factors and return-to-work (RTW) among injured workers. **Design:** Retrospective cohort study. **Setting:** A multidisciplinary foot and ankle treatment program in Ontario, Canada. **Participants:** The study included 88 injured workers discharged between October 2010 and July 2013 with 73% being male at a mean age of 47 years. Only clients that were not working at intake were included in our study. **Outcome Measures:** Relevant covariates, including demographic data, time from injury and functional scores were recorded. Our primary outcome, RTW, was assessed at 3 months follow-up. Logistic regression was used to identify those factors associated with a successful RTW. **Results:** By 3 months post-treatment discharge 28 (32%) of the clients were able to RTW. Logistic regression revealed that a shorter time since injury was the only variable in our study that was significantly associated with RTW at 3 months follow-up ($p<0.05$). Age, gender, level of education, LEFS, PCS and PHQ-9 scores at intake were not significantly associated with RTW. **Conclusions:** Time from injury to referral for treatment is a strong predictor of vocational outcome following treatment. Workers compensation boards should refer foot and ankle injured workers to treatment programs as early as possible to achieve a more successful RTW. **Key words:** return to work, lower extremity, vocational rehabilitation.

PMR – 114

SPASTICITY HEALTH LITERACY AMONG CANADIAN FAMILY PHYSICIANS

Joshua Goldstein, Chetan Phadke, Farooq Ismail, Chris Boulias

West Park Healthcare Centre

Context/Objective: A previous survey of family physicians in Ontario showed deficiencies in recognizing spasticity and knowledge of treatments. The current study assessed spasticity related literacy

among family physicians across Canada and if the literacy was related to gender, Canada versus international medical training, and years of experience among family physicians. **Design:** This study was a cross-sectional online survey, using the web portal fluidsurvey.com. Survey was sent via email to 2,795 family physicians across Canada. A French translation of the survey was sent to those located in Quebec. **Results:** Out of the 2,795 emails sent to physicians, 564 emails bounced or were incorrect. Out of the 2,231 emails successfully sent, 111 completed the online questionnaire (5.0% response rate). Response rate was similar across provinces. Eighty-four of the respondents were Canada-trained, while 27 were internationally-trained. Only 24.5% of all respondents were able to correctly identify the definition of spasticity and 32.4% felt adequately trained to recognise spasticity in the community. Results indicated that Canada-trained physicians were 2.6 times more likely than internationally-trained physicians to correctly identify the treatment for focal spasticity. Furthermore, Canada-trained physicians were 2.3 times more likely than internationally-trained physicians to identify the correct treatment for generalised spasticity ($p<0.05$). Gender and years of experience did not influence any answers. **Key words:** muscle spasticity, botulinum toxins, family physicians.

PMR – 115

THE DEVELOPMENT OF A CLINICAL PRACTICE GUIDELINE FOR THE DIAGNOSIS AND MANAGEMENT OF NEUROPATHIC PAIN FOLLOWING SPINAL CORD INJURY

Stacey Guy¹, Mehta Swati², Joanna Gorski³, Colleen O'Connell⁴, Patrick Potter⁵, Andrea Townson⁶, Eldon Loh⁷, CPG Working Group⁸

¹Lawson Health Research Institute, ²Lawson Health Research Institute, Western University, ³Prescriptum Healthcare Communications Inc., ⁴Dalhousie University, ⁵Western University, ⁶University of British Columbia, ⁷Western University

Context/Objective: Evidence-based management of neuropathic pain (NP) following spinal cord injury (SCI) continues to present a challenge. We are in the process of developing the first Canadian clinical practice guideline for the screening, diagnosis and management of NP for rehabilitation in persons with SCI. **Design:** Two-year project with a modified GRADE approach. **Setting:** Canadian rehabilitation centre focus. **Participants:** Steering Committee, Working Groups, methodologist, external stakeholders. **Interventions:** An extensive literature review was conducted. Subject matter experts were identified and invited to form an international Working Group. This Group will form recommendations by identifying areas of interest, evidence evaluation and panel consensus. External stakeholder review will occur. Guideline dissemination will take various forms depending on the audience. **Outcome Measures:** Alignment with AGREE. **Results:** The Working Group was formed ($n=23$), consisting of physiotherapists (2), neurologist (1), neurosurgeon (1), SCI consumer (1), physiatrists (7), nurse (1), psychologists (2), research scientists (7), and healthcare administrator (1). Eight questions pertaining to areas of interest were developed. A modified GRADE approach was used to assess evidence which will inform recommendation development. Three groups of experts reviewed the evidence in a first meeting. Recommendations continue to be developed; these will be presented to the full panel for consideration. **Conclusions:** The initial phase of development suggests these guidelines will be a useful tool for clinicians who manage persons with central NP after SCI. The Working Group will next draft recommendations to present to the full panel for consensus; guideline completion is expected in early 2015. **Key words:** practice guideline, pain management, spinal cord injuries.

PMR – 116

PROTOTYPE OF WIRELESS ENABLED PRESSURE SENSING LAYER TO PREVENT ULCERS IN PATIENTS WITH SPINAL CORD INJURY

Ed Hanada, Shuqin Li, Ruihang Wang, Mengjie Yang, Jingjing Zhang*Dalhousie University/Capital District Health Authority/Nova Scotia Rehabilitation Centre¹, Dalhousie University*

Context: About one third of persons with spinal cord injury living in the community are reported to have pressure ulcers, which may require lengthy hospitalizations and substantial costs. **Objective:** To develop an economical prototype pressure sensing layer that can alert users wirelessly on their smart phone of high sustained pressure to prevent ulcer formation. **Methods:** A 40 cm × 40 cm pressure sensing layer was created, that consisted of 80 resistive sensor strips that passed voltage to 16 analog multiplexers. The signals were then processed through an analog to digital converter and passed onto a microcontroller. The system recorded pressure readings and cumulated time for each sensor, and allowed for comparison to a threshold value. The pressure data was plotted in 2D and 3D mapping views through MATLAB. The controller would wirelessly send notifications of high pressure values that were sustained for greater than 15 minutes that exceeded a predetermined threshold value to an Android phone through Bluetooth. **Results:** Multiple trials of pressure values from able bodied persons sitting on the sensing layer were successfully sent from the controller and mapped without delay. High pressure areas were color coded and mapped to location. Areas of sustained high pressure were successfully communicated via Bluetooth to the smart phone. **Conclusions:** An economical (<\$350 total cost) pressure sensing and mapping system with wireless communication to a smart phone was successfully designed and built, and has high potential for providing a means for preventing pressure ulcers in persons with spinal cord injury. **Key words:** pressure sensor, ulcer prevention, spinal cord injury.

PMR – 117**EVALUATION OF HEALTH UTILITY IN PATIENTS RECEIVING ONABOTULINUMTOXINA (BOTOX) FOR THE TREATMENT OF ADULT FOCAL SPASTICITY: RESULTS FROM MOBILITY, A PROSPECTIVE OBSERVATIONAL COHORT STUDY****Farooq Ismail¹, Theodore Wein², Meetu Bhogal³, Grace Trentin⁴***¹Westpark Healthcare Centre, ²McGill University, ³Allergan, Inc., ⁴Allergan, Inc.*

Context: OnabotulinumtoxinA (onabotA) has been approved in Canada since 2001 for the management of adult focal spasticity (AFS). Many studies have reported on the clinical efficacy of onabotA, but patient-reported outcomes (PRO) data is limited. **Objective:** MOBILITY evaluates health utility (HU) related to the clinical use of onabotA across several indications including AFS. **Design:** Multi-center, observational study collecting PROs in patients initiating (naive) or receiving ongoing (maintenance) onabotA treatment. HU was the primary outcome measure obtained from the SF-12 Health Survey using the SF-6D, collected at baseline, week 4 post-treatment and up to 5 subsequent injection visits. **Results:** 440 patients with AFS (mean age, 52.7 yrs) were enrolled in MOBILITY. The most common etiologies reported were stroke ($n=222$), multiple sclerosis (MS; $n=61$) and spinal cord injury (SCI; $n=45$). Eighty-seven percent (86.8%) of patients were Caucasian, 50.2% female and 39.8% were naive to treatment. Highest mean baseline HU scores were in traumatic brain injury patients (0.655) vs. stroke (0.634), SCI (0.604), and MS (0.589). Improvements in HU scores from baseline were seen in all cohorts across all visits. Baseline scores were generally higher in maintenance vs. naive; however, mean changes from baseline were greatest in naive patients. The AFS cohort reported 37 adverse events in 21 patients; 16 (43.2%) were serious and 17 (45.9%) considered unrelated to treatment. **Conclusions:** MS patients have the lowest HU scores compared to patients with other neurological lesions. OnabotA treatment

can improve HU over time in patients with focal spasticity due to various etiologies. **Key words:** muscle spasticity, botulinum toxin, type A, health surveys.

PMR – 119**THE IMPORTANCE OF PHYSICAL ACTIVITY AND PEER RELATIONSHIPS FOR THOSE LIVING WITH TRAUMATIC SPINAL CORD INJURY IN SASKATCHEWAN****Gary Linassi¹, Marla Rogers¹, Darren Nickel¹, Donna Goodridge¹, Laura Klassen¹, Bonnie Jeffery², Katherine Knox¹, Arlene Brandt³, Daryl Fourney¹, Hyun Lim¹, Luc Noreau⁴***¹University of Saskatchewan, ²University of Regina, ³Saskatoon Health Region, ⁴Universite Laval*

Objective: To identify health and wellness benefits of physical activity as perceived by those with traumatic spinal cord injury (tSCI). **Design:** Basic interpretive descriptive study. **Setting:** Saskatchewan, Canada. **Participants:** Adults with tSCI. **Outcome Measures:** Qualitative interview. **Results:** Participants were asked about their experiences of living with tSCI in Saskatchewan, including changes that have occurred since their injury. Twenty-three adults released their transcript for analysis. Although most reflected on the physiological changes since the time of their injury, many discussed their involvement in wheelchair sport, including rugby, sledge hockey, and shooting. Others mentioned positive experiences with leisure physical activity, including hand-cycling, kayaking, or sailing. Participants reported engaging in these activities in order to improve health and build strength. Others engaged in physical activity to provide focus and relieve stress. In some cases, wheelchair sport also included opportunities for travel. An emphasized benefit was added peer support, which provided learning opportunities for adapting to injury. Barriers to participating in physical activity included the cost of the equipment, lack of accessible equipment at fitness facilities, living in a rural area where activities are not offered, and difficulties with the built-environment. Neuropathic pain was a barrier to both physical activity and peer support. **Conclusions:** Much like the general population, persons with tSCI report engaging in structured and unstructured physical activity do so to improve their health and mental wellness. However, engagement in physical activity also facilitates peer support. Further research is needed to test interventions to increase physical activity. **Key words:** spinal cord injuries, exercise, peer group.

PMR – 120**NEEDS AND HEALTHCARE UTILIZATION IN SPINAL CORD INJURY: A COMPARISON OF SASKATCHEWAN AND NATIONAL FINDINGS FROM THE SPINAL CORD INJURY COMMUNITY SURVEY****Gary Linassi¹, Marla Rogers¹, Luc Noreau², Darren Nickel¹, Katherine Knox¹, Donna Goodridge¹, Laura Klassen¹, Bonnie Jeffery³, Arlene Brandt⁴, Daryl Fourney¹, Hyun Lim¹***¹University of Saskatchewan, ²Universite Laval, ³University of Regina, ⁴Saskatoon Health Region*

Objective: To describe needs and healthcare utilization of those with traumatic spinal cord injury (tSCI) living in Saskatchewan (SK), and compare to the rest of Canada. **Design:** Online survey. **Setting:** Canada. **Participants:** Seventy-four adults living with tSCI from SK and 1,052 from the rest of Canada. **Outcome Measures:** National Spinal Cord Injury Community Survey. **Results:** Respondents from SK did not differ significantly from those across Canada in terms of age, gender, ethnicity, or living arrangements. There were more

transportation-related injuries in SK (65% vs. 53%, $p=0.009$). For all respondents, the most important needs were identified as equipment/technologies, accessible housing and income support. More SK respondents had their equipment/technology needs (50% vs. 31%, $p=0.014$) and their accessible housing needs (50% vs. 45%, $p=0.001$) completely met. Fewer SK respondents placed high importance on SCI-specialized and general healthcare ($p<0.001$). About one quarter of respondents from SK (26%) and beyond (27%) indicated that there was a time they felt they needed care in the past 12 months but either did not access or receive it. The most commonly accessed healthcare providers were family physicians and occupational therapists for all respondents. Those from outside of SK accessed urologists ($p=0.037$) and wound care specialists ($p=0.010$) more frequently than those from SK. **Conclusion:** While there are some differences between those in Saskatchewan versus the rest of Canada, it is clear that many adults with tSCI have unmet needs and that the systems addressing those needs have room for improvement. **Key words:** spinal cord injuries, utilization, needs assessment.

PMR – 121 AWARD WINNER

IMPACT OF INCREASED PROSTHETIC WEIGHT ON GAIT SYMMETRY IN DYSVASCULAR TRANSFEMORAL AMPUTEES: A RANDOMIZED PROSPECTIVE DOUBLE-BLIND CROSSOVER TRIAL

Beverly Moylan¹, Ruby Paner², Tim Pauley², Steven Dilkas², Michael Devlin²

¹University of Toronto, ²West Park Healthcare Centre

Context: The trend in the prosthetic industry is towards the use of lightweight prostheses. Lighter components are more expensive, however, a lighter prosthesis does not improve the metabolic cost of ambulation for a transfemoral amputee. One study showed more than half of participants preferred a weighted prosthesis, with no adverse effect on self-selected walking speed. **Objective:** The purpose of this study was to determine the impact of increased prosthetic weight on gait symmetry, as well as weight preference, in dysvascular transfemoral amputees when comparing across three mass conditions. **Design:** A randomized prospective double-blind crossover trial. **Setting:** A university affiliated community rehabilitation hospital. **Participants:** Ten dysvascular unilateral transfemoral amputees. **Intervention:** Three visually identical weights of 150 g (placebo weight), 770 g, and 1,625 g were added independently to each participant's prosthesis. **Outcome Measures:** Gait asymmetry was assessed using the GAITRite walkway, and subject preference was recorded. **Results:** Repeated-measures analysis of variance of direct GAITRite spatiotemporal measures showed no differences across prosthetic mass conditions. However, there was a statistically significant difference in the calculated secondary measure of degree of asymmetry in step width, with the heaviest condition imparting greatest symmetry. Ninety percent of subjects preferred the weighted prostheses. **Conclusions:** Short-term increases in prosthetic weight do not adversely impact direct spatiotemporal gait measures in dysvascular transfemoral amputees. However, the heaviest weight brought gait width closer to parity, which is the ideal outcome. In addition, most subjects preferred a heavier prosthesis. These results do not support a shift towards lighter prostheses in dysvascular transfemoral amputees. **Key words:** amputees, prostheses and implants, gait.

PMR – 122

PILOT TESTING OF AN ELECTRONIC TABLET WAITING ROOM QUESTIONNAIRE FOR PEOPLE WITH AMPUTATIONS

Michael Payne¹, Eric Earle², Ricardo Viana¹, Ben Esposito¹, Barry Deathe¹

¹Dept of PM&R, Western University, ²Schulich School of Medicine and Dentistry

Context: There are advantages to using electronic data collection for patient care, program review, and research. Comorbidities causing sensory, visual, and cognitive impairment are common among people with amputations, and may present some unique challenges to the use of technology in a tablet computer format. **Objective:** To determine the feasibility and patient comfort with a tablet-based questionnaire in an outpatient amputee rehabilitation clinic compared to a traditional paper-based questionnaire. **Design:** Convenience sample of 48 patients (age range 19–91) with major extremity amputations returning to a tertiary care centre amputee rehabilitation clinic completed both tablet and paper questionnaires, followed by a semi-structured interview. Patients had highly varied prior tablet/smartphone and internet/email experiences. **Results:** 20.5% of patients needed hands-on assistance completing the paper questionnaire compared to 20.8% for the tablet. Age was positively correlated with completion times of both the tablet ($r=0.588$, $p=0.001$) and paper ($r=0.525$, $p<0.001$) questionnaires. No gender differences were found in any of the studied parameters. Only 1 person indicated that he/she was uncomfortable with the use of a tablet in future visits. **Conclusions:** This pilot study of electronic tablet-based questionnaires demonstrates excellent acceptance by patients with amputations in an outpatient clinic setting. While there were differences in the questionnaires used, patients reported a preference for using tablets. Assistance rates were identical for both tablet and paper. Tablet use for patient questionnaires poses significant advantages over paper questionnaires and should be further explored. **Key words:** amputees, computers, questionnaires.

PMR – 123

ANALYSIS OF CANADIAN PHYSICAL MEDICINE AND REHABILITATION SPECIALISTS

Mohan Radhakrishna¹, Lalith Satkunam², Lori Gray²

¹McGill University, ²University of Alberta

These are the results of an online survey for practicing physical medicine and rehabilitation (PM&R) specialists. In this survey many domains of practice were assessed both clinical and administrative. There are an estimated 385 physiatrists practicing in Canada. This survey was begun by 168 and completed by 119. Seventy-nine percent were in full-time practice. Sixty percent were male. Fifty percent had completed a fellowship and 94% had passed the Royal College of Physicians and Surgeons of Canada PM&R examination. Electrodiagnostic medicine (EMG) certification was achieved even in full-time practice. Sixty percent were male. Fifty percent had completed a fellowship and 94% had passed the Royal College of Physicians and Surgeons of Canada PM&R examination. Musculoskeletal ultrasound has become increasingly popular in clinical medicine and research. Twenty-seven percent indicated using this modality with half of these certified within the last 10 years. **Key words:** demography, physical medicine and rehabilitation, physician's practice patterns.

PMR – 124

IMPAIRED PERCEPTION OF ANGER AND SADNESS IN INDIVIDUALS WITH SPINAL CORD INJURIES

Jennifer Salter¹, Stephen Smith², Karen Ethans¹

¹University of Manitoba, ²University of Winnipeg

Context: Numerous studies have identified emotion-specific deficits resulting from focal brain damage. **Objective:** The purpose of the current study was to examine whether impairments in the recognition of specific facial expressions of emotion could also result from damage to the spinal cord. Such a finding would be consistent with the view that ascending information from the body modulates emotional experiences. **Design:** Thirty-six individuals with complete (ASIA-A classification) spinal cord lesions and 36 matched healthy controls completed an emotion recognition test. Participants viewed photo-

graphs of faces expressing happiness, fear, sadness, anger, disgust, surprise, and no emotion, and were asked to verbally indicate which emotion was being displayed. *Results:* The individuals with spinal cord injuries (SCIs) were less accurate at identifying emotional expressions than were controls. Specific impairments were noted for the recognition of anger and sadness. The level of the SCI did not affect results. *Conclusions:* These data suggest that feedback from the body projected via the spinal cord influences the perception of some emotional expressions, and that disruption of these projections can produce emotional impairments in individuals with SCIs. *Key words:* spinal cord, emotions, expression.

PMR – 125

ASSESSMENT OF SEX DIFFERENCE IN BASELINE COGNITION OF ELITE ATHLETES USING THE MONTREAL COGNITIVE ASSESSMENT TOOL

Joan Stilling¹, Brian Benson^{1,2}, Sean Dukelow^{1,3,4}, Chantel Debert^{1,3,4}

¹Faculty of Medicine, University of Calgary, ²Canadian Sport Institute Calgary, ³Division of Physical Medicine and Rehabilitation, ⁴Department of Clinical Neurosciences, University of Calgary

Objective: To show the feasibility of using the Montreal Cognitive Assessment Tool (MoCA) to evaluate baseline cognition in a group of elite athletes, and to compare sex difference in baseline MoCA scores in athletes participating in collision/contact sports compared to athletes in non-contact sports. *Design:* Baseline case series of normative data. *Setting:* Sport Medicine Clinic at the University of Calgary, Alberta, Canada. *Participants:* Male and female athletes ($n=219$ and 139 , respectively) were recruited from the college, varsity and Canadian National sports teams. Standardized interviews and physical examinations (done by a physician) were performed on the athletes from football, hockey, soccer, rugby, basketball, wrestling, alpine skiing, bobsled, skeleton, luge, speed skating, field hockey, track & field and volleyball. *Interventions:* A baseline pre-season MoCA test was performed and biographical information gathered from participants. *Outcome Measurements:* The MoCA, a cognitive assessment tool, was used to assess outcome. The test is scored out of 30 points (mild cognitive impairment ≤ 26). *Results:* All subjects had an education level of grade 12 or greater. The average age was 23.4 ± 3.4 . The overall mean MoCA score for males was 26.1 ± 2.1 and was 26.9 ± 2.2 for females, producing a statistically significant difference ($p=0.0015$, Mann-Whitney U test). When independently assessing contact and non-contact sports, there was a significant difference between males and females in contact sports ($p=0.016$, Mann-Whitney U test). This was not the case for males vs. females in non-contact sports ($p=0.1892$, Mann-Whitney U test). *Conclusions:* The MoCA can be used to assess baseline cognition in the elite athletic population. There was a significant sex difference in all athletes and contact/collision sport athletes in baseline MoCA scores. This could be explained by males sustaining more subconcussive injury than females and anatomical or cognitive differences, however reasons for sex difference on MoCA score should be further evaluated. *Key words:* brain injuries, data collection, sex characteristics.

PMR – 126

EVALUATION OF THE QUALITY OF WRITTEN FEEDBACK ON CANMEDS DAILY ENCOUNTER FORMS IN PM&R RESIDENCY TRAINING

Ricardo Viana¹, Keith Sequeira¹, Thomas Miller², Michael Payne¹

¹Parkwood Hospital - St. Joseph's Health Care London, ²Parkwood Hospital/Mount Hope - St. Joseph's Health Care London³

Context: A single page "Daily Encounter Form" (DEF) was developed for our residency program in an attempt to foster reflective practice and awareness of CanMEDS competencies in clinical practice. Comments for "Strengths" and "Areas for Improvement" related to the encounter were requested for formative feedback. *Design:* Retrospective review of evaluations completed for PM&R residents from December 2010–December 2013. Feedback was separately coded and categorized by the authors and reviewed for agreement. The written feedback for each "Strengths" and "Areas for Improvement" were subdivided and coded to one of four quality ratings: *i*) none, *ii*) general comment, *iii*) specific example(s) and *iv*) specific suggestion(s). *Results:* 192 DEFs were completed from December 2010–December 2013. PM&R consultants completed 87.5% of the forms, with the remainder completed by off-service consultants, trainees or allied health members. 67.7% of the forms were discussed and signed on the day of the encounter. On average 2.2 competencies were highlighted with each encounter. Specific strengths were identified in 53.2% and general strengths in 45.8%. Regarding Areas of Improvement, 38% of the forms included a specific example or suggestion for improvement while 43.8% provided no suggestions. *Conclusions:* DEFs facilitate assessment of CanMEDS competencies in the clinical environment. While the ratings suggest that there are missed opportunities for providing feedback regarding areas for improvement, it is possible that specific formative feedback was provided despite not being explicitly recorded. Complete and constructive reports are encouraged as trainees may access these throughout residency for reflection and assessment of performance. *Key words:* postgraduate, CanMEDS, reflective practice.

PMR – 127 AWARD WINNER

MRI MORPHOMETRIC HIP COMPARISON ANALYSIS OF ANTERIOR ACETABULAR LABRAL TEARS

Aly Abdel-Rahman, MD, FRCPC, CSCN Diplomate (EMG)

HealthPointe Medical Center, University of Alberta

Objective: Anterior (3-o'clock) acetabular labral tears (AALTs) have been reported to be associated with iliopsoas impingement (IPI). However, no study has examined the association between anatomic bony variables of the hip joint and AALTs. The purpose of this study was to evaluate the association between AALTs, femoroacetabular impingement (FAI) and other bony variables of the hip. *Material and Methods:* Seventy-six out of 274 hip MRI records met the inclusion criteria. Two independent blinded investigators evaluated the location of acetabular labral tears (ALTs), edema at the musculotendinous junction of the iliopsoas insertion, femoral neck anteversion angle, femoral neck shaft angle, acetabular anteversion angle, alpha angle, lateral central edge angle (LCEA), acetabular index and acetabular depth. Comparison analyses between groups were performed. *Results:* Twenty-two patients had no ALTs (controls), 19 patients had AALTs, and 35 patients had ALTs not isolated at the 3-o'clock position (25 with cam-bony deformities [FAI-Cam] and 10 with pincer-bony deformities [FAI-Pincer]). The alpha angle mean was significantly higher ($p<0.001$) in FAI-Cam group (62.7° , 95% confidence interval [CI]: 56.2° – 69.2°) compared to AALTs group (46.9° , 95% CI: 40.1° – 53.7°). The LCEA mean was significantly higher ($p<0.001$) in FAI-Pincer group (41.9° , 95% CI: 39.3° – 44.5°) compared to AALTs group (29.4° , 95% CI: 24.2° – 34.6°). There was no statistically significant difference in any of the bony variables between the controls and AALTs group. *Conclusion:* Our study demonstrated that AALTs are pathologically distinct and not associated with FAI or other bony abnormalities. This supports the previous studies, which proposed that AALTs are associated with IPI. *Key words:* magnetic resonance imaging, magnetic resonance arthrography, iliopsoas tendon, femoroacetabular, impingement.

SYSTEMATIC REVIEWS

PMR – 128

DOES IMAGING GUIDANCE IMPROVE PATIENT OUTCOME FOLLOWING CORTICOSTEROID INJECTIONS OF THE SHOULDER?*Steven Macaluso, Katherine Salter**Western University*

Context: Use of corticosteroid injection is associated with small to modest short-term gain in function and pain reduction. Use of ultrasound guidance (USG) may improve accuracy of shoulder injection significantly; however, it is uncertain whether USG-guided injection is associated with improved patient outcomes. *Objective:* To examine current evidence to determine whether USG-guided injection is associated with improved patient outcomes and reduced risk for adverse events compared to landmark-guided injection. *Method:* Multiple electronic databases were searched (January 2008–June 2013). Searches were limited to previously-published systematic reviews and meta-analyses examining the use of USG-guided injection and including the assessment of pain and function. The AMSTAR tool was used to assess methodological quality of identified reviews. *Results:* Following removal of duplicates, 4 systematic reviews (3 meta-analyses) were identified for inclusion. AMSTAR scores ranged from 5 to 9. The most recent meta-analyses identified ≤ 6 studies (≤ 3 RCTs) evaluating the impact of accuracy on patient outcomes. Pooled analyses demonstrated a small reduction in pain associated with USG (6-weeks post-injection); however, these analyses were statistically heterogeneous. Compared to landmark guidance, USG injection was not associated with clinically significant improvements in function or range of motion. There were no significant between group differences in adverse events noted. *Conclusions:* There have been few well-designed RCTs that examine the impact of increased injection accuracy on patient outcomes and reviews report little information regarding the use of specific techniques and/or approaches that may influence clinical effectiveness. Further investigation is warranted. *Key words:* injection, corticosteroid, shoulder.

PMR – 129 AWARD WINNER

NUTRITIONAL SUPPLEMENTATION FOR KNEE OSTEOARTHRITIS*Steven Macaluso, Katherine Salter, Ranita Manocha,**Cristina Batey**Western University*

Context: Osteoarthritis (OA) of the knee is a common condition which has considerable impact on patients' quality of life and function. There is increasing interest by patients in the use of nutritional supplements. We looked at the research to see if there is any evidence to help guide use of these supplements for osteoarthritis. *Methods:* Relevant systematic reviews in English published 2008–2013 were extracted from PubMed, SCOPUS, and Web of Science databases. Articles were assessed for methodological quality using the 11-item AMSTAR system by two independent reviewers. Based on research quality, strength of results and clinical availability, the intervention was then assigned a level of recommendation. *Results:* Nine systematic reviews met the inclusion criteria and examined various interventions including glucosamine, chondroitin, S-Adenosylmethionine, Dimethyl sulfoxide and methylsulfonylmethane (DMSO/MSM), collagen derivatives, and Avocado-soybean unsaponifiables. Glucosamine alone significantly reduced pain scores, but did not meet clinical significance. No significant differences in pain or function were identified when comparing collagen to placebo. Supplementation with avocado-soybean unsaponifiables significantly reduced pain scores and improved function in one systematic review. Pain was reduced with DMSO/MSM when compared to placebo but this was nullified with a random effects

analysis. S-Adenosylmethionine had a non-significant impact on pain or function. *Conclusions:* There is a wide range in the quality of data for nutritional supplements for knee OA, with most high quality data in favour of glucosamine and avocado-soybean for reduction of pain. Data on collagen derivatives, DMSO/MSM and S-Adenosylmethionine comes from poor quality limited evidence. *Key words:* osteoarthritis, supplement, nutrition.

PMR – 130

CLINICAL REVIEW OF ACUPUNCTURE FOR NON-TRAUMATIC SHOULDER PAIN*Steven Macaluso, Ranita Manocha, Katherine Salter,**Cristina Batey**Western University*

Context: Non-traumatic shoulder pain is a common problem that can result in significant morbidity. Common etiologies include rotator cuff dysfunction, glenohumeral osteoarthritis, and adhesive capsulitis. Acupuncture is increasingly being used in musculoskeletal conditions to improve pain and function. We review the quality and outcomes of systematic reviews addressing acupuncture for non-traumatic shoulder pain. *Methods:* Relevant systematic reviews in English published 2008–2013 were extracted from PubMed, SCOPUS, and Web of Science databases. Articles were assessed for methodological quality using the 11-item AMSTAR system by two independent reviewers. Based on research quality, strength of results and clinical availability, the intervention was then assigned a level of recommendation. *Results:* Four (4) systematic reviews met the inclusion criteria and addressed acupuncture for pain, range of movement, and function. AMSTAR scores ranged from 5 to 9.5 out of 11. Overall acupuncture may be beneficial for shoulder pain but may not improve range of motion or function at 6 months. *Conclusions:* Although the quality of most studies of acupuncture for shoulder pain are poor, there are several systematic reviews of moderate quality. While the evidence is not strong it favours acupuncture having a small benefit on non-traumatic shoulder pain. *Key words:* acupuncture therapy, review, systematic, shoulder pain.

PMR – 131

TOILETING: A NEGLECTED TOPIC IN ADULT REHABILITATION POPULATIONS. A CLINICAL REVIEW*David Yachnin¹, Hillel Finestone², Jeffrey Jutai³**¹Bruyère Research Institute, ²Elisabeth Bruyère Hospital, Bruyère Research Institute, ³University of Ottawa*

Context: The ability to toilet independently is critical to dignity and self-esteem. Rehabilitation patients' reduced balance and arm mobility can impair their ability to safely and independently toilet themselves – i.e., defecate, urinate and clean the perianal/urethral regions. Discharge home after a rehabilitation stay may depend on the ability to perform these functions independently. The purpose of this review was to synthesize the available information on toileting in rehabilitation populations and identify gaps in research concerning this neglected area. *Methods:* The following databases were searched for articles on toileting in adult rehabilitation populations: Cochrane Library, Ageline, CPIO, CINAHL, Medline and PubMed. *Results:* Studies on toileting were found in populations with chronic low-back pain, hip fracture, rheumatoid arthritis, amputation, multiple sclerosis, stroke, traumatic brain injury, Parkinson's disease, spinal cord injury and dementia. The review was divided into 1) causes of toileting impairment (physical vs. cognitive disability) (17 studies), 2) measurement of toileting performance (degree of cleanliness, need for assistive devices) (8 studies), 3) consequences of impairment (7 studies) and 4) interventions to enhance toileting independence (5 studies). Physical disabilities predominated over

cognitive ones. No dedicated measures for toileting were found, but the FIM, a universally accepted measure of burden of care, has a toileting component. Both patients and health care professionals are embarrassed to discuss toileting, and affected patients feel distress

and loss of dignity. *Conclusions:* Although toileting impairment is a barrier to achieving independence, the rehabilitation literature on this topic is sparse. Currently available technologies may be effective toileting adjuncts. *Key words:* toileting, rehabilitation, disability.

CASE REPORTS

PMR – 132

TRANSHUMERAL AMPUTATION FOR COMPLEX REGIONAL PAIN SYNDROME- TYPE 2: CASE REPORT

Kshitij Chawla, Amarjit Arneja

University of Manitoba

Context: There is lack of evidence regarding the benefits, patient outcomes and recurrence in patients with Complex Regional Pain Syndrome (CRPS) undergoing amputation. Patients with long-standing and therapy resistant CRPS may find benefit from amputation but recurrence risk is still reported high. *Findings:* A 44-year-old man involved in motor vehicle accident sustained open comminuted fractures of left radius and ulna. Few weeks after surgical management of the fractures he reported constant burning pain through left arm, grading 10/10 on verbal Numeric Rating Scale. Physical examination revealed edema, erythema, and changes in nail and hair growth patterns. Decreased passive ROM in all directions at wrist and elbow. There was numbness over the ulnar aspect of forearm and hand. Wrist extension <3/5. MCP extension <3/5. Flicker with finger abduction. Electro diagnostic study concluded severe injuries to ulnar and radial nerve below the elbow. After consultation with Pain clinic and Physiatry, he was diagnosis with CRPS Type 2. Multiple treatment options were discussed, including neuropathic pain medications, physiotherapy and interventional blocks. High risk of recurrence with amputation was explained. However, the patient insisted on amputation and after consult with Plastic Surgery he underwent transhumeral amputation. The patient persisted to have CRPS and severe limb pain and did not tolerate prosthesis. *Conclusion/Relevance:* The patient underwent amputation within 5 months of being diagnosed with CRPS type-2 and refused any conservative treatments. His symptoms continued to persist resulting in a difficult rehabilitation course. *Key words:* causalgia, complex regional pain syndromes, amputation.

PMR – 133

RADIATION-INDUCED MYELOPATHY AND AUTONOMIC FAILURE

Priya Dhawan, Brent Goodman

Mayo Clinic

Context: Clinical, radiographic, and autonomic nervous system test findings are described in a case of progressive autonomic failure resulting from a radiation-induced cervico-thoracic myelopathy. *Findings:* A 22-year-old female was referred to our institution for evaluation of progressive autonomic failure. She was diagnosed 3 years prior with thoracic region Hodgkin lymphoma; treated initially with chemotherapy, followed by autologous stem cell transplantation, and ultimately external beam radiation to the neck and chest. Several months later she developed ascending lower limb numbness and weakness, eventually becoming paraparetic. MRI studies demonstrated extensive, confluent T-2 signal change involving the cervical and thoracic spinal cord, and ultimately she was diagnosed with a radiation-induced myelopathy. Several months later she developed recurrent syncope and near-syncope, and a pacemaker was placed without benefit. Her neurological examination revealed a spastic paraparesis with a T4 sensory level. Autonomic testing

revealed intact postganglionic sympathetic sudomotor function, marked cardiovagal impairment, and cardiovascular adrenergic failure with orthostatic hypotension on tilt-table testing. Symptomatic stabilization was achieved following the initiation of fludrocortisone and midodrine. *Conclusion/Relevance:* Myelopathy is an uncommon complication of radiation to the neck and thorax. Progressive autonomic dysfunction, resulting in cardiovagal, genitourinary, and cardiovascular adrenergic failure has not been well characterized in radiation-induced myelopathy. Timely recognition of this condition will facilitate implementation of potentially beneficial symptomatic treatment and avoidance of unnecessary diagnostic tests and treatments. *Key words:* myelopathy, autonomic failure, radiation.

PMR – 134

PROPRIOCEPTIVE BRACING DURING INPATIENT REHABILITATION FOR ATAXIA AND BALANCE IMPAIRMENT FROM OSMOTIC DEMYELINATION SYNDROME AND SENSORY NEURONOPATHY: A CASE SERIES

Sogool Kachooie¹, Cristina Batey¹, Michael Payne¹, Leanne Brady², Sarah Dunford², Thomas Miller¹

¹Western University, ²St Joseph's Health Care

Context: The combined effects of alcohol on the brain, cerebellum and the peripheral nervous system result in similar functional proprioceptive impairments to those seen in sensory neuronopathy (ganglionopathy) from Sjogren's syndrome. Management approaches to enhance both residual proprioception and function are crucial to successful rehabilitation. We present 2 cases of ataxia due to a central etiology as well as 1 case of peripheral sensory neuropathy that benefitted from proprioceptive orthoses in a rehabilitation setting. *Findings:* A male age 52, and a female age 67, were admitted to inpatient rehabilitation due to complications of alcoholism. The use of lower limb proprioceptive tools, such as leg wrappings, compression garments, weighted vests and weighted ankle orthoses, or a combination, resulted in significant improvement in pre and post, video gait analysis, TUG, motor FIM, and Berg Balance Scale. A third case of sensory ganglionopathy in a 62 year old female, also noted significant improvement in outcomes, following similar rehabilitation interventions, in TUG, 2 minute walk test, Berg Balance Scale, as well as transfers and toileting as measured by the motor FIM. In all 3 cases proprioceptive bracing and a weighted vest were used to improve gait, transfers, balance scores and confidence in mobility during inpatient rehabilitation. *Conclusion/Relevance:* The novel use of proprioceptive bracing, weighted vests, and weighted ankle orthoses, provide additional afferent input and should be considered as a treatment option of both centrally and peripherally induced ataxia and balance challenges to improve function. *Key words:* alcoholism, Sjogren's syndrome, proprioception.

PMR – 135

PERI-INCISIONAL BOTULINUM TOXIN FOR CHRONIC POST CRANIOTOMY HEADACHE FOLLOWING TRAUMATIC BRAIN INJURY: A CASE SERIES

Heather MacKenzie, Keith Sequeira*Western University, Department of Physical Medicine and Rehabilitation, St. Joseph's Health Care London*

Context: Botulinum toxin (BTX) has traditionally been used to treat conditions of pathologically increased muscle tone. However, the observed analgesic benefit of BTX cannot be fully explained by the anticholinergic effect it is known to have at the presynaptic terminal of the neuromuscular junction. BTX has been used successfully for the management of primary headache syndromes but there is no published data on its use for the treatment of chronic post craniotomy headache (PCH) following neurosurgical intervention for traumatic brain injury (TBI). *Findings:* We present three patients managed surgically for post-traumatic epidural hematomas who developed chronic headaches with focal peri-incisional pain as the predominant feature. Two patients used topical liniment containing lidocaine, ketoprofen, and amitriptyline with minimal benefit. Oral medications resulted in side effects and/or inadequate analgesia. BTX (4:1 dilution, total dose of 20–50 units) was injected into multiple peri-incisional sites of the scalp. Two of the three patients also received injections into the cranial musculature. All patients reported reductions in headache pain and scar sensitivity lasting at least two months. Repeat injections were performed with favourable outcomes in all three cases. There were no complications. *Conclusion/Relevance:* While the exact mechanism of action remains unclear, peri-incisional BTX appears to be a valuable tool in the chronic management of PCH following TBI. Oral analgesics rely heavily on patient compliance for their effectiveness and their use is frequently limited by systemic side effects. Furthermore they can lead to medication-induced headaches thereby worsening the clinical picture. *Key words:* botulinum toxins, brain injuries, craniotomy, secondary headache disorders.

PMR – 136**FROM WHEELCHAIR TO CANE: ELECTIVE TRANSTIBIAL AMPUTATIONS IN A PATIENT WITH L4 SPINA BIFIDA****Amanda Mayo¹, David Berbrayer²***¹Sunnybrook Health Sciences Centre, St. John's Rehab, ²Sunnybrook Health Sciences Centre*

Context: Myelomeningocele, a form of congenital spina bifida, is associated with lower extremity weakness, sensory loss, impaired bowel/bladder function and obstructive hydrocephalus. Patients with lower lumbar and sacral levels of spina bifida are mostly ambulatory through to adolescence and some into adulthood. They have increased risk for foot deformities, osteoarthritis, ulcers and osteomyelitis. Many become non-ambulatory as adults, due to these complications and obesity. *Findings:* A 27-year-old female with Spina Bifida (L4 level), ambulated with bilateral AFOs and canes until late adolescence. She then developed bilateral subtalar arthritis, chronic foot ulcerations and osteomyelitis. From age 21 to 26 years, she required multiple foot surgeries and IV antibiotics. From age 25, she used a wheelchair and scooter. The patient, frustrated with repeated surgeries, hospitalizations, and loss of ambulation decided on amputations versus further foot reconstruction. The patient underwent elective transtibial amputations, 2 months apart. She was fitted with bilateral transtibial prosthesis with Vari-flex feet 4 weeks post second amputation. After 4 months of intensive rehabilitation, she ambulated with a cane. Her Houghton score of prosthetic use was 7 out of 9 with no feelings of instability. Her L-test of functional mobility was 27 seconds. The patient felt her quality of life had improved. *Conclusion/Relevance:* This young, non-obese patient had her ambulation and quality of life restored with bilateral transtibial amputations. Despite a negative prognostic indicator of poor mobility pre-amputation; transtibial amputation should be considered for lower level spina bifida patients with chronic foot osteomyelitis. *Key words:* transtibial, amputee, myelomeningocele.

PMR – 137**THE CORRELATION OF AUTONOMIC STORMING, STATUS DYSTONICUS, ELEVATED CREATINE KINASE, AND SERUM LIVER ENZYMES: A CASE REPORT AND SYSTEMATIC REVIEW****Serge Mrkobrada, Vithya Gnanakumar***University of Calgary*

Context: CC is a previously healthy 19-month-old infant who sustained a severe anoxic brain injury in the setting of an upper respiratory viral infection. At 10 days post injury, he had onset of dysautonomic episodes (tachycardia, hypertension, diaphoresis, dystonia, and irritability), which often lasted most of the day. His dystonia was severe, manifested by contracture formation, and likely compartment syndrome of the forearm. Within four weeks post injury, he progressed to episodes of status dystonicus. The dystonia fluctuated in severity from week to week, and several interventions were trialed including different oral medications and the placement of an intrathecal baclofen pump at 6 weeks post injury. Serum creatine kinase (CK) peaked at 4,504 U/L, alanine transaminase (ALT) at 183 U/L and aspartate transferase (AST) at 198 U/L. *Findings:* Though polypharmacy or an underlying metabolic condition were originally suspected to be the cause of his elevated liver enzymes, this case demonstrated a clear correlation between changes in serum ALT, AST and CK and severity of dystonia following brain injury. *Conclusion/Relevance:* A review of the literature demonstrated a similar pattern of liver enzyme elevation in long distance marathon runners, epileptics, and patients with myopathies. Elevated muscle breakdown due to dystonia can lead to increased AST and ALT following a brain injury. Early recognition of this phenomena can prevent unnecessary hepatic and metabolic investigations. *Key words:* brain injury, dystonia, rhabdomyolysis.

PMR – 138**CAROTID STENOSIS AS AN IMPORTANT CAUSE OF ISOLATED UPPER LIMB PROXIMAL WEAKNESS****Mark Ng¹, Reza Vosoughi²***¹Section of Physical Medicine and Rehabilitation, Department of Internal Medicine, University of Manitoba, ²Section of Neurology, Department of Internal Medicine, University of Manitoba*

Context: Isolated proximal upper limb weakness can be an important manifestation of critical carotid stenosis. If identified promptly, definitive management may be offered to prevent devastating ischaemic consequences. *Findings:* A 73-year-old gentleman with a history of ischaemic heart disease presented with a 48-hour history of isolated acute onset left-sided shoulder weakness. Initial examination revealed no other neurological deficit and CT brain revealed no acute pathology. Emergency physicians considered a working diagnosis of lacunar infarct, considering the lack of widespread neurological symptoms. For follow-up, they contacted the neurologist on call, who recommended urgent CT angiogram (CTA) of brain and cervical arteries focusing on the carotids. CTA revealed >90% stenosis of the right internal Carotid Artery origin. Urgent vascular surgery referral was requested for carotid endarterectomy. *Conclusion/Relevance:* Any physiatrist involved in management of patients with neuromuscular diseases may encounter patients with sudden onset isolated upper limb proximal weakness for evaluation. It is vital to consider watershed infarction between Middle Cerebral Artery and Anterior Cerebral Artery territories secondary to critical Internal Carotid stenosis. The motor cortex is supplied by both the Anterior and Middle Cerebral Arteries, with the watershed area between these two vascular territories located at approximately the motor cortical area representing the shoulder. In this case, critical

carotid stenosis resulted in ischaemia of this watershed area resulting in isolated shoulder weakness. These ischaemic strokes are called 'watershed' or 'hemodynamic' infarcts. Prompt identification by CT angiogram or Carotid Doppler Ultrasound is necessary for definitive and timely treatment and prevention of future disabling strokes. *Key words:* carotid stenosis, weakness, watershed infarct.

PMR – 139 AWARD WINNER

MONONEURITIS MULTIPLEX IN GRAFT VERSUS HOST DISEASE: A CASE REPORT

Rachel Reardon¹, Gerald Wolff²

¹University of Ottawa, ²The Ottawa Hospital

Context: Graft versus host disease (GVHD) is a common complication of hematopoietic stem cell transplantation (HSCT). It is characterized by immune-mediated multisystemic inflammation due to donor T-cells attacking mismatched recipient antigens. It has been associated with a variety of neuromuscular complications. There are a few case reports of mononeuritis multiplex. One describes a pediatric patient with severe GVHD developing a peroneal neuropathy and meralgia paresthetica, without clarification of pathophysiologic mechanisms. Chronic GVHD resulting in sclerodermoid skin changes and entrapment neuropathies secondary to skin sclerosis has been described on a few occasions. *Findings:* A 49-year-old man with chronic lymphocytic leukemia received an allogeneic HSCT, complicated by acute GVHD. Four months later he developed a left foot drop and shortly afterwards, left thumb extension weakness. On examination he had profound weakness of extensor pollicis brevis and longus (grade 2/5) and of left dorsiflexion, ankle eversion, great toe extension (1/5), and ankle inversion (3/5). Other posterior interosseous nerve (PIN) muscles were normal. Nerve conduction studies showed reduced radial CMAP amplitude and no recordable peroneal motor response from extensor digitorum brevis. Needle electromyography showed active denervation and reinnervation in extensor pollicis longus and brevis, tibialis anterior and tibialis posterior. MRI did not support an L5 radiculopathy. These findings were consistent with mononeuritis multiplex involving a branch of the left posterior interosseous and sciatic nerves. *Conclusion/Relevance:* Mononeuritis multiplex is a rare but recognized complication of GVHD. We present a case not due to skin sclerosis with nerve entrapment. *Key words:* graft vs host disease, hematopoietic stem cell transplantation, mononeuropathies.

PMR – 140

AID KINETICS DURING FOREARM CRUTCH ASSISTED GAIT IN A TRANSPELVIC AMPUTEE

Ranita Manocha¹, Megan MacGillivray², Bonita Sawatzky²

¹Western University, ²University of British Columbia

Context: Transpelvic amputations are the least commonly performed lower extremity amputation. As prosthetic gait in this population has high energy costs, most transpelvic amputees use forearm crutches in a swing-through gait pattern. No studies have been published on the kinetics of this gait pattern in this population. This study illustrates crutch ground reaction force profiles for a 56-year-old transpelvic amputee using three commercially available forearm crutch designs. *Findings:* Across the 3 crutch types, average vertical ground reaction forces were approximately 40% body weight (BW). Average forces in the braking, propulsive, and lateral directions were 5% BW. Crutch C, which had a spring-like polymer in the shaft and a ball-and-socket foot exhibited the lowest mean braking and lateral ground reaction forces. Kinetics were asymmetric between the left and right sides. *Conclusion/Relevance:* This case highlights general features of swing-through gait kinetics in a transpelvic amputee, contributing to the paucity of literature in this area. Different elements of crutch design such as shaft material and tip configuration could contribute to altered kinetics. Asymmetric weight distribution following such an amputation may also be an important consideration. Additional basic science and clinical research is needed to guide crutch design and ultimately prescription to meet an individual patient's needs. *Key words:* crutches, equipment design, hemipelvectomy.

PMR – 141

CORTICOSTEROIDS AS AN AFFECTIVE DISEASE MODIFYING TREATMENT OF INFLAMMATORY COMPLEX REGIONAL PAIN SYNDROME IN THE UPPER LIMB: A CASE SERIES

Paul Winston

Island Health Authority, University of British Columbia, University of Victoria

Context: Despite over a hundred years of definitions, names and controversy, Complex Regional Pain Syndrome (CRPS) remains a debated diagnosis with multiple treatments, and philosophies. Failure to treat acutely may result in lifelong pain, loss of function; even amputation. Unemployment and prolonged disability is common. Pharmacologic treatment varies by institutional preference and lacks consensus. Oral corticosteroids have been studied in very few trials, but are the only pharmacologic treatment with level 1 evidence. Acute CRPS was assessed in patients with antecedent trauma or neurologic injury with the pertinent findings of a painful, unilateral hot and swollen hand and wrist, sudomotor changes, swollen hands, capsular thickening of joints and severe loss of range of motion in multiple joints of the hand, wrist or shoulder. *Findings:* Clinical practice has demonstrated dramatic disease altering affects and even resolution and cure of CRPS when offered early in the course of the disease. *Conclusion/Relevance:* This case series addresses patients presenting with CRPS in the upper extremities after neck or arm fracture or neurologic injury. Treatment with oral prednisone resulted in a dramatic decrease in pain and/or increase in function and range of motion. *Key words:* complex regional pain syndrome, corticosteroids, causalgia.

EDUCATION

PMR – 143 AWARD WINNER

**THE IMPACT OF PHYSIATRY-LED
MUSCULOSKELETAL (MSK) CLINICAL SKILLS
WORKSHOPS ON MEDICAL STUDENTS: AN
OBSERVATIONAL STUDY**

Meiqi Guo¹, Audrey Yap¹, Anne Agur², Denyse Richardson¹

¹Division of Psychiatry, Department of Medicine, University of Toronto, ²Division of Anatomy, Department of Surgery, University of Toronto

Context: CaRMS (Canadian Resident Matching Service) reports indicate that fewer medical students select Psychiatry as a career choice compared to other specialties. In addition, studies have shown that medical students have low confidence in musculoskeletal (MSK) clinical skills, an area of Psychiatry expertise. *Objective:* This study will determine if: 1) medical students' interest in Psychiatry can be increased by extra-curricular Psychiatry-led MSK clinical skills workshops; 2) workshops improve students' MSK skills, measured by their self-rated confidence and Objective Structured Clinical Exam (OSCE) performance. *Design:* Observational Study. *Setting:* Faculty of Medicine, University of Toronto Participants: 80–90 second-year medical students. *Interventions:* Students participate in two 3-hour interactive workshops led by Psychiatry faculty/residents that focus on physical examination of the upper and lower limb joints. *Outcome measures:* 1) Participants' interest in Psychiatry and self-rated confidence in MSK Clinical Skills by surveying before, immediately after and 9 month post-workshop. Surveys use the Likert scale (1–5). 2) Comparison of participants' MSK OSCE station(s) average score with that of the remainder of the class. *Results:* Results from the pilot 2013 workshops showed that over 85% of attendees found their confidence in MSK clinical skills improved. In the current study, pre and post-workshop surveys and MSK OSCE scores will provide further evidence whether the workshops meet their objectives. *Conclusions:* Psychiatry-led extra-curricular MSK clinical skills workshops may be a novel way to enhance interest in Psychiatry, and simultaneously, may help improve medical students' MSK Clinical Skills. *Key words:* career choice, education, medical, undergraduate, physical and rehabilitation medicine.

PMR – 144

**INTEGRATING PHYSICAL MEDICINE AND
REHABILITATION INTO THE MEDICAL SCHOOL
CURRICULUM: A REVIEW OF THE LITERATURE
AND RESTRUCTURING OF THE UNIVERSITY OF
MANITOBA UNDERGRADUATE PROGRAM**

Jennifer Salter

University of Manitoba

The principles of Physical Medicine and Rehabilitation (PM&R) are an integral part of many medical and surgical specialties. Their importance will continue to rise as the population ages and the prevalence of chronic and disabling conditions increases. Unfortunately physicians and medical students are often unfamiliar with the speciality and have insufficient knowledge about the problems individuals with disabilities face. This may be due to the poor representation of PM&R in medical school curriculums. Although musculoskeletal medicine is included in most programs there is rarely a focus on the other components of PM&R such as understanding the consequences of illness on function. Research has shown that patient care, attitude towards teamwork and the interdisciplinary team, and clinical skills can be optimized by including principles of PM&R in the undergraduate program. The University of Manitoba is

completely restructuring the medical school curriculum, integrating PM&R throughout the four years of training. Concepts such as spiral of learning and longitudinal themes incorporate key elements of the speciality. Additionally, PM&R has been introduced in conjunction with other relevant specialties to allow rehabilitation to be seen in context. Clerkship changes include an interactive session with a multi-disciplinary team and a PM&R core rotation. These changes are designed to increase students' knowledge of the speciality, increase academic opportunities for medical students, and improve the quality of referrals. This poster will review the literature on teaching PM&R to medical students and highlight key aspects of the new University of Manitoba medical school curriculum. *Key words:* student, medical, education, physical medicine and rehabilitation.

**PMR – MEDICAL STUDENT ESSAY CONTEST AWARD
RECIPIENT**

**CHALLENGES FOR PHYSICALLY DISABLED
POPULATIONS IN LOW-INCOME COUNTRIES**

Jordan Farag

McMaster University

Physically disabled individuals in low-income countries have poorer access to healthcare services and overall lower quality of life compared to non-disabled individuals. The International Classification of Functioning, Disability and Health (ICF) serves as an excellent framework to examine the medical and sociocultural components of disability at both individual and population levels. The purpose of this paper is to highlight 3 major barriers to rehabilitative healthcare services for physically disabled populations in low-resource settings. These include: discrimination, poverty, and inadequate healthcare systems. To achieve this, a case study is presented, exploring the disability experience of a child with muscular dystrophy in rural Tanzania. The case study is discussed in the context of the ICF framework. Furthermore, we review literature in the field of disability, as it relates to discrimination, poverty and healthcare systems. Ultimately, we conclude that the plight of disabled individuals living in low-resource settings will persist, unless its root causes are addressed at a population level. This requires collaboration of government, healthcare workers and disabled individuals themselves, as well as respect for the basic human rights of those with disabilities. *Key words:* disability, global health, rehabilitation.

**PMR – 145 RESIDENT ESSAY CONTEST AWARD WINNER
SYMPATHETIC SKIN RESPONSES AND
AUTOMATIC DYSFUNCTION IN SPINAL CORD
INJURY**

Michael J. Berger

PGY1, Division of Physical Medicine and Rehabilitation, The University of British Columbia

Sympathetic skin responses (SSRs) are a measure of sympathetic cholinergic sudomotor function that has been used in the assessment of autonomic dysfunction in patients with spinal cord injury (SCI). This review highlights the basic mechanisms underlying SSRs as well as its application to the SCI population. We address the utility of SSRs in assessing autonomic function, the relationship between autonomic and sensorimotor impairment and the association between SSRs and the sequelae of autonomic dysfunction in SCI (in particular autonomic dysreflexia and orthostatic hypotension). Overall, SSRs are a rapid, non-invasive and reliable method illustrating that the severity of autonomic impairment can be independent from sensorimotor impairment. We suggest that SSRs be used in

conjunction with other validated autonomic tests in order to predict or document autonomic dysfunction in SCI. *Key words:* spinal cord injury, autonomic control, sympathetic skin responses, autonomic dysreflexia, orthostatic hypotension.

**PMR – 146 STUDENT RESEARCH AWARD WINNER
A NOVEL WAY OF DETECTING INTRATHECAL
BACLOFEN WITHDRAWAL IN POST- OPERATIVE
PATIENTS**

Alvin H. Ip, BKin^{1,2}, Kristin Buxton, CPNP³, Robert Tasker, MD⁴, Shenandoah Robinson, MD²

¹Faculty of Medicine, University of British Columbia, Vancouver, B.C., Canada, ²Departments of Neurosurgery and Neurology, Boston Children's Hospital, Harvard Medical School, Boston, MA, United States, ³Department of Complex Medicine, Boston Children's Hospital, Harvard Medical School, Boston, MA, United States, ⁴Department of Critical Care, Boston Children's Hospital, Harvard Medical School, Boston, MA, United States

Objective: To create and test a screening tool for intrathecal baclofen (ITB) withdrawal that is convenient and usable for a broad range of healthcare providers. *Design:* Single center cohort study. *Participants:* Retrospective cohort of 33 consecutive patients (median age: 14 year; range 8 to 21) with a baclofen pump who underwent spinal fusion for neuroscoliosis or another event that put them at risk for interruption of delivery of ITB. Three (9.1%) had confirmed ITB withdrawal. *Methods:* We consulted the literature and clinicians with expertise in ITB withdrawal syndrome. After compiling this knowledge into a scorecard, we achieved consensus from clinicians. Once IRB approval was obtained, we tested the tool on participants. *Results:* The ITB Withdrawal Scorecard includes the major signs of withdrawal, including pruritis, hypotension or hypertension, tachycardia, hyperthermia, agitation, hallucinations, insomnia, clonus, and seizures. The ITB Withdrawal Scorecard had 100% sensitivity, 86.7% specificity, 42.9% positive predictive value, and 100% negative predictive value. *Conclusions:* We developed a convenient and easy-to-use screening tool that may improve the detection of ITB withdrawal in patients, especially when used by providers with minimal experience in diagnosing this condition. We demonstrated the feasibility of this tool and will further evaluate it in a prospective study. *Key words:* complication, intrathecal baclofen pump, post-operative, scoring tool, withdrawal.

**PMR – 147 RESIDENT RESEARCH AWARD WINNER – 1
INPATIENT REHABILITATION LENGTH OF STAY
AND SURVIVAL FOLLOWING MALIGNANT
SPINAL CORD COMPRESSION: IS IT WORTH IT?**

Christian Fortin, MD, Jennifer Voth, PhD, Susan Jaglal, PhD, B. Catharine Craven, MD, MSC

University of Toronto, Department of Medicine, Toronto Rehabilitation Institute – University Health Network; Institute for Clinical Evaluative Sciences, Toronto

Context/Objective: Malignant spinal cord compression (MSCC) leads to significant disability and limited survival. We sought to compare demographic characteristics and clinical outcomes of patients admitted for inpatient rehabilitation following MSCC versus other etiologies of non-traumatic spinal cord injury (NT-SCI). *Design:* Retrospective cohort study, using administrative data sets held securely in a linked, de-identified form and analyzed at the Institute for Clinical Evaluative Sciences (ICES). *Setting:* Ontario rehabilitation facilities ($n=59$). *Participants:* Adults admitted for rehabilitation following incident diagnoses of MSCC ($N=144$) or NT-SCI ($n=1283$) from April 2007 to March 2011. *Outcome Measures:* Demographic and impairment characteristics, Functional Independence Measure (FIM), discharge destination, goal attainment, length of stay (LOS), and survival. *Results:* The mean total

FIM change in the MSCC cohort was 20.2 ± 14.22 , ($p < 0.001$). The NT-SCI cohort had greater FIM gains (24.0 ± 14.44 , $p = 0.006$) and FIM efficiency than the MSCC cohort (1.2 ± 1.73 vs. 0.76 ± 0.76 , $p < 0.001$). A majority (65.3%) of the MSCC cohort were discharged home and met their rehabilitation goals (75.3%), rates comparable to NT-SCI (69.8% and 81.9%). Three-month, 1-year, and 3-year survival rates in the MSCC and NT-SCI cohorts were 76.4% versus 97.6%, 46.5% versus 93.8%, and 27.8% versus 86.8%, respectively. *Conclusions:* Despite compromised survival, patients with MSCC make clinically significant functional gains and exhibit favourable discharge outcomes following inpatient rehabilitation, but not to the extent of NT-SCI patients. Unique survival related prognostic factors and timelines for accrual of FIM gains in the MSCC population warrant discussion with MSCC patients considering inpatient rehabilitation. *Key words:* population, rehabilitation, spinal cord compression, spinal cord neoplasms.

**PMR – 148 RESIDENT RESEARCH AWARD WINNER – 2
THE INFLUENCE OF DIAGNOSTIC
TERMINOLOGU ON PARENTS' PERCEPTION
OF SEVERITY FOLLOWING PEDIATRIC MILD
TRAUMATIC BRAIN INJURY OR CONCUSSION**

Jordan Raugust, MD, John Latter, MD, MPA, FRCPC

University of Calgary, Department of Clinical Neurosciences, Division of Physical Medicine and Rehabilitation, Calgary, Alberta, Canada

Objective: Determine the impact of diagnostic terminology on parents' perception of their child's need to rest and willingness to advocate for conservative return-to-play (RTP) following pediatric mild traumatic brain injury (mTBI) or concussion. *Design:* Cross-sectional survey. *Setting:* Summer ice hockey camps. *Participants:* 1425 parents of pediatric ice hockey players. *Interventions:* Subjects were randomly administered one of three clinical scenarios in questionnaire form. The scenarios described a typical sports-related concussion/mTBI and were identical except for the diagnosis: 1) concussion, 2) mTBI; and 3) concussion, which is a form of mTBI (con-mTBI). Parents indicated how long they felt their child should wait before RTP, given the diagnosis provided. *Outcome Measures:* The number of days parents felt their child should rest before RTP. The proportions of conservative (>14 days) responses were compared between the groups with different diagnostic terms using a difference in proportions measure with 95% confidence intervals. *Results:* The proportion of parents having conservative RTP expectations for each diagnosis was: concussion (34.9%), mTBI (45.7%), and con-mTBI (41.3%). The difference in proportions was significant for concussion vs. mTBI (95%CI=4%,17%) and concussion vs. con-mTBI (95%CI=0.1%,13%), but not for mTBI vs. con-mTBI (95%CI=-2%,11%). *Conclusions:* Diagnostic terminology impacts parents' perception of concussion/mTBI severity. Utilizing the term mTBI, with or without the term concussion, encourages more cautious RTP expectations. We must carefully consider the influence of diagnostic terminology when discussing RTP guidelines following concussion/mTBI. *Key words:* concussion, children, ice hockey, head injuries.

**PMR – 149 RESIDENT RESEARCH AWARD WINNER – 3
GOING PLACES: DOES THE TWO-MINUTE WALK
TEST PREDICT SIX MINUTE WALK TEST IN
LOWER EXTREMIT AMPUTEES?**

Lauren Reid, MD¹, Penny Thomson, BSc¹, Markus Besemann, MD², Nancy Dudek, MD MEd¹

¹University of Ottawa, The Ottawa Hospital Rehabilitation Centre, ²Canadian Forces Health Services

Supported by Canadian Forces Health Services, Surgeon General Health Research Project and University of Ottawa Summer Studentship *Context:* Assessing a patient's ability to walk the distances

required for community ambulation (at least 300 m) is highly important in amputee rehabilitation. During the two-minute walk test, most amputees cannot walk 300 m. For that reason, the six-minute walk test may be preferred but this is a longer test and it has not been fully validated in this population. *Objective:* Assessing a patient's ability to walk the distances required for community ambulation (at least 300 m) is highly important in amputee rehabilitation. During the two-minute walk test, most amputees cannot walk 300 m. For that reason, the six-minute walk test may be preferred but this is a longer test and it has not been fully validated in this population. This study: 1) examined the convergent and discriminative validity of the six-minute walk test and 2) assessed whether the two-minute test could predict the results of the six-minute test. *Methods:* 86 patients with unilateral or bilateral amputations at the syme, trans-

tibial, knee disarticulation or trans-femoral level completed the six-minute walk test, the two-minute walk test, the Timed Up and Go test, and completed the Locomotor Capabilities Index version 5, the Houghton scale, and the Activity-Specific Balance Confidence scale. *Results:* The six-minute walk test correlated strongly with the other tests ($R^2=0.36-0.9$), demonstrating convergent validity. It demonstrated discriminative validity with respect to age, etiology of amputation, and K-level ($p<0.0001$). The two-minute test was highly predictive of the six-minute test distance ($R^2=0.91$). *Conclusion:* The six-minute walk test is a valid measure of amputee ambulation. However, the results suggest that this longer test may not be necessary, since the two-minute walk test strongly predicts the six-minute walk test. Clinicians can save time by using the shorter test. *Key words:* ambulation, amputation, outcome assessment.

Author index

Abstract numbers

- A Abdel-Rahman, Aly, 127
 Agur, Anne, 143
 Arneja, Amarjit, 132
 Ashworth, Nigel, 108
 Askari, Sussan, 110
- B Barry, Amelia, 102
 Batey, Cristina, 129, 134
 Benson, Brian, 125
 Berbrayer, David, 103, 105, 136
 Berger, Michael J., 145
 Besemann, Markus, 149
 Bhogal, Meetu, 117
 Boulias, Chris, 114
 Brady, Leanne, 134
 Brandt, Arlene, 119
 Buxton, Kristin, 146
 Byszewski, Anna, 111
- C Campbell, Nerissa, 106
 Cassidy, Caitlin, 106
 Chan, K Ming, 108
 Chawla, Kshitij, 132
 Chia, Jonathan C. L., 108
 Coros, Kimberly, 101
 Craven, B. Catharine, 109, 147
- D Deathe, Barry, 122
 Debert, Chantel, 125
 Deng, George, 110
 Devlin, Michael, 121
 Dhawan, Priya, 133
 Dilkas, Steven, 121
 Dojeiji, Sue, 111
 Dudek, Nancy, 149
 Dukelow, Sean, 125
 Dunford, Sarah, 134
- E Earl, Eric, 112, 122
 Esposito, Ben, 122
 Ethans, Karen, 110, 124
- F Farahani, Farnoosh, 109
 Fennell, Jeremy, 101
 Finestone, Hillel, 131
 Fortin, Christian, 101, 147
 Fourney, Daryl, 119
- G Gandhi, Rajiv, 113
 Gnanakumar, Vithya, 137
 Goldstein, Joshua, 114
 Goodman, Brent, 133
 Goodridge, Donna, 119
 Gorski, Joanna, 115
 Gray, Darren, 108
 Gray, Lori, 123
 Guo, Meiqi, 143
 Guy, Stacey, 115
- H Hanada, Ed, 116
 Hill, Denise, 110
 Hitzig, Sander, 109
 Ho, Catherine, 101
 Ho, Chester, 110
- I Ip, Alvin H., 146
 Ismail, Farooq, 114, 117
- J Jacquemin, Géraldine, 110
 Jaglal, Susan, 147
 Jeffery, Bonnie, 120
 Jutai, Jeffrey, 131
- K Kachooie, Sogoal, 134
 Klassen, Laura, 120
 Knox, Katherine, 120
- L Latter, John, 148
 Lau, Johnny, 113
 Lim, Hyun, 119
 Linassi, Gary, 119
 Li, Shuqin, 116
 Lo, Alex, 101
 Loh, Eldon, 115
- M Macaluso, Steven, 128
 MacGillivray, Megan, 140
 MacKenzie, Heather, 135
 Madady, Mona, 106
 Manocha, Ranita, 129, 140
 Marks, Meredith, 111
 Mayo, Amanda, 136
 Miller, Thomas, 126, 134
 Moylan, Beverly, 101, 121
 Mrkobrada, Serge, 137
- N Naidu, Dhiren, 108
 Ng, Mark, 138
 Nickel, Darren, 119
 Noreau, Luc, 120
 Novin, Ali, 101
- O O'Connell, Colleen, 110, 115
- P Paner, Ruby, 121
 Pauley, Tim, 121
 Payne, Michael, 106, 122, 126, 134
 Phadke, Chetan, 114
 Potter, Patrick, 115
- R Radhakrishna, Mohan, 123
 Raugust, Jordan, 148
 Reardon, Rachel, 139
 Reid, Lauren, 149
 Richardson, Denyse, 143
- Robinson, Shenandoah, 146
 Rogers, Marla, 119
- S Salter, Jennifer, 124, 144
 Salter, Katherine, 128
 Satkunam, Lalith, 123
 Sawatzky, Bonita, 140
 Sequeira, Keith, 126, 135
 Short, Christine, 110
 Smith, Karen, 110
 Smith, Stephen, 124
 Stilling, Joan, 125
 Swati, Mehta, 115
- T Tasker, Robert, 146
 Thomson, Penny, 149
 Townson, Andrea, 110, 115
 Trentin, Grace, 117
- V Veljkovic, Andrea, 113
 Viana, Ricardo, 122, 126
 Vosoughi, Reza, 138
 Voth, Jennifer, 147
 Wang, Ruihang, 116
 Wein, Theodore, 117
 Wiebe, Scott, 102
 Winston, Paul, 141
 Wolff, Gerald, 139
 Wong, Sandra, 113
 Wood, Tim, 111
- Y Yachnin, David, 131
 Yak, Amelie, 113
 Yang, Mengjie, 116
 Yap, Audrey, 143
- Z Zeng, Lisa, 109
 Zhang, Jingjing, 116

Page numbers

- A Abdel-Rahman, Aly, 1064
 Agur, Anne, 1069
 Arneja, Amarjit, 1066
 Ashworth, Nigel, 1059
 Askari, Sussan, 1060
- B Barry, Amelia, 1058
 Batey, Cristina, 1065, 1066
 Benson, Brian, 1064
 Berbrayer, David, 1058, 1059, 1067
 Berger, Michael J., 1069
 Besemann, Markus, 1070
 Bhogal, Meetu, 1062
 Boulias, Chris, 1061
 Brady, Leanne, 1066
 Brandt, Arlene, 1062
 Buxton, Kristin, 1070
 Byszewski, Anna, 1060
- C Campbell, Nerissa, 1059
 Cassidy, Caitlin, 1059
 Chan, K Ming, 1059
 Chawla, Kshitij, 1066
 Chia, Jonathan C. L., 1059
 Christian Fortin, 1070
 Coros, Kimberly, 1058
 Craven, B. Catharine, 1060, 1070
- D Deathe, Barry, 1063
 Debert, Chantel, 1064
 Deng, George, 1060
 Devlin, Michael, 1063
 Dhawan, Priya, 1066
 Dilkas, Steven, 1063
 Dojeiji, Sue, 1060
 Dudek, Nancy, 1070
 Dukelow, Sean, 1064
 Dunford, Sarah, 1066
- E Earl, Eric, 1060, 1063
 Esposito, Ben, 1063
 Ethans, Karen, 1060, 1063
- F Farag, Jordan, 1069
 Farahani, Farnoosh, 1060
 Fennell, Jeremy, 1058
 Finestone, Hillel, 1065
 Fortin, Christian, 1058, 1070
 Fourney, Daryl, 1062
- G Gandhi, Rajiv, 1061
 Gnanakumar, Vithya, 1067
 Goldstein, Joshua, 1061
 Goodman, Brent, 1066
 Goodridge, Donna, 1062
 Gorski, Joanna, 1061
 Gray, Darren, 1059
 Gray, Lori, 1063
 Guo, Meiqi, 1069
 Guy, Stacey, 1061
- H Hanada, Ed, 1062
 Hill, Denise, 1060
 Hitzig, Sander, 1060
 Ho, Catherine, 1058
 Ho, Chester, 1060
- I Ip, Alvin H., 1070
 Ismail, Farooq, 1061, 1062
- J Jacquemin, Géraldine, 1060
 Jaglal, Susan, 1070
 Jeffery, Bonnie, 1062
 Jutai, Jeffrey, 1065
- K Kachooie, Sogoal, 1066
 Klassen, Laura, 1062
 Knox, Katherine, 1062
- L Latter, John, 1070
 Lau, Johnny, 1061
 Lim, Hyun, 1062
 Linassi, Gary, 1062
 Li, Shuqin, 1062
 Lo, Alex, 1058
 Loh, Eldon, 1061
- M Macaluso, Steven, 1065
 MacGillivray, Megan, 1068
 MacKenzie, Heather, 1067
 Madady, Mona, 1059
 Manocha, Ranita, 1065, 1068
 Marks, Meredith, 1060
 Mayo, Amanda, 1067
 Miller, Thomas, 1064, 1066
 Moylan, Beverly, 1058, 1063
 Mrkobrada, Serge, 1067
- N Naidu, Dhiren, 1059
 Ng, Mark, 1067
 Nickel, Darren, 1062
 Noreau, Luc, 1062
 Novin, Ali, 1058
- O O'Connell, Colleen, 1060, 1061
- P Paner, Ruby, 1063
 Pauley, Tim, 1063
 Payne, Michael, 1059, 1063, 1064, 1066
 Phadke, Chetan, 1061
 Potter, Patrick, 1061
- R Radhakrishna, Mohan, 1063
 Raugust, Jordan, 1070
 Reardon, Rachel, 1068
 Reid, Lauren, 1070
 Richardson, Denyse, 1069
 Robinson, Shenandoah, 1070
 Rogers, Marla, 1062
- S Salter, Jennifer, 1063, 1069
 Salter, Katherine, 1065
 Satkunam, Lalith, 1063
 Sawatzky, Bonita, 1068
 Sequeira, Keith, 1064, 1067
 Short, Christine, 1060
 Smith, Karen, 1060
 Smith, Stephen, 1063
 Stilling, Joan, 1064
 Swati, Mehta, 1061
- T Tasker, Robert, 1070
 Thomson, Penny, 1070
 Townson, Andrea, 1060, 1061
 Trentin, Grace, 1062
- V Veljkovic, Andrea, 1061
 Viana, Ricardo, 1063, 1064
 Vosoughi, Reza, 1067
 Voth, Jennifer, 1070
 Wang, Ruihang, 1062
 Wein, Theodore, 1062
 Wiebe, Scott, 1058
 Winston, Paul, 1068
 Wolff, Gerald, 1068
 Wong, Sandra, 1061
 Wood, Tim, 1060
- Y Yachnin, David, 1065
 Yak, Amelie, 1061
 Yang, Mengjie, 1062
 Yap, Audrey, 1069
- Z Zeng, Lisa, 1060
 Zhang, Jingjing, 1062