TRAINEE ORAL PRESENTATIONS: SESSION 1

Role of Physical Medicine and Rehabilitation in Post-COVID Lung Transplantation: A Case Series

***Chloe Haldane**, Alicia Lakey, Stacey Bhola-Reebye, & Rajiv Reebye*

Background: Coronavirus 2019 infection (COVID-19) is associated with the development of end-stage fibrotic lung disease. In such patients, lung transplant is a lifesaving treatment for select candidates. We present on the first three post-COVID-19 lung transplantation recipients admitted for intensive inpatient rehabilitation at our center.
Methods: All three patients were of male sex, had limited pre-existing comorbidities, were independent at baseline and working full-time. All patients were admitted for intensive inpatient rehabilitation and underwent standardized testing within their rehabilitation stay.
Results: Patient 1: 54 years old, initially hospitalized for 63 days prior to bilateral lung transplantation. During consultation by PMR, the patient was identified to have subtle left sided weakness and found to have microbleeds on imaging likely related to VV ECMO. The patient was admitted to intensive inpatient rehabilitation for 50 days and discharged at a functionally independent level. Patient 2: 48 years old, initially hospitalized 67 days prior to bilateral lung transplantation. The patient was admitted to intensive inpatient rehabilitation for 22 days and discharged at a functionally independent level. Patient 3: 59 years old, initially hospitalized for 79 days prior to bilateral lung transplantation. Postoperative course was complicated by lumbosacral plexopathy assessed early by PMR. The patient was admitted for intensive inpatient rehabilitation.
Conclusions: The shift in health care needs during the COVID 19 pandemic, required PMR specialists to be involved in patient care earlier and in more acute settings. The post COVID-19 lung transplantation patient population described required a collaborative care model directed by PMR.

Implementing coordinated physical activity coaching: barriers and facilitators identified by Physiotherapists and Spinal Cord Injury BC peer coaches

***Marisa S. Lin,** Catherine Le Cornu Levett, Christopher B. McBride, Regina Colistro, Tova Plashkes, Andrea Bass, Teri Thorson, Ryan Clarkson, Rod Bitz, Kristen Walden, Kathleen A. Martin Ginis, and Jasmin K. Ma*

Background: A large decrease in physical activity is commonly observed among patients with spinal cord injury (SCI) following discharge from rehabilitation. The ProACTIVE SCI is a behavioural intervention that has previously demonstrated medium to large-sized effects on physical activity, fitness, and psychosocial predictors of physical activity in a lab-based setting. The purpose of this study was to examine the barriers and facilitators of an implementation intervention to support GF Strong physiotherapists and SCI BC peers in applying the ProACTIVE SCI coaching intervention in the hospital and as a client returns to the community setting, respectively.
Methods: Semi-structured interviews guided by the Theoretical Domains Framework (TDF) were conducted. Using the TDF framework, barriers and facilitators were coded abductively to identify factors that affect physical coaching delivery. A critical friend and member checking were used throughout the analysis process.
Results: Participants included nine physiotherapists and two SCI BC peer coaches. The most commonly identified TDF domains included environmental context and resources, social influences, skills, and memory, attention, and decision processes. Specifically, interventionists identified the need for: ongoing use of the physical activity coaching form; referral processes, shared reporting, relationships between physiotherapists and peer coaches; training to support onboarding of new staff; and reminders to conduct physical activity coaching prior to discharge.
Conclusion: Findings will be used to support the long-term sustainability of the ProACTIVE SCI intervention's delivery at GF Strong Rehabilitation Hospital and through SCI BC. The identified necessity for continued structured referral between physiotherapists and SCI BC peers poses potential

service collaborations that may affect other health behaviours beyond physical activity.

Lets Talk About Sex: Effects of Epidural Spinal Cord Stimulation on Sexual Function in Individuals with Spinal Cord Injury

Claire Shackleton, *Soshi Samejima, Tiev Miller, Rahul Sachdeva, Ann Parr, Uzma Samadani, Theoden Netoff, Shea Hocaloski, Stacy Elliot, David Darrow, & Andrei V. Krassioukov*

Background/aims: Spinal cord injury (SCI) can impair sexual functioning. Sexual function is rated as one of the highest priorities for quality of life in individuals with SCI. However, research shows treatments are limited and the sexual needs of people with SCI are under-prioritized. Epidural spinal cord stimulation (ESCS) presents as a novel therapeutic tool to improve sexual functioning after SCI. This preliminary study aimed to evaluate the effects of ESCS on restoring sexual function in a subset of participants enrolled in the Epidural Stimulation After Neurologic Damage (ESTAND) trial.
Methods: Fifteen participants, aged 29 – 62 years, with chronic (mean ± SD: 9.2 ± 4.8), thoracic motor-complete injuries were implanted with an epidural 16-contact paddle stimulator at T11-T12. Sexual function questionnaires were collected at baseline and each subsequent month for 13 months of the ESCS intervention.
Results: Females (n = 5) reported decreasing sexual distress over time, with a 40% reduction in distress from pre-post intervention. There was a 3.5% reduction in overall female sexual dysfunction following stimulation, with improvements in desire, arousal, orgasm and satisfaction domains. Majority of male participants (n = 10) had improved scores across all erectile dysfunction domains. The severity of orgasm dysfunction was significantly reduced ($p = 0.02$) for all individuals after ESCS intervention.
Conclusion: Our results show that ESCS can serve as a potential therapeutic modality to improve sexual function and reduce distress after SCI, thus addressing one of the most meaningful recovery targets for people with SCI.

Ambulation - A Web-Based Knowledge Translation Tool for Independent Walking Prediction after Traumatic Spinal Cord Injury

Heather Hong, *Ramtin Hakimjavadi, Nader Fallah, Suzanne Humphreys, Kristen Walden, Vanessa Noonan, and Philippe Phan*

Background: Several clinical prediction models (CPM) for functional outcomes after traumatic spinal cord injury (TSCI) have been published. However, few are used in practice due to the gap between knowledge creation and action, components of the knowledge-to-action (KTA) process.
Aim: To build "Ambulation", a web-based knowledge translation (KT) tool for clinicians that predicts independent walking 1-year after TSCI.
Methods: To predict independent walking, we used the published CPM by Hicks et al. (2017), and built Ambulation, a front-end website using HTML, CSS and JavaScript.
Results: Ambulation consists of five pages: home, calculation, result, team and contact page. Overall, 27 individuals (SCI clinicians, researchers, persons with SCI, marketing, legal and IT professionals) were consulted, amounting to 11 iterations, each time refining the design and user experience. Additionally, a short user survey and Google Analytics were integrated to inform the websites' clinical utility. Ambulation was uploaded onto two unique domains (www.ambulation.ca and www.sciclinaltools.com) and soft launched to a group of 30 surgeons, physiatrists, and/or physiotherapists on the 7th Feb 2022. To date, five survey-responses were received, each with encouraging feedback e.g. "easy to use and provides great information for discharge planning". Google Analytics revealed a steady increase site traffic with 140 new users.
Conclusion: Ambulation was created to provide clinicians with a KT tool to predict independent walking 1-year after TSCI and facilitate treatment discussions for persons with SCI. Furthermore, evaluation of this tool will inform how Ambulation and other future SCI KT tools can be adopted into clinical practice.

Trends in provision of mobility assist devices post traumatic spinal cord injury in Canada.

Paul Adamiak, *& Andrea Townson*

BACKGROUND: Mobility after a spinal cord injury (SCI) is often accomplished using assistive technology. The goal of this study was to review the mobility devices being provided following traumatic SCI in Canada. The specific aims were to identify trends in mobility device provision over time, as well as describe relationships between the type of, and number of, mobility devices provided based on SCI classification, patient gender, patient age, and geographic location.
METHODS: Data was obtained from the Rick Hansen Spinal Cord Injury Registry, a Canada-wide registry of traumatic SCI patients. All patients (n=7350) enrolled in the registry between 2004-2019 were included. Analyses were conducted in STATA. Descriptive statistics were used to identify trends.
RESULTS: Mobility devices consisted of walking aids, scooters, manual wheelchairs, and power wheelchairs. 4256 (58%) of entries included mobility device data. Most patients received only one mobility device (n=2635, 62%). The most prevalent devices were manual wheelchairs (n=2142, 50%) and walking aids (n=1665, 39%). Patterns in the number of mobility devices provided were consistent across gender, age, geographic region, year of discharge, and SCI classification. The types of mobility devices provided varied substantially based on classification of SCI. Patient age and geographic region also influenced the types of devices patients received. Over the data collection period there was a decrease in the provision of manual wheelchairs. There were no differences in types of devices provided based on gender.
CONCLUSION: These results describe trends in mobility device provision following traumatic SCI in Canada.

TRAINEE ORAL PRESENTATIONS: SESSION 2

Development of Therapeutic Alliance and Social Presence in a Digital Mindfulness-Based Intervention for Adolescents with Concussion

Kiarah O'Kane*, Esther Choi, Thalia Otamendi, Veronik Sicard, Olivier Brown, Lauren Butterfield, Rachel Kardish, Katherine Healey, Andra Smith, Gary Goldfield, Roger Zemak, Noah Silverberg, Andree-Anne Ledoux, & Molly Cairncross*

Background/Aims: Self-guided digital interventions may offer an accessible treatment option for adolescents recovering from concussion. Given high attrition rates in digital interventions, exploring modifiable factors that increase participant engagement and retention is critical. Therapeutic alliance is associated with adherence in face-to-face therapy, though its utility in digital interventions is unknown. Social presence—the extent to which a digital encounter feels like it is occurring in-person—is another factor bolstering engagement with digital content (e.g., online health information). However, it has not been explored in a clinical context. This pilot study explored the development of therapeutic alliance and social presence in a digital mindfulness-based intervention (MBI) for adolescents recovering from concussion.
Methods: Adolescents ages 12-18 years were recruited from GF Strong Rehabilitation Centre's Adolescent Complex Concussion Clinic if they had post-concussion symptoms for >1-month post-injury, or from the CHEO Emergency Department within 48h of concussion. Participants completed a 4-week MBI delivered via smartphone application. At 4 weeks, participants completed questionnaires and a semi-structured interview exploring their experience of therapeutic alliance and social presence with the digital intervention guides.
Results: Data collection is ongoing (n=10 completed, n=3 currently enrolled). Quantitative and qualitative findings will be presented to characterize participants' experiences of therapeutic alliance and social presence with the digital intervention guides.

Conclusion: Therapeutic alliance and social presence may be promising modifiable factors that increase participant engagement with self-guided digital interventions. Understanding the aspects of interventions important to the development of therapeutic alliance and social presence will inform subsequent modifications to the app.

Graded exposure therapy for adults with persistent post-concussion symptoms: A historical controlled trial

***Mathilde Rioux**, Gabriel McKeown, Penelope M.A. Brasher, Keith Owen Yeates, Ana-Maria Vranceanu, Deborah L. Snell, Molly Cairncross, William J. Panenka, Chantal T. Debert, Mark T. Bayley, Cindy Hunt, Matthew J. Burke, Andrew Baker, and Noah D. Silverberg*

Background/Aims: Excessive avoidance of activities feared to trigger symptom exacerbation is associated with slow recovery from concussion. By targeting fear avoidance behaviour, graded exposure therapy (GET) may improve concussion outcomes. We aimed to determine whether GET is more effective than usual care at reducing post-concussion symptoms (PCS) and disability following concussion.
Methods: In a historical controlled design, we compared cohorts from two independent studies. All participants were recruited from the same concussion clinics. Participants receiving GET (N=30; 2019-2020) completed 16 videohealth sessions. The comparison group (N=62; 2017-2018) received usual care. Participants rated PCS severity (Rivermead Post Concussion Symptoms Questionnaire; RPQ) and disability (World Health Organization Disability Assessment Schedule; WHODAS 2.0 12-item) at clinic intake (median=2.6 months post-injury) and again median=2.3 months later.
Results: Mean raw RPQ change was -15.0 (SD=10.9) for the GET group and -5.3 (SD=11.5) for the comparison group, standardized mean difference=-0.87 (95%CI=-1.33, -0.39). On the WHODAS, mean change was -5.2 (SD=4.2) Rasch points for the GET group and -3.4 (SD=5.1) for the comparison group, standardized mean difference=0.39 (95%CI=-0.83, 0.08). Repeated-measures ANOVAs to adjust for group differences in time of assessments yielded similar estimates. There was a main effect of time on the RPQ (p=.006) and WHODAS (p=.017) but the time-by-group interaction was only significant for the RPQ (p<.001).
Conclusions: PCS improved over time but more so for participants receiving GET compared to usual care. A similar, although weaker, pattern was apparent for disability. This non-randomized study supports GET as a potentially effective treatment for persistent PCS.

Association between DASH and shoulder muscle strength in upper trunk and pan-plexus brachial plexus injuries

***Sahil Chawla**, Sean Bristol, Kristine M Chapman, Chris Doherty, Alex Seal, Emily M Krauss, Cameron Cunningham, Russell O'Connor, Kristin Jack, & Michael J Berger*

BACKGROUND: Muscle strength measured with Medical Research Council (MRC) grading is the most commonly reported outcome in patients with brachial plexus injuries (BPI), but it's unclear whether it correlates with functional outcomes. The objective of this study was to investigate whether shoulder muscle strength using MRC is associated with upper extremity function in patients with either an upper trunk pattern of injury, pan-plexus, or axillary palsy injury, with minimally impacted hand function.
METHODS: Data were obtained from a two-center prospectively collected database of peripheral nerve injuries. Upper extremity function was measured using the Disabilities of the Arm, Shoulder, and Hand (DASH) questionnaire. Muscle strength was assessed with MRC for elbow flexion, shoulder abduction and shoulder external rotation. A fourth MRC score was calculated as the sum of three MRC scores.
RESULTS: Twenty-one patients met inclusion criteria (mean age=51.7±16.2). The median DASH score was 53 (range, 18-88; CV, 34.7%). The median MRC Score for elbow flexion was 4+ (range, 0-5), shoulder abduction was 1 (range, 0-5), shoulder external rotation was 0 (range, 0-5), and sum score was 8 (range, 0-21). All subjects had greater than anti-gravity strength in their finger flexors and abductors (MRC>3). There was no significant correlation between DASH score and individual/sum MRC scores (p>0.05).
CONCLUSION: Our study demonstrated no relationship between DASH and MRC scores in patients with an upper trunk BPI pattern. This suggests other factors besides muscle strength more heavily influence DASH score. Further research is required to determine optimal outcome measures for individuals with BPI.

Effect of Isometric and Isotonic Exercise on Total Knee Arthroplasty Outcome Systematic Review and Meta-Analysis

***Farzad Ravari**; William C. Miller; & Brodie Sakakibara*

Background. Knee osteoarthritis (OA) is one of the most common joint disorders that leads to the destruction of cartilage and disability, with a prevalence of 10% in males and 13% in females. Approximately every year 135,800 cases of total knee arthroplasty (TKA) are performed in Canada at a cost of $1.4 B and almost all of them need rehabilitation for faster recovery and return to daily activity.
Purpose. The purpose of this study is the evaluation of the effect of rehabilitation before (prehabilitation) and after surgery on the outcome of TKA.
Study Selection. The study was RCT based on the PICO model in individuals more than 19 years old, with rehabilitation before or after surgery.
Data Source. The main sources of databases were Embase, Medline, and CINAHL, PubMed. The Covidence was used as a searching manager tool, and the quality of studies and outcomes were evaluated by the PEDro scale and the GRADE.
Data Extraction and Synthesis. Following reviewing the studies for data extraction, data synthesis was done by the RevMan tool.
Limitations. The quality of the evidence and heterogeneity of the studies due to baseline data missing in some studies were limitations of the study.
Results. Prehabilitation statistically improved TUG and post-operative rehabilitation improved 6MWT, ROM, ADL, and QOL, but none of them significantly influenced pain score.
Conclusion. The study showed rehabilitation after surgery could have a statistical preference over the outcome, further studies are required to clarify the efficacy and effectiveness of rehabilitation before and after TKA.

DeepLabCut provides reliable kinematic data across a diverse array of tasks in young healthy and chronic stroke populations.

Ronan Denyer and Lara A. Boyd

Background/Aims: Recent advances in artificial intelligence have facilitated the development of DeepLabCut1, an open-source software capable of precisely tracking discrete body parts of interest across time in video. Here we share data from a set of experiments with human subjects showing that (1) DeepLabCut derived kinematic measures are reliable, (2) DeepLabCut can capture kinematic data across diverse tasks, and (3) DeepLabCut can capture changes in reaching performance of chronic stroke participants.
Methods/Results:
First, young healthy participants performed key presses on a keyboard in time with flashing visual metronome stimuli while a video camera captured footage of their fingers. The timing of each key press was recorded by the computer while DeepLabCut was used to extract 2D position data for each video frame. The timing of movements derived from keyboard presses recorded by the computer correlated near perfectly with the timing of keyboard presses derived from the 2D position data ($R = 1$, $p < 2e\text{-}35$), indicating kinematic measures derived from DeepLabCut are reliable. Second, we present data from the TRack And Intercept Task (TRAIT)2, in which participants interact with an augmented reality system and perform reaches to move a spaceship across a television to intercept asteroids. We captured video footage of task performance by 2 moderately impaired chronic stroke participants and found that DeepLabCut reliably identified discrete body parts (wrist, elbow, shoulder) across video frames. We further found that the range of motion of reaching increased across 5,000 trials of practice.
Conclusions: Taken together, our findings suggest that DeepLabCut may represent a reliable open science alternative to costly proprietary motion capture systems, capable of supplying high quality kinematic data across a diverse array of tasks and clinical populations.

POSTER PRESENTATIONS:

Evaluation of the Quality of Current COVID-19 Resources Developed for Individuals with Spinal Cord Injuries

***Pegah Derakhshan**, William C. Miller, Ethan Simpson, Chris McBride, Jaimie Borisoff, Julia Schmidt, & W.Ben Mortenson*

Background: In a crisis such as the COVID-19 pandemic, there is a need for information on dealing with it among people with spinal cord injuries (SCI). Organizations provided resources, but many of them were generic. In some cases, the information was provided by dubious sources, contradictory, or not assessed for usability with individuals with SCI. This study reviewed the current COVID-19 web-based resources for individuals with SCI and evaluated their quality.
Methods: A scoping review for COVID-19-related online resources for individuals with SCI was performed by first identifying SCI-relevant authorities and, subsequently, targeted website searching using a systematic search strategy. The included resources were categorized based on their content and format (e.g., video, infographic, text). The WAVE Web Accessibility Evaluation Tool, the Quality of Life in Essential Tremor Questionnaire, DISCERN, and Infographic Design Rubric were used to evaluate the accessibility and quality of the resources.
Results: The search identified 71 SCI organizations and 10,538 potential resources. Based on inclusion and exclusion criteria, 173 resources were included and categorized based on their content into eight main domains: prevention, caregivers, exercise, COVID-19 impact, mental health, vaccine, nutrition, and telehealth. The average score for the quality of the text, infographic, and video resources are 10.1/28 (Range:3-24), 35.3/44 (Range:23-41), and 53.2/80 (Range:21-77), respectively.
Conclusion: Website resources mainly focused on preventing COVID-19. Only three of them addressed telehealth and virtual care during COVID-19 for individuals with SCI. The results of this study will help us develop an SCI-oriented toolkit for this pandemic and future ones.

Predicting life satisfaction among person with incomplete spinal cord injury who can ambulate

***Murveena Jeawon** B. Sc, Bethany Hase B. Sc, Susanna Miller BA, Janice J Eng PhD; Andrea Bundon PhD; Habib Chaudhury PhD, Jocelyn Maffin B. Sc, Ryan Clarkson Dipl, Jenna Wright BASc, & W. Ben Mortenson PhD*

Background: In Canada, currently 52% of people have incomplete tetraplegia, 18% have incomplete paraplegia and 30% have complete paraplegia or tetraplegia (RHSCIR 2019). People who have an incomplete spinal cord injury (iSCI) will regain some walking capacity, however, the majority of them will have impaired mobility (Zörner et al., 2013; Freschta et al., 2022). Although there has been considerable research exploring life satisfaction (LS) among people with SCI, much less is known about LS among people with iSCI who regain some walking ability. Purpose of the study: 1) to examine relationships between LS and socio-demographic factors in this group, and 2) to explore the perspectives of people with varying levels of LS (low, moderate, and high).
Methods: Semi-structured interviews and standardized measures of function, health, and life satisfaction were used to collect data for this mixed-method study.
Results: The average age of the 24 participants was 55 years, and 46% of them were women. Gender, attended rehabilitation, marital status were strongly associated, and living situation was moderately associated with LS. The qualitative findings supported the quantitative findings, and also revealed how the neighbourhood/built environment was not supportive for people with iSCI who can walk but have mobility limitations. Participants with lower levels of LS reported feeling devalued by able-bodied people.
Conclusion: Findings of this study suggest that the neighbourhood - built environment can be improved and the need for sensitivity training for the general population, which would help to reduce negative attitudes, misperceptions about invisible symptoms and promote inclusion.

The quality and availability of current breastfeeding guidelines for mothers with spinal cord injury: a narrative review

***Laura McCracken**, Leah Rosetti, Stacy Elliott, Amanda Lee, Shea Hocaloski, Karen Hodge, Ineta*

Zobina, Christina-Anastasia Rapidi, Prokopios Manthos, Aggeliki Galata, Tiev Miller, Raymond Chung, & Andrei Krassioukov

Background/Aims: This narrative review aimed to (1) assess the quality of currently available guidelines for breastfeeding, and to (2) identify whether gaps exist regarding breastfeeding recommendations for mothers with SCI.
Methods: An environmental scan was performed to identify existing postpartum and breastfeeding guidelines. Guidelines were evaluated using the AGREE II tool by a group of 13 raters consisting of medical and research experts (n=10) as well as mothers with breastfeeding experience after SCI (n=3). A total of 7 guidelines were identified and evaluated using Domain 1 to determine applicability for mothers with SCI and Domains 2-7 if the guideline specifically targeted mothers with SCI. Scaled scores were calculated for each domain. Free marginal kappa with 95% confident intervals (95% CI) and % agreement were used for determining inter-rater agreement.
Results: Of the 7 guidelines appraised, only one mentioned SCI (Postpartum Care in SCI from BC Women's Hospital, scaled score=34.5%). There was large variability between domains with none being >50%, suggesting substantial limitations. Overall agreement ranged from 15.81% to 67.31% with slight to good inter-rater agreement between appraisers (n=13, kappa range=0.02–0.62, 95% CI: -0.05–0.80). All other guidelines were appraised for Domain 1 only (scaled scores range=0.5%–17.7%). Overall agreement ranged from 47.01%–93.33%, with fair to excellent inter-rater agreement between appraisers (n=10–13, kappa range=0.38–0.92, 95% CI: 0.03–1.00).
Conclusion: Overall, we found that most guidelines did not specifically meet the needs of mothers with SCI and that developing new guidelines are needed moving forward.

Time commitment and perceived difficulty of cleaning catheters for re-use among adults with spinal cord injury

***Liza Roik**, Tiev Miller, Claire Shackleton, Soshi Samejima, Rahul Sachdeva, Matthias Walter, & Andrei Krassioukov*

Background: Bladder dysfunction is common among people with spinal cord injuries (SCI). Although intermittent catheterization (IC) is performed to facilitate routine voiding, IC is both time and resource intensive. Despite the potential risk for developing urinary tract infections, people with SCI often re-use their catheters. A known barrier of IC is the preparation (i.e., cleaning) of catheters for re-use.
Objectives: To assess (1) the time commitment, and (2) perceived difficulty in cleaning catheters for re-use among adults with neurogenic lower urinary tract dysfunction following SCI.
Methods: Two individuals with chronic SCI (1 tetraplegic, C7, AIS D, and 1 paraplegic L2/L3, AIS D, both ≥ 1 year since injury) participated. Using a standardized procedure (i.e., "Milton method" involving the dilution of 6mL of sterilizing solution in 1L of cold water for a final concentration of 0.6% sodium hypochlorite), catheter cleaning was timed for each participant. Catheter cleaning routine difficulty was assessed with a 5-point Likert scale. Motor function was assessed with the Upper Extremity Motor Score (UEMS).
Results: Cleaning time, motor impairment, and perceived difficulty were comparatively greater for the participant with tetraplegia (total cleaning time=25m:24s UEMS=45, average difficulty rating=2.1) than the participant with paraplegia (total cleaning time=20m:25s UEMS=50, average difficulty rating=1.9).
Conclusions: Our preliminary results suggest that cleaning catheters for re-use using this method is relatively more time-intensive and difficult for people with a higher neurological level of injury and more pronounced upper limb motor impairment. This study is currently on-going with a target sample of 20 participants.

Dance first, think later: A case-series on the cardiometabolic demands and psychosocial effects of wheelchair dancing in people with spinal cord injury

***Tiev Miller**, Claire Shackleton, Soshi Samejima, Ali Hosseinzadeh, Amanda H.X. Lee, Rahul Sachdeva, Tom E. Nightingale, & Andrei V. Krassioukov*

Background: This case-series investigated the energy expenditure, cardiovascular responses and psychosocial outcomes during two wheelchair dancing routines with different tempos.
Methods: Three individuals with chronic, non-traumatic spinal cord injuries (SCI) [males, age: 42±13 years, C3-T12, AIS D, schwannoma=1,

poliomyelitis=1, ependymoma=1] performed one slow (Rumba, 80 bpm) and one fast (Salsa, 170 bpm) wheelchair dance routines. Physiological [heart rate (HR), blood pressure (BP), relative oxygen consumption (VO2), metabolic task equivalent (MET)] and psychosocial parameters [ratings of perceived exertion (RPE), enjoyment (EES) and Brunnel Mood Score (BRUMS)] were measured pre, during, and post-dancing.

Results: All participants showed an elevation in HR and relative VO2 from rest to dancing with a subsequent decrease in these parameters post-dance for both routines (HR: rest=72.7±18.9bpm, dance=83.9±18.6bpm, post-dance=76.5±15.1bpm; relative VO2: rest=3.14±0.44ml/kg/min, dance=6.83±2.10ml/kg/min, post-dance=4.67±1.17ml/kg/min). Relative to the slow dance routine, two out of three participants demonstrated greater ΔHR, Δabsolute VO2, Δrelative VO2, ΔRPE and ΔEES during the fast dance routine. For all three participants, METs ranged from 1.7-2.4 (slow) and 2.1-3.8 (fast), suggesting the intervention was of light to moderate intensity for slow and fast dance routines, respectively. Enjoyment ratings ranged from "quite a bit" to "extremely" (EES=5-6, slow; EES=6-7, fast). No differences were observed for BRUMS subscales.

Conclusion: This case-series offers a preliminary understanding of the acute cardiometabolic and psychosocial responses to wheelchair dance routines of differing intensities performed by individuals with SCI. Responsiveness observed among these participants suggests the potential use of wheelchair dance for promoting physical activity and improving psychological well-being.

The Long-Term Effect of Cervical Transcutaneous Spinal Cord Stimulation on Cardiovascular Regulation in Chronic Cervical Spinal Cord Injury: A Case Study

***Kawami Cao**, Soshi Samejima, Tristan W. Dorey, Claire Shackleton, Tiev Miller, Laura McCracken, Rahul Sachdeva, & Andrei Krassioukov*

Background: Cervical spinal cord injury (SCI) disrupts sympathetic cardiovascular control, often leading to blood pressure (BP) dysregulation including orthostatic hypotension (OH). Heart rate variability (HRV) and BP variability (BPV) assess autonomic balance. We aimed to investigate whether cervical transcutaneous spinal cord stimulation (TSCS) reduces OH severity by improving autonomic cardiovascular control. We hypothesized that TSCS improves control of sympathetic activity without adverse cardiovascular effects.

Methods: A 29-year-old female with chronic C6 motor-complete SCI and symptomatic OH underwent two months (3x/week, 90minutes/session) of cervical TSCS (LIFT System, ONWARD medical, N.V.) and upper extremity exercise. Electrocardiogram and continuous BP were recorded at rest and during the Head-Up Tilt Test (HUTT) pre- and post-intervention. Frequency-omain analyses of resting RR-intervals and systolic BP extrapolated autonomic influences on the cardiovascular system. Low-frequency (LF, 0.04-0.15Hz) and high-frequency (HF, 0.15-0.4Hz) power were used for analysis.

Results: The participant exhibited improved resting systolic BP (96mmHg to 119mmHg) and reduced OH severity (-56.9mmHg to -24.5mmHg) from baseline to post-intervention. HRV at rest showed increases in LF and HF power post-intervention, suggesting increased autonomic activity. LF power of BPV at rest increased post-intervention, possibly indicating improved sympathetic activity of the vasculature. There were no adverse cardiovascular effects.

Conclusion: This is a preliminary investigation of the effects of cervical TSCS on autonomic cardiovascular regulation in chronic cervical SCI. Results show improved resting BP and BP control during orthostatic challenge. Concomitant changes in HRV and BPV following long-term cervical TSCS suggest amelioration of SCI-related cardiovascular dysfunction through sympathetically mediated vascular tone.

Effect of Fixed ratio Oxycodone/Naloxone (Targin) on Pain and Constipation Control in an Individual With Chronic Spinal Cord Injury: A Case Report

*Rahul Sachdeva, **Ali Hosseinzadeh**, Aaron Rizzardo, Andrea Maharaj, Michael Berger, & Andrei Krassioukov**

Background: Among the spinal cord injury (SCI) population, about 60% of patients develop pain within days to weeks post-injury, which ultimately persists into chronic stages. Opioids are widely used in this population and have efficacy in treating chronic pain, but they may not be well-tolerated due to consequences such as opioid induced constipation (OIC). Moreover, the superimposed effect of

neurogenic bowel and OIC may increase severity of autonomic dysreflexia (AD) episodes, reduced quality of life and discontinuation of medication. Various clinical trials have shown efficacy of combination oxycodone/naloxone (Targin®) in decreasing OIC in cancer patients, while population of spinal cord injury (SCI) is understudied. The following case report describes the effectiveness of Targin® on controlling pain and OIC, as well as autonomic functions in SCI population.

Methods: A 55 year-old male with C5 AIS-A tetraplegia who underwent opioid treatment for 9 years was recruited. The pain severity was assessed using revised McGill short form (SF-MPQ-2) and visual analog scale of pain (VAS) questionnaires. The bowel function was assessed using patient assessment of constipation symptoms (PAC-Sym) and quality of life (PAC-QoL). The autonomic function was evaluated via 24-hour ambulatory blood pressure monitor.

Results: Following the 8-week course of the clinical trial in 2020, Targin@ alleviated patient's pain severity by at least 67%, improved both bowel function and satisfaction and decreased the severity of bowel management associated AD by 24.8%.

Conclusion: This case study shows the possible effectiveness of Targin® in managing chronic pain and OIC following SCI.

Adaptation of Physiological Arousal and Step Symmetry During a Split-Belt Walking Paradigm

***Eric McGinn**, Stephanie Ross, & Courtney Pollock*

Background: It has been shown that an individual's perception of challenge/risk of negative outcomes such as falling, can influence the motor control of balance performance. Electrodermal activation (EDA) provides an objective measurement of arousal associated with these perceptions. It is established that when asymmetrical walking conditions are imposed during split-belt treadmill walking, participants will adapt step length bilaterally to achieve a symmetrical gait pattern despite asymmetric belt velocities. Aims: Our principle aim for this study was to develop a fundamental understanding of how physiological arousal changes during gait adaptation to a split-belt walking challenge.

Methods: Participants Healthy people 19-40 years old will perform a walking paradigm that includes two familiarization conditions, a split-belt condition, and a de-adaptation condition. EDA will be measured by quantifying conduction between two electrodes on the hand. Measures: Step-length asymmetry will serve as our indication of motor adaptation. Both EDA and step-length asymmetry will be fit with an exponential function (y = a * e^(-x/t) + c) and the decay constant (t) will be calculated to quantify the overall rate of adaptation for both measurements during the split condition.

Preliminary Results: Based on our pilot data (n=4), EDA and step-length asymmetry adapt according to the exponential function above. We have observed consistently lower t-values for EDA compared to step-length asymmetry, suggesting that EDA adapts more rapidly than step-length asymmetry.

Conclusion: We believe that our study will demonstrate a relationship between EDA and motor adaptation, which can then be built upon in future studies.

Access to neurorehabilitation interdisciplinary outpatient programs in British Columbia

***Nathan Chen**, Andre Prescott, & Paul Winston*

Aim: This survey explored access to British Columbia (BC) hospital-based neurorehabilitation outpatient programs (HB-NROPs).

Methods: Interviews with rehabilitation-focused health care providers across regions of BC were conducted.

Participants: Twelve individuals were practicing physiatrists, one was a physiotherapist, one was an orthotist, and one was a rehabilitation program coordinator.

Results: Wait times for HB-NROPs were up to three months for initial appointments and inclusion criteria was variable. Two HB-NROPs had occasional access to specialized physicians. Informal communication methods were preferred modes of collaboration.

Conclusion: BC HB-NROPs varied in access, use of interdisciplinary care and outcome measures used to measure performance. The lack of coverage for non-physician services may be a barrier to collaborative care in the community. Future projects should explore solutions to improve funding and equal access to BC HB-NROPs.

Ultrasonographic Evaluation of Muscle Quality after Anterior Interosseous to Ulnar Nerve Transfer for Chronic Cubital Tunnel Syndrome

***Lee Bauer**, MD, BSc, Michael Berger, MD, PhD, BSc, FRCPC, Chris Doherty, MD, MPH, FRCSC, Sean Bristol, MD, FRCSC, Emily Krauss, MD, BSc, MSc, FRCSC, Alex Seal, MD, FRCSC, Kristin Jack, MD, FRCPC, Kristine Chapman, MD, FRCPC, Russel O'Connor, MD, FRCPC, & Cameron Cunningham, MD, FRCPC*

Background: Surgical management for chronic cubital tunnel syndrome (CCTS) may be augmented by transferring a branch of the anterior interosseous nerve (AIN) supplying pronator quadratus (PQ) to the distal ulnar motor bundle (AIN-U), to improve ulnar intrinsic muscle strength. Our study used ultrasound to measure muscle quality after AIN-U.
Methods: 8 adults (2 females and 6 males, mean age 57 ±12 years) were evaluated at a mean 34 ±15 months post AIN-U. Dominant arms of 8 healthy individuals (3 females and 5 males, mean age 32 ±6 years) were evaluated as controls. Ultrasound images were captured of the first dorsal interossei (FDI), abductor digiti minimi (ADM), and PQ. Images were manually segmented to determine muscle thickness and mean echogenicity. We also obtained Compound muscle action potential (CMAP) amplitudes of FDI and ADM.
Results: Comparing AIN-U arms to controls, there was significant difference in FDI echogenicity (105.9 ±18.9 vs. 58.0 ±14.3, p=0.0086), and PQ echogenicity (140.0 ±14.0 vs. 61.6 ±14.4, p=0.0022), but no significant difference (p>0.05) in FDI thickness, ADM thickness, ADM echogenicity or PQ thickness. Echogenicity correlated significantly with CMAP in FDI (r=-0.71, p=0.0002), but not in ADM.
Conclusions: Our study demonstrates: 1) after AIN-U in CCTS, FDI muscle echogenicity is still increased compared to controls, indicative of irreversible muscle fibrosis, 2) ADM echogenicity was similar between AIN-U and control groups, likely reflective of the preferential fascicular involvement of FDI in CCTS, 3) FDI muscle echogenicity negatively correlates with CMAP amplitude, highlighting the utility of this parameter in clinical evaluations.

Ultrasound Evaluation of Critical Forearm Muscles Involved in Grasp Function

***Emmanuel Ogalo** BKin, MSc Candidate, Hannah Ro, & Dr. Micheal Berger, MD, PhD*

INTRODUCTION: Evaluating critical muscles responsible for grasp function following neuromuscular disease bears increasing significance. Ultrasound (US) may be a useful alternative to electrodiagnostic assessment.
OBJECTIVE: To determine optimal US measurement sites exhibiting the highest degree of reliability for maximal cross-sectional area (CSA) and muscle thickness (MT) measurements in clinically relevant forearm muscles involved in grasp.
METHOD: Cross-sectional B-mode images were captured in 19 healthy participants (age=24.7±8.2; 13F, 6M), using standardized gain, depth, and frequency settings. Images were obtained in 2cm increments from fixed forearm anchor points (lateral epicondyle for extensor carpi ulnaris (ECU), ulnar styloid for extensor Indicis (EI), and the wrist crease for flexor pollicis longus (FPL). CSA and MT were measured at each site. US scans were performed by an experienced examiner and a student with limited US experience (n=10).
RESULTS: Intraclass correlation coefficient (ICC) with 95% confidence intervals (CI) for maximal CSA was 0.98 for ECU (CI: 0.91-0.99), 0.89 for EI (95% CI, 0.40-0.97), and 0.95 for FPL (CI: 0.81-0.99). ICC for maximal MT measurement was 0.98 for ECU (CI: 0.91-0.99), 0.90 for EI (CI: 0.59-0.98), and 0.87 for FPL (CI: 0.48-0.97). The correlation between maximal CSA and MT was weak-moderate (ECU r=0.02, EI r=0.58, FPL r=0.31). Normative values for CSA and MT, as well as optimal scanning sites for these muscles were also determined.
CONCLUSION: US evaluation of MT and CSA exhibit excellent interrater reliability. Standardized measurement locations and normative data may improve the accuracy of US evaluation of MT and CSA when monitoring adaptations to neuromuscular disease affecting forearm muscles.

Assessing the Usefulness of Electrodiagnosis in Patients with Complex Regional Pain Syndrome: Informing Diagnosis and Management

***Fraser MacRae**, Ève Boissonnault, Paul Winston*

Objective: To categorizes the diagnosis and treatment of nerve injuries in CRPS patients based on electrodiagnostic findings.
Design: Retrospective cohort analysis of patients diagnosed with CRPS.
Setting: Outpatient physical medicine and rehabilitation clinic.
Subjects: Patients who had abnormal electrodiagnostic findings, with CRPS.
Methods: A database was created of all patients treated for CRPS with electrodiagnostic findings. Patients were analyzed by type of nerve injury, treatment, and outcome.
Results: 41 participants fit into three groups. (1) Those who have a discrete nerve injury that likely occurred at or around the time of the initial traumatic CRPS inciting event (n = 21). (2) Those who had an isolated median neuropathy and later developed CRPS (n = 16), (3) Those who developed a discrete nerve injury due to the sequelae of their CRPS manifestations (n = 4).
Category 1 patients likely had symptoms either CRPS I or II, as the difference between the sub-types is not concrete. Category 2 patients likely had pure CRPS II - discrete nerve injury instigating CRPS symptoms. Category 3 patients likely had compression of a peripheral nerve due to the inflammation of CRPS I.
Conclusions: The use of electrodiagnosis offers insight into the nature of the injuries and may reveal missed diagnoses of the presence of discrete nerve injuries. The results of electrodiagnosis can inform best practice interventions and assist in the diagnosis and treatment of CRPS. We recommend integrating electrodiagnostic measures as potential screening tools during the assessment of suspected CRPS. Nerve specific interventions may be beneficial.

Canadian Physicians' Use of Perioperative Botulinum Toxin Injections to Spastic Limbs: A Cross-sectional National Survey

***Farris Kassam**, BSc, Sepehr Saeidiborojeni, MD, Heather Finlayson, MD, FRCPC, Paul Winston, MD, FRCPC, & Rajiv Reebye, MD, FRCPC*

Background/Aims: Perioperative botulinum toxin (BoNT) injections are known to lead to a reduction of pain and spasticity. The aim of this paper is to investigate the practice patterns of Canadian physicians who use perioperative BoNT injections to improve surgical outcomes on spastic limbs.
Methods: A cross-sectional national survey composed of an invitation email and an 18-item questionnaire was disseminated by a national physical medicine and rehabilitation (PM&R) society to 138 physician members involved in spasticity management.
Results: Most respondents (74%) used BoNT injections for perioperative treatment for patients with limb spasticity undergoing surgery. Of those surveyed, 65% of physicians used BoNT preoperatively, 21% used BoNT intraoperatively, and 24% used BoNT postoperatively.
Of the physicians who performed BoNT injections preoperatively, 6% performed BoNT injections 7 to 12 weeks preoperatively, 32% performed BoNT injections 4 to 6 weeks preoperatively, 47% performed BoNT injections 2 to 3 weeks preoperatively, and 15% performed BoNT injections 0 to 1 week preoperatively. The majority of physicians (85%) responded that injecting BoNT perioperatively may improve a patient's surgical outcome and all of the participants (100%) stated that BoNT did not contribute to any perioperative complications or adverse effects. Qualitative responses emphasized that successful outcomes from the perioperative BoNT were linked to enhanced collaboration with surgeons.
Conclusion: The optimal timing for perioperative BoNT was suggested to be 2 to 3 weeks before the surgery by 47% of survey respondents. All participating physicians responded that perioperative BoNT did not contribute to any known perioperative complications or adverse events.

Cryoneurolysis of the femoral nerve for the treatment of focal spasticity in two ambulatory patients

*Ève Boissonnault, **Fraser MacRae**, Mahdis Hashemi, & Paul Winston*

Background: Spasticity of the lower limb may lead to reduced knee flexion and impair gait in Multiple Sclerosis (MS). Cryoneurolysis is an emerging technique for spasticity management.
Aims: To demonstrate cryoneurolysis of the femoral nerve to the rectus femoris for the longer-term management of spasticity.
Methods: Two patients with a history of MS, undergoing lower limb spasticity, are followed. One had previously undergone cryoneurolysis of the ipsilateral tibial nerve. Cryoneurolysis of the femoral

nerve was performed under ultrasound and electrical stimulation guidance. 3 lesions were created by freezing at different places along the nerve.

Results:

One Month

Patient 1: Modified Ashworth Scale (MAS) improved from 3 to 2. V1 and V3 (Tardieu Scale) did not change (115°, 70°). V2 increased from 35° to 45°. 10m walk time quickened from 20.14s to 12.55s with a hip flexion assist and from 21.15s to 13.17s without.

Patient 2: MAS improved from 2 to 1; V1 increased from 130° to 145°; V2 improved from 50° to 65°. The 10m walk time worsened marginally (7.86s before, 8.12s after).

Three Months

Patient 1: MAS remains at 2; V1, V2, and V3 increased to 125°, 55°, and 75° respectively; the 10m walk test improved to 12.49s with a brace and slowed to 14.82s without a brace.

Conclusion: Cryoneurolysis is effective as a novel treatment for lower limb spasticity in MS. This treatment may be considered for patients presenting with lower limb spasticity resulting in reduced knee flexion.

Patient perspectives on interdisciplinary peripheral nerve trauma care

Aidan Pye *BSc, Suzy Stanton, Sean Bristol MD2, Kristine M. Chapman MD and Michael J. Berger MD, PhD*

Background/Aims: Peripheral nerve injury (PNI) is a debilitating condition leading to muscle weakness, chronic pain, and loss of function. PNIs are treated through interdisciplinary clinics in many Canadian centers, where patients see surgeons, neurologists, physiatrists and electrodiagnostic. The purpose of this study was to assess patients' perceptions of the effectiveness of the delivery of care and healthcare information in an interdisciplinary PNI clinic.

Methods: A cross-sectional study was undertaken using a survey. Participants were patients of an interdisciplinary PNI clinic. The survey included 5-point Likert scales for measuring patient understanding and open-ended questions- these were categorized into themes using conventional content analysis. The survey was co-designed by a patient-partner.

Results: Twenty complete responses were obtained; 65% were male, 35% were female and the mean age was 42.6±17.8. Median scores of 4 for patient understanding of the testing purposes, test results, nerve recovery, and surgical decision-making, were obtained. When asked about improving the clinical experience, 58% indicated no improvements were necessary, while 17% indicated the clinic felt overwhelming. When asked about positive aspects of their clinical experience, 64% appreciated the team approach, 27% valued the informative nature of the clinic, and 27% appreciated the progress they felt when providers at the clinic performed nerve testing.

Conclusions: The results of this study demonstrate that patients with PNI have positive perceptions of delivery of care and information in an interdisciplinary peripheral nerve clinic. These results provide insight into how interdisciplinary care may be beneficial to PNI patients.

Subjective Memory Problems After Concussion

Edwina Picon*, Dr. Noah Silverberg, Dr. Daniela Palombo, & Dr. Rebecca Todd*

Background/Aims: Subjective memory problems - forgetting names, leaving important objects at home - are among the most common lingering concussion symptoms. Memory complaints after concussion are largely unrelated to injury severity, objective memory performance, or neuroimaging metrics of the brain's structural integrity and may be a manifestation of Functional Cognitive Disorder (FCD). Biased metacognition, i.e., misjudging one's own cognitive performance and abilities as worse than they actually are, might be a key mechanism underlying FCD and can be conceptualized moment-to-moment, as local metacognition (i.e., judgment of confidence in a decision) and more generally, as global metacognition (longer-term evaluations of overall cognitive performance). We aim to investigate whether local and global metacognition correlate with memory perfectionism, a psychological factor thought to contribute to FCD. We hypothesize that participants with possible-FCD-after-concussion will display greater metacognitive bias on a memory task and higher scores on functional memory symptom questionnaires compared to healthy controls.

Methods: A cross-sectional study of adults with (n=35) and without (n=20) a recent concussion. Participants completed questionnaires,

neuropsychological and performance validity testing with an experimenter over Zoom, and a metacognitive memory and perception task.
Results: Preliminary results indicate that the possible-FCD-after-concussion-group has similar memory performance, memory perfectionism, and local metacognition compared to the control group, despite having a higher functional cognitive symptom burden.
Conclusion: Lingering subjective memory problems after concussion might be indicative of a functional cognitive disorder, especially when objective memory performance is unimpaired. Intact local but impaired global metacognition seems to be a unique characteristic of this population.

Priorities For Quality Of Life After TBI

***Jasleen Grewal**, Dr. Julia Schmidt, & Anika Cheng*

Traumatic brain injury (TBI) is highly prevalent injury with serious long-term consequences. Individuals with TBI experience high rates of poor health and social outcomes such as reduced physical capacity, limited social participation, issues with mental health, and unstable housing. Given these impacts, individuals with TBI can experience reduced quality of life (QOL). Clinicians work with individuals with TBI to help improve their engagement in daily life thereby, improving QOL. While existing research indicates various factors involved in promoting QOL after TBI, there is limited research using patient-partnered approaches on priorities to improve QOL from the perspective of people with lived experience. In this study we will conduct a mixed-methods study to identify individual's priorities for QOL post-injury. A structured consensus process, the TRIAGE method, will be used to collect information through focus groups with individuals with TBI. Qualitative data analysis of will be conducted using thematic analysis; quantitative data will be analysed using descriptive statistics. This work is currently underway and will be completed by December 2022. The key priorities to improve QOL will be determined by people living with TBI. Clinically, these findings will inform how clinicians prioritise rehabilitation goals with individuals with TBI. Results will also inform community programs developed and facilitated by clinicians in private and public settings.

Living in a reshaped reality: Exploring social participation and self-identity after TBI

***Rinni Mamman**, W. Ben Mortenson, Jennifer Fleming, and Julia Schmidt*

Background/Aims: Individuals with a moderate to severe traumatic brain injury (TBI) experience substantial changes in their life after injury. This constructivist grounded theory study aimed to understand life experiences after TBI and explored the impacts on social participation and self-identity.
Methods: Sixteen participants with moderate to severe TBI (>12-months prior) (mean age= 49.8, 69 % male) were recruited. Data from semi-structured interviews were analysed thematically.
Results: An overarching theme of 'living in a reshaped reality' was identified, which depicted how changes in social participation and self-identity influenced ongoing experiences with TBI. Three main themes were generated: 1) 'there's nothing that's the same' highlighted the daily challenges individuals faced post-injury, 2) 'rebuilding and restarting' described how individuals with TBI navigated through their unfamiliar reality, and 3) 'embrace it and run with it' explored participants' reactions towards life with a TBI.
Conclusion: These findings are further illustrated through an explanatory model. Future research and clinical practices can build on this understanding to develop programs to help individuals address their needs in post-injury life.

Enabling Meaning after Brain injury through Acceptance and Resiliency Construction (EMBARC)

***Rebecca Tsow**, Courtney Pollock, Swati Mehta, Alyssa Turcott, Ruthine Kang, & Julia Schmidt*

Background/Aims: People with brain injury often struggle to reconcile their previous selves with who they are after injury, which can lead to anxiety and depression (Ownsworth, 2018). Programs and services that emphasize acceptance, resiliency and life meaning over the pursuit of able-bodiedness can promote successful rehabilitation (Villa et al., 2021). However, little is known of existing community programs that address these priorities. This study aims to: 1) Explore community programs and services that foster acceptance, resiliency, and meaning after

brain injury, and 2) Understand the barriers and facilitators to implementation of these programs.
Methods: A participatory focus group design with patient partnership will be used to explore experiences of conducting brain injury programs and barriers and facilitators to their implementation. Approximately 32 participants will be recruited from community organizations that conduct programs for people with brain injury. Using a manifest content analysis approach, focus group data will be analyzed while minimally deviating from information provided by participants (Kleinheksel et al., 2020). Focus groups will be conducted online (i.e., through Zoom).
Results: This study is ongoing; data will be finalized by June 2022. Results will be presented as categories with supporting quotations from participants. Findings will highlight existing brain injury resources, reveal program barriers and facilitators, and suggest priorities for adapting existing services or developing future community programs.
Conclusion: This study will inform individual- and community-level approaches to promote meaningful life after brain injury. Overall, findings will contribute knowledge to the rehabilitation field, supporting future programming for people with brain injury.

Exploring loneliness during the COVID-19 pandemic in the elderly and disability population

***Niloufar Benam**, William C. Miller, Gordon Tao, W. Ben Mortenson, & Julia Schmidt*

Introduction: The coronavirus disease 2019 (COVID-19) led to a global pandemic, declared by the World Health Organization (WHO) in March 2020. Public health measures were implemented across the world to reduce the spread of the disease. These measures created disruptions in occupations that fostered connection, especially for the elderly and disability populations. As a result, people experienced loneliness and reduced mental health and well-being. However, the factors that impacted loneliness during the COVID-19 pandemic are unclear. Objectives: To investigate factors associated with levels of loneliness among elderly and disability populations after 12-months following COVID-19 physical restrictions.
Methods: A total of 72 British Columbian adults belonging within the elderly (>64 years) or the disability population were included. Participants were interviewed with online surveys on their levels of anxiety, depression, social support, and loneliness. Data were analysed using multiple linear regression to investigate the association between the independent variables, anxiety, depression, social support, and the dependent variable, loneliness.
Results: Our analysis showed a significant positive correlation between anxiety and loneliness ($\beta = 0.363$, $p < 0.05$), and a significant negative correlation between social support and loneliness ($\beta = -0.360$, $p < 0.05$). There was no significant correlation between depression and loneliness ($\beta = 0.142$, $p > 0.05$).
Conclusions: Facilitating engagement in occupation to reduce anxiety and improve social support may be helpful in reducing loneliness in the elderly and disability populations. Occupational Therapists may help facilitate reduced loneliness through anxiety reduction strategies and increased social support.

The microbiological and physical properties of catheters for intermittent catheterization: A systematic review on the impact of reuse and cleaning

***Mark Grasdal**, Dr Matthias Walker, & Dr Andrei Krassioukov*

Background and purpose: To review systematically the clinical evidence of the effectiveness of various intermittent catheter cleaning methods that have been proposed as methods to prepare catheters for re-use.
Methods: A keyword search in Medline, Excerpta Medica dataBASE, the Cumulative Index to Nursing and Allied Health Literature, Web of Science and Cochrane Central Register of Controlled Trials, was undertaken to identify all English, Russian and German language literature evaluating the effectiveness of various intermittent catheter cleaning methods. Studies selected for review included analytical experimental, prospective cohort and cross-sectional. Cleaning methods reviewed included heat-based sterilization, chemical cleaning solutions, mechanical abrasion, photocatalytic sterilization, and combined methods.
Results: Overall, 12 studies were included. Heat-based sterilization and mechanical abrasion methods were either not effective or damaged the physical properties of catheters. Two studies reported evidence that their chemical cleaning methods (i.e., soaked catheters in a 70% alcohol solution for 5 minutes or combined approach detergent wash followed by soaking in Milton sterilizing fluid also known as the Milton method) both preserved the

structural integrity of their catheters and were bactericidal.
Conclusions: Numerous cleaning methods resulted in the destruction of catheters. However, there are two reported cleaning methods, submersion for five minutes in 70% alcohol and the Milton method, that eliminate bacterial colonization while leaving the physical properties of the catheters unchanged. While these cleaning methods are promising, higher-powered / longitudinal studies confirming the safety and efficacy of these cleaning methods must be obtained before current clinical recommendations can be modified.

Validating the Accuracy of a Fully Implantable Optical Sensor for Monitoring Spinal Cord Hemodynamics and Oxygenation

***Katharina Raschdorf**, Amanda Cheung, Shahbaz Askari, Farnaz Sahragard, Megan Webster, Kitty So, Mahta Khoshnam Tehrani, Sid Gunamalai, Garrett Frank, Femke Streijger, Babak Shadgan, & Brian Kwon*

Background: Current clinical guidelines for the early management of spinal cord injury (SCI) patients emphasize mean arterial pressure (MAP) augmentation for seven days post-SCI. However, to assess the effectiveness of MAP augmentation on spinal cord perfusion, we must develop new techniques that enable us to monitor the injury site continuously in real-time over the first week post-SCI. To address this clinical need, a miniaturized prototype of a fully implantable optical sensor, based on near-infrared spectroscopy (NIRS), was developed to monitor spinal cord oxygenation and tissue hemodynamics from the injury penumbra. This study aimed to validate the accuracy of the NIRS system against an invasive, combined PO2/blood flow (OxyFlow) sensor in response to a physiologic challenge (i.e., hypoxia).
Methods: We performed six non-survival experiments on uninjured Yucatan miniature pigs. A prototype of a fully implantable, multi-wavelength NIRS system was laid onto the dura. A pair of intraparenchymal OxyFlow sensors were inserted into the ventral aspect of the spinal cord tissue underneath the NIRS sensor. Using a linear regression approach, the magnitude of change in response to moderate-severe hypoxia in NIRS parameters (hemoglobin difference (Hbdiff), tissue oxygenation index (TOI%) and total hemoglobin (THb)) was compared to OxyFlow parameters of PO2 and spinal cord blood flow.
Results/Conclusions: Overall, the NIRS parameters were within ±20% of typically observed OxyFlow measures. Further work is needed to fully characterize the relationship between these parameters and their clinical utility.

Who writes this stuff: A scoping review on the quality of web-based information for spinal cord stimulation

***Ali Hosseinzadeh**, Tiev Miller, Rahul Sachdeva, Claire Shackleton, Soshi Samejima, & Andrei Krassioukov**

Background: This scoping review aimed to model typical consumer behavior by simulating a common health-related internet search to identify the range and quality of web-based information on the use of spinal cord stimulation (SCS) as a potential treatment option.
Methods: A systematic search was performed using the Joanna Briggs Institute's methodology for scoping reviews. Google Trends was used to identify the top trending search queries. Top queried terms were entered in common search engines (Google, Baidu, Yahoo, and Bing). Information on SCS found within the first 2 pages of returned results were assessed for information source type, SCS method, indications, contraindications, and risks/hazards.
Results: A total of 202 websites were identified. After duplicate removal (n=147), a total of 55 unique primary sites [for-profit (21); non-profit (18); media/blogs (6); journal articles (10)] were assessed. Of the diversity of indications for SCS identified (n=33), only 2 sites mentioned SCI. More than half of all websites featured information pertaining exclusively to epidural (E)SCS (n=34). Contraindications described comorbidities affecting surgical outcomes but did not describe conflicting devices and implants. Hazards/side-effects identified were predominantly ESCS-related surgical complications. Purported complications were rudimentary with no long-term management considerations (e.g., battery replacement).
Conclusions: Publicly available web-based information on the use of SCS mainly targets people with pain (n=32). Neurological populations (e.g., SCI) were seldom mentioned. Of the sites curating information on ESCS, none described known contraindications (e.g., other implants), or long-term

management considerations. This suggests the public may be exposed to incomplete or potentially misleading information regarding SCS.

Enhancing Emotions Capability: The Role of Occupational Therapy in Treating ASD

Tahmineh Mousavi

Background/Aims: Emotions have been seen as core difficulties in individuals with Autism Spectrum Disorders (ASD) and have been studied as a potential underlying factor for many autism behavioral problems. Emotional difficulties consider part of children with ASD's social communication deficits. Many children with ASD experience significant impairment in emotion regulation. Emotions Capability is one of the most fundamental of Nussbaum's 10 Central Human Functional Capabilities and is defined as the right to be loved and belong. This study aimed to explore the views of some school staff (teaching and non-teaching) about the Emotions Capability of students with ASD.
Methods: Twelve school staff of autism schools in Tehran, Iran participated in semi-structured face-to-face interviews, transcribed verbatim and thematically analyzed.
Results: Five themes emerged related to Emotions Capability: feeling profoundly and intensely, teaching how to express their emotions, art education, anxiety and fear, and challenges of textbooks.
Conclusion: The findings will help occupational therapists better understand and consider their roles in promoting the Emotions Capability of children with ASD by developing social skills, identifying their abilities and interests, assisting them access resources, focusing on learning strategies, and providing happy and supportive environments.

Effect of passive cycling on cardiac function

Michael DA Ruiz-Peters[3]*, Matthew C Dorton [1,2],*, *Rebekah HY Lee [1,2], & Victoria E Claydon [1,2]*
[1]Department of Biomedical Physiology and Kinesiology, Simon Fraser University, Burnaby, British Columbia, Canada.
[2] International Collaboration On Repair Discoveries (ICORD), Vancouver, British Columbia, Canada.
*[3] Department of Physical Medicine & Rehabilitation, University of British Columbia, Vancouver, British Columbia, Canada. *contributed equally.*

Background/Aims: Individuals with spinal cord injury (SCI) may have autonomic impairment that adversely affects cardiovascular control. Previous work indicates that passive cycling (PC) may augment cardiovascular control, and is positively correlated with cycling cadences; however, accessibility is a barrier. We aimed to establish the safety, efficacy, and acceptability of a PC wheelchair attachment on blood pressure (BP), heart rate (HR), stroke volume (SV), cardiac output (CO), cerebral blood flow (CBF), and user ratings of comfort and satisfaction.
Methods: In this analysis-blinded study, able-bodied controls (n=16, 9 females, aged 27±6 years) participated in lower extremity PC, seated in a wheelchair while an attachment pedaled their legs in 10-minute intervals at 3 randomized speeds (0.3, 0.6, and 0.9 m.sec-1). Cardiovascular parameters were continuously measured using beat-to-beat finger plethysmography. CBF was derived via Doppler ultrasound. After the protocol, two questionnaires were completed (Comfort Rating and QUEST).
Results: Systolic BP was increased during PC at 0.6 m.sec-1 (+11±11 mmHg, p=0.038) and 0.9 m.sec-1 (+10±14 mmHg, p=0.003). CO was increased at these same speeds (p= 0.036, p=0.004, respectively), driven by increased SV (p=0.013, main effect for treatment). User comfort and satisfaction ratings were high, particularly for safety and tolerance.
Conclusion: This study provides evidence that upright PC using this attachment improves cardiac indices in healthy controls, with high degrees of safety and tolerance. Based on these results, testing is underway for individuals with SCI, who may experience greater benefits than healthy controls with intact cardiovascular autonomic control.

Perioperative Botulinum Toxin to enhance outcomes of surgeries on spastic limbs: a review of current literature and implications for clinical practice

***Sepehr Saeidiborojeni** MD, Heather Finlayson MD, FRCPC, & Rajiv Reebye MD, FRCPC*
[a] Canadian Advances in Neuro-Orthopedics for Spasticity Congress, Canada
[b] Division of Physical Medicine and Rehabilitation, Faculty of Medicine, University of British Columbia, Vancouver, British Columbia
[c] GF Strong Rehabilitation Centre, Vancouver, British Columbia

Background and Aims: We present the results of our recent studies regarding the perioperative use of Botulinum Toxin (BoNT).
Methods: We conducted a systematic review of the evidence for perioperative injection of BoNT to enhance outcomes of surgeries on spastic limbs.1 We then published the first case series of patients with different spasticity etiologies who benefited from BoNT administration pre-, intra-, and postoperatively to optimize their surgical outcomes.2 Lastly, we performed a cross-sectional survey of Canadian physicians with expertise in spasticity management regarding their implementation of perioperative BoNT in clinical practice.3
Results: Our systematic review found level 1 evidence that preoperative BoNT is effective for reducing pain, spasticity, and analgesic use in pediatric patients with cerebral palsy, but that intraoperative BoNT is not. Our case series demonstrated that perioperative BoNT improved surgical outcomes in patients with spasticity due to different etiologies. In our national survey, spasticity management specialists responded they administer perioperative BoNT to improve outcomes of surgeries on spastic limbs, with optimal timing suggested to be 2-3 weeks pre-surgery, and no known perioperative complications or adverse events. They noted the lack of adequate communication among health team members as an important barrier impeding the provision of this intervention to potential candidates.
Conclusions: Perioperative BoNT injections can improve surgical outcomes on spastic limbs. Our studies highlight a need for more robust research to clarify the optimal timing for perioperative BoNT injection. Furthermore, enhancing collaboration and implementing more effective communication among physicians and surgeons when planning surgeries on spastic limbs can result in better outcomes.