

## TRAINEE ORAL PRESENTATIONS: SESSION 1

### Shedding light on brain activation during walking after a stroke

Shannon B Lim, Sue Peters, Chieh-ling Yang, Lara A Boyd, Teresa Liu-Ambrose, Janice J Eng

Recovery of independent walking after stroke is highly variable. Independent walking can range from taking slow, calculated steps within one's household to comfortably walking across variable terrain within the community. It is possible that the variability in walking recovery may be explained by variations within functional brain activation during walking.

The **objective** of this series of experiments is to identify brain activation during real-time simple to complex walking tasks in individuals living at home after a stroke.

**Methods:** Using functional near-infrared spectroscopy (fNIRS) we measured brain activation during 1) comfortable-paced walking, 2) slow and fast-paced walking and 3) walking while completing a secondary verbal task (complex walking). The relationship between these brain activation changes and clinical outcomes of impairment and function were also assessed.

**Results:** Regions of brain activation depended on the walking task and these activations related to clinical outcomes. Specific areas of activation included executive function (i.e. prefrontal cortex), motor planning (i.e. premotor cortex), primary motor and sensory, and sensory integration regions (i.e. posterior parietal cortex). A higher magnitude of activation in specific regions related to less impairment, greater walking automaticity, faster walking speed, greater ability to change walking speed, and higher general cognition.

**Conclusions:** Results from this series of studies shed light on the possible compensatory mechanisms adopted by individuals post-stroke and may indicate a either a ceiling effect or capacity limit for individuals with greater impairment and poorer performance. Investigating real-time brain activation during walking could lead to future individualized treatment

prescriptions and specific regional activations may inform future interventions on target areas for stimulation to promote better recovery of walking.

### Memory perfectionism is associated with persistent memory complaints after concussion

Evgenia Todorova, Edwina Picon, David Perez, Andrew Howard, Noah Silverberg

**Objectives:** Up to half of patients continue to have persistent cognitive symptoms, particularly memory complaints 12+ months after an initial concussion, despite normal cognitive function on neuropsychological testing. Memory perfectionism, characterized by placing a high value on memory and being intolerant of minor memory lapses, may reinforce perceptions of memory problems. The present study examined the relationship between memory perfectionism and memory complaints in adults with persistent symptoms following concussion.

**Methods:** Secondary analysis of baseline data from a randomized control trial assessing behavioural interventions for post-concussion symptoms. Eighty-four adults (M=42.35, SD=11.44 years old) who had sustained a concussion M=17.74 (SD=10.06) weeks earlier were recruited from two public sector concussion clinics in British Columbia. They completed assessments of memory and global cognitive functioning (National Institutes of Health Toolbox-Cognition Battery), performance validity (Test of Memory Malingering), memory complaints (from the Rivermead Postconcussion Symptoms Questionnaire), depression (Patient Health Questionnaire-2), anxiety (Generalized Anxiety Disorder-7), and memory perfectionism (Achievement subscale of the Memory in Adulthood questionnaire).

**Results:** Severe memory complaints were associated with memory perfectionism (OR=1.241, p<0.001) but not with objective memory functioning, global cognitive functioning, depression, anxiety or gender. Excluding participants with performance invalidity did not alter this pattern. Further sensitivity analysis indicated that memory perfectionism was uniquely related to memory complaints and not to other non-specific post-concussion symptoms (e.g., fatigue).

**Conclusion:** As in Functional Cognitive Disorder occurring in other clinical settings, high memory perfectionism may help explain subjective memory complaints months after a concussion.

### **Unexpected symptoms after concussion: Potential links to functional neurological and somatic symptom disorders**

*Edwina L. Picon, David L. Perez, Matthew Burke, Chantel T. Debert, Grant L. Iverson, William J. Panenka, Noah D. Silverberg*

**Objective:** Reporting of unexpected symptoms after concussion might, in some people, reflect a Functional Neurological Disorder (FND), Somatic Symptom Disorder (SSD), or exaggeration (feigning). This study aimed to determine whether reporting unexpected symptoms after concussion was associated with risk factors for FND/SSD, exaggeration, or both.

**Methods:** Secondary analysis of baseline data from a randomized controlled trial involving adults (N=77; 61% women) with persistent symptoms following concussion. Unexpected neurological symptoms (from the Screening for Somatoform Symptoms scale, e.g., paralysis) and somatic symptoms (from the Personal Health Questionnaire-15, e.g., stomach pain) did not overlap with post-concussion symptom scale items. The independent variables were risk factors for exaggeration (neuropsychological performance validity test failure and personal injury litigation) and predisposing and perpetuating factors for developing FND and/or SSD (e.g., fear avoidance behavior).

**Results:** When adjusting for all covariates, fear avoidance behavior was most strongly related to unexpected neurological symptoms (B=0.11, 95% confidence interval=0.05-0.18, p<0.001), while current anxiety scores were most strongly related to unexpected somatic symptoms (B=0.34, 95% confidence interval=0.15-0.52, p<0.001). Performance validity test failure and litigation were not significant predictors in either model.

**Conclusion:** Unexpected neurological and other somatic symptoms after concussion should not be dismissed as exaggeration. Psychological factors thought to perpetuate FND and SSD (e.g., fear avoidance behavior) may contribute to unexpected symptoms following concussion. More research is needed at the intersection of FND, SSD, and persistent post-concussive symptoms.

### **Exploring the experiences, barriers and facilitators of delivering physiotherapy using tele-rehabilitation platforms during the pandemic**

*Tzu-Hsuan Peng, Amy Schneeberg, Janice Eng, Catherine Le Cornu Levett, Jennifer Yao, Anne Harris, Courtney Pollock*

**Objectives:** In response to the outbreak of COVID-19, physiotherapists have integrated tele-rehabilitation into their practice to support physical distancing measures. This study aims to: (1) investigate physiotherapists' experiences with tele-rehabilitation during the pandemic. (2) identify the barriers and facilitators of implementing tele-rehabilitation services.

**Methods:** A cross-sectional study design was used, and data was collected via an original online Qualtrics survey, including demographic information and tele-rehabilitation experience using phone and video-conferencing. The link was sent to all of the physiotherapists who work in VCH providing outpatient therapy. The data was collected from November 19th, 2020, to January 15th, 2021.

**Results:** 77 physiotherapists gave complete responses (81.8% female). Few respondents (5.2%) provided tele-rehab services before the pandemic, but the majority of them (76.6%) offered tele-rehab over video-conferencing during the pandemic. Client comfort (90.9%) and positioning of Webcam (75.3%) were the main technical difficulties reported, and patients with hearing loss (55.8%), physical safety (53.2%), and client interests (54.5%) were barriers identified by physiotherapists. The majority of respondents reported having sufficient equipment (80.5%) and being able to maintain client privacy (65.0%) when they provide tele-rehab over video. Performing a subjective assessment (83.2%) was the most common area of practice identified to be able to perform over tele-rehab. Following the pandemic, about 65% of respondents plan to continue to integrate tele-rehab into their practice.

**Conclusion:** The responses provide important insight into potential use of tele-rehab following the pandemic.

## **Preliminary results from a student-delivered Community Outreach teleheAlth program for Covid education and Health promotion (COACH)**

*Michelle Christie Yang, Cam Clayton, Julia Schmidt, Jill G. Zwicker, Devin Harris, Chelsea Pelletier, Brodie M. Sakakibara.*

**Background:** While quarantining, social isolation, and physical distancing are important in minimizing the spread of the novel coronavirus (COVID-19), they may also compromise one's ability to manage their health and thus, increases risk of adverse health events.

**Objectives/Hypotheses:** To evaluate a novel two-month long student-delivered Community Outreach teleheAlth program for Covid education and Health promotion (COACH) delivered via telephone/videoconference. We hypothesized that COACH would improve health promoting behaviour in community-living adults,  $\geq 65$  years of age. We also anticipated COACH would improve secondary outcomes in areas of perceived stress, depressive and anxiety symptoms, social support, health-related quality of life, and health promotion self-efficacy.

**Methods:** In this single-group pre-post study, we recruited 75 community-living adults (age  $\geq 65$  years) who had access to telephone/video-conferencing technology. Our primary outcome was the Health Directed Behaviour subscale of the Health Education Impact Questionnaire. Secondary outcomes included DASS-21 (mental health), Medical Outcomes Study Social Support Survey (social support), SF-36 (quality of life), and Self-Rated Abilities for Health Practices Scale (health promotion self-efficacy). Participants received six 30-45-minute telephone/video-conference tailored health coaching and COVID-19 information sessions over two months with a trained student-coach.

**Results:** Mean age of participants was 72.4 (58.7% female), with 80% reporting 2 or more chronic conditions. Paired sample t-test showed statistically significant improvement in health directed behaviour ( $p < .001$ ,  $d = 0.45$ ) and health promotion self-efficacy ( $p < .001$ ,  $d = 0.44$ ).

**Conclusion:** COACH may help improve health promoting behaviours in older adults, especially in areas of health directed behaviour and health promotion self-efficacy.

## TRAINEE ORAL PRESENTATIONS: SESSION 2

### **Association between upper-limb functional outcome and muscle strength in upper trunk brachial plexus injuries**

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

**Objective:** Muscle strength measured with Medical Research Council (MRC) is the most commonly reported outcome in patients with brachial plexus injuries (BPI), but it's unclear as to whether it correlates with functional outcomes. The objective of this study was to investigate whether muscle strength using MRC testing correlates with upper extremity function in patients with an upper trunk component to their BPI.

**Methods:** Data was obtained from a multi-centre database of peripheral nerve injuries. Upper limb function was measured using the Disabilities of the Arm, Shoulder, and Hand (DASH) questionnaire. Upper trunk muscle strength was assessed with MRC muscle grading for elbow flexion, shoulder abduction and shoulder external rotation. A fourth MRC score was calculated as the sum of the three graded MRC scores.

**Results:** Twelve male patients met inclusion criteria (mean age=47.3 $\pm$ 15.8). The mean DASH Score was 52.9 $\pm$ 16.7. The median MRC Score for elbow flexion was 4.0 (range, 0-5), shoulder abduction was 1.0 (range, 0-5), shoulder external rotation was 0 (range, 0-5), and the sum score was 6.0 (range, 0-15). All subjects had greater than anti-gravity strength in their finger flexors and finger abductors. There was no significant correlation between functional DASH score and individual or sum MRC score ( $p > 0.05$ ).

**Conclusion:** Our study suggests there is no relationship between DASH scores and MRC muscle strength in patients with upper trunk involvement of BPI. This suggests that other factors besides muscle strength may more heavily influence DASH score. Future studies may aim to explore and identify these factors.

## **Assistive technology decision-making among individuals with disabilities: A social network analysis**

*Bahareh Kardeh, Ben Mortenson*

**Objectives:** Many people with disabilities experience unmet needs and have difficulty accessing required services and assistive technology (AT). In this regard, they are involved in complex decision-making processes, which often include professionals, family and friends, peers, and other resources. However, the structure and influence of these networks have not been explored. The purpose of this study is to investigate: 1) how individuals with disabilities make decisions about AT, 2) how their AT-related social networks are constructed and influence decisions, and 3) how these AT-related decisions and social networks may differ considering sociodemographic and intersectional factors.

**Methods:** A purposive sample of 12-15 participants (19 years or older) with a disability, who live in Metro Vancouver and speak English, will be recruited for this mixed-methods study. The quantitative portion includes personal information, standardized measures, and an egocentric sociogram (i.e., a social network diagram). The qualitative portion includes a semi-structured interview about participants' experiences regarding the research questions. We will use Social Network Analysis (SNA) to analyze and interpret the findings.

**Results:** Participants' AT-related decision-making process is expected to align with these seven steps: initiative, assessment, typology, selection, funding, delivery, and follow-up. Social networks are expected to influence and address AT barriers related to: 1) awareness and information, 2) mediation of resources and service provision, and 3) support. Network measures and visual data will be reported upon completion of the study.

**Conclusion:** This study can help inform future interventions within AT-related social networks of individuals with disabilities to improve AT use and access.

## **Heart rate changes associated with autonomic dysreflexia in daily life of individuals with chronic spinal cord injury**

*Belinda Yee, Tom Nightingale, Andrea Ramirez, Andrei Krassioukov, Matthias Walter*

**Objective:** To characterize heart rate (HR) changes during autonomic dysreflexia (AD) in daily life for individuals with chronic spinal cord injury (SCI).

### **Methods:**

Forty-five individuals with a chronic SCI at or above the sixth thoracic spinal segment with confirmed AD were included for analysis. Any systolic blood pressure (SBP) increase  $\geq 20$ mmHg from baseline from a 24-hour ambulatory surveillance period was identified and categorized as either confirmed (i.e. known AD trigger), unknown (i.e. no diary entry), and unlikely (i.e. potential physical activity driven SBP increase). SBP-associated HR changes were categorized as either unchanged, increased or decreased compared to baseline.

**Results:** A total of 797 episodes of SBP increase above AD threshold were identified and classified as confirmed ( $n = 250$ , 31.4%), unknown ( $n = 472$ , 59.2%) or unlikely ( $n = 75$ , 9.4%). Median SBP changes and median SBP-related HR changes were 37 mmHg and -8 bpm, 28 mmHg and -6 bpm, or 30 mmHg and -4 bpm for confirmed, unknown, or unlikely episodes, respectively. HR-decrease/increase ratio was 3:1 for confirmed and unknown, and 1.5:1 for unlikely episodes. HR changes resulting in brady-/tachycardia were 34.4% / 2.8% for confirmed, 39.6% / 3.4% unknown, and 26.7% / 9.3% for unlikely episodes, respectively.

**Conclusions:** Our findings suggest that most confirmed AD episodes are associated with a HR decrease. Further improvements, such as more precise participant diaries combined with the use of 24-hour Holter electrocardiogram and wearable-sensors-derived measures of physical activity could provide a better, more detailed characterization of HR changes during AD.

## **Relationships between CVD risk, neuropathic pain, mental health, and autonomic function in chronic SCI**

*Matthew C Dorton, John K Kramer, Sonja de Groot, Marcel Post, Victoria E Claydon*

**Objectives:** There is a high prevalence of neuropathic pain (NP) [1] and decreased mental health (MH-) [2] following spinal cord injury (SCI). Evidence has shown that the presence of NP and MH- are significantly associated with increased cardiovascular disease (CVD) risk [3]. In addition, NP [4] and CVD [5] risk are both associated with the extent of autonomic impairment after SCI. The primary objective of this

study was to further explore the relationships between CVD risk, autonomic function, NP, and MH- following SCI.

**Methods:** We performed a multicentre cross-sectional study of individuals with chronic, traumatic SCI (n=257, 61 females, aged 47±9 years, duration of injury 23±9 years). CVD risk was calculated using the 10-year Framingham risk score; autonomic function was determined from peak heart rate during maximal exercise (HRpeak); NP was inferred from the DN4 (n=136); MH- was assessed using the MHI-5 questionnaire (n=240).

**Results:** There was a high prevalence for both NP (33%) and MH- (42.5%) in individuals with chronic SCI, with 15% experiencing both. An adverse CVD risk profile was present in 38% and was correlated with MH- (r=0.14; p=0.04), with increased odds of CVD when MH- is present (OR=3.07, CI 1.73-5.47; p<0.001). NP was correlated with HRpeak (r=-0.13; p=0.09) but was not associated with MH- or CVD risk.

**Conclusions:** MH- was associated with increased CVD risk, but not NP. More preserved cardiovascular autonomic function tended to be associated with NP. The interrelationships of secondary consequences of SCI are complex and need further exploration.

### The implementation of coordinated physical activity coaching among physiotherapists and SCI peer mentors at discharge

*Ma, JK, Shu, H, Le Cornu Levett, C, McBride, CB, Walden, K, Clarkson, R, Thorson, T, Colistro, R, Plashkes, T, Martin Ginis, KA*

**Objectives:** The purpose of this study is to evaluate an implementation intervention designed to support rehabilitation hospital physiotherapists to transition physical activity coaching to spinal cord injury (SCI) peer mentors at discharge and its effects on physical activity coaching behaviour and determinants pre and immediately post-training.

**Methods:** This study employed a single group, pre-post design. The implementation intervention consisted of two training days separated by a 1-month practice period, a physical activity coaching checklist tailored for each setting, the addition of a physical activity prompt in patient discharge forms, and the engagement of champions. The determinants of PA coaching were evaluated using a Theoretical Domains Framework-based survey. Surveys were administered before and immediately following

training. Paired two-tailed t-tests were conducted to detect a significant within-subject effect over time on PA coaching determinants and behaviour.

**Results:** All 13 potential participants attended the training. Ten participants completed the TDF survey. No significant differences were observed in any of the current physical activity coaching behaviours evaluated during the 1-month time period between training sessions. However, participants reported significant improvements in physical activity coaching behavioural determinants including environmental context and resources, social influences, knowledge, skills, beliefs about capabilities, behavioural regulation, and memory, attention and decision processes (ps<0.05).

**Conclusions:** The engagement of hospital physiotherapists and members of a provincial SCI support organization facilitated the initial implementation of a physical activity coaching intervention at the point of discharge. Improvements in physical activity coaching determinants signal the potential for changes in physical activity coaching behaviour.

## POSTER PRESENTATIONS:

### Integrating Cognitive Behavioural Techniques into physiotherapy practice: A scoping review.

*Alex Kasapi, Kirsten Ward*

**Purpose:** To determine efficacy of physiotherapist delivered Cognitive Behavioural Therapy (CBT) based techniques in rehabilitation/clinical settings. Several randomized trials have demonstrated the efficacy of CBT delivered in combination with physiotherapy services in comparison to standard care of physiotherapy alone, in many different rehabilitation and clinical settings. However, there is a paucity of research, as well as knowledge, surrounding CBT techniques delivered by physiotherapists and integrated into physiotherapy practice.

In this scoping review we examine the use of CBT based techniques delivered by physiotherapists in different clinical populations in order to better understand the implications of this integrated approach.

**Method:** A systematic literature search was conducted using four databases; Medline, Embase, CINAHL, and Psycinfo. Studies of CBT techniques integrated into physical therapy/physiotherapy/exercise were included in this review.

**Results:** 772 titles were reviewed for inclusion/exclusion criteria. Twenty-two articles were included after full reviews. Preliminary results suggests a common trend of CBT techniques integrated into physiotherapy practice in the treatment of patients with chronic conditions. There is a broad range of approaches to PT training in CBT prior to provision of CBT techniques in physiotherapy treatment.

**Conclusion:** The integration of CBT based techniques with physiotherapy in various clinical populations has shown to be effective in reducing outcomes such as pain, fear of falling and chronic fatigue.

### **Clinician responses to decreased self-awareness after traumatic brain injury**

*Rinni Mamman, Anika Cheng, Rebecca Tsow, Julia Schmidt*

**Objectives:** To examine how clinicians are reporting, assessing, and treating self-awareness after TBI.

**Methods:** A retrospective chart review has been completed. Data collection included identifying medical records of individuals with TBI receiving inpatient rehabilitation at GF Strong Rehabilitation Centre (n=59) within a five-year period (2014-2019). A reflexive thematic analysis approach was applied to the data to generate themes.

**Results:** Preliminary data indicated that clinicians have different approaches in addressing decreased self-awareness (e.g., making an explicit diagnosis of the observed self-awareness, engaging with the client to try and improve self-awareness). Few formal assessments were conducted of self-awareness through standardized outcome measures and limited interventions were reported in addressing these impairments in self-awareness.

**Conclusion:** Findings demonstrate how clinicians are reporting, assessing, and treating impaired self-awareness after TBI to develop research priorities and integrated knowledge translation initiatives. Ultimately, outcomes of this research will enable development of implementation approaches to facilitate assessment and intervention of impaired self-awareness after TBI.

### **A systematic review of patient-reported outcomes following nerve transfer surgery for brachial plexus injury**

*Chloe Haldane, MD, Geoffrey Frost, Emmanuel Ogalo Sean Bristol, Christopher Doherty, Michael Berger*

**Purpose:** The purpose of this systematic review was to determine the impact of nerve transfer surgery for brachial plexus injury (BPI) on patient-reported outcomes.

**Methodology:** MEDLINE, EMBASE, and CINAHL were searched and screened in duplicate for relevant studies on September 25th, 2019 and repeated June 24th, 2020. The patient population included male and female patients who received nerve transfer surgery for BPI. Two reviewers independently abstracted data regarding injury, surgical technique, surgical timing, follow-up duration, strength and patient-reported outcome measures. Quality was assessed in duplicate using the Methodological Index for Non-Randomized Studies criteria. Results: Twenty-one studies involving 464 participants were included in analyses. The mean age was 32.9±6.6 (range: 5-77) and 89.2% of included participants were male. The most used patient-reported outcome was the Disabilities of Arm, Shoulder and Hand (DASH). Return to work was reported in five studies, with 66.0% of participants returning to work. Patient satisfaction was assessed in four studies with an overall satisfaction of 68.5%. Pain was assessed in 12 studies with a preoperative mean visual analog scale score of 5.8±1.7 and 4.2±1.0, postoperatively.

**Conclusions:** Patient-reported outcomes following nerve transfer for BPI, are infrequently reported in the literature. While patient-reported outcomes demonstrate post-operative improvement, there is evidence of ongoing limitations and post-operative DASH scores demonstrate high degree of ongoing disability.

### **Objective neurophysiological measures to define motor function in healthy aging and chronic stroke**

*Christina B Jones*

**Background:** In 2019, 62,000 people in Canada experienced a stroke. Despite best efforts to facilitate a full recovery, approximately 50% these individuals will be left with lasting motor impairments. Though our knowledge on how to best facilitate recovery

after brain injury is expanding, access to trained rehabilitation professionals is limited, thus creating a bottleneck in the health care system. A recent shift to increasingly objective measurements has been seen, with novel research utilizing structural and functional neuroimaging as biomarkers of motor function. Of these methods, electroencephalography (EEG) stands out as a promising objective assessment tool as it can be implemented quickly, is well-tolerated and is cost-effective. Recent studies have investigated the use of EEG-based analysis of motor function, however to-date no studies have utilized EEG to investigate both upper and lower limb motor status together in individuals with neurological injury. In addition to quantifying motor status, there is also evidence to indicate uses in monitoring responses to rehabilitation-promoting interventions. For example, translingual neurostimulation (TLNS) has been used successfully to aid in motor recovery post traumatic brain injury, despite having limited insight into the associated neurophysiological changes.

**Objectives:** The purpose of the proposed work is to define neurophysiological measures of motor function before and after TLNS using EEG in individuals who have experienced a stroke.

### **Bowel burdens: A systematic review of the impact of bowel dysfunction and autonomic dysreflexia on quality of life after spinal cord injury**

*E.K. Sober-Williams, R.H.Y. Lee, V.E. Claydon*

**Objective:** Many individuals with spinal cord injury (SCI) experience autonomic dysfunction, including profound impairment to bowel and cardiovascular function that substantially impacts day-to-day living. Indeed, the burden of bowel dysfunction is reported to exceed other autonomic and motor deficits; bowel management emerges as a potential determinant of quality of life (QoL). Notably, for individuals with high level lesions (T6 and above), stool impaction and bowel management are common triggers of autonomic dysreflexia (AD; profound hypertension secondary to sensory stimuli below the lesion) that further complicates bowel care. To date, bowel-related QoL has been studied using a variety of methods, making comparisons difficult, and few studies address the impact of bowel care-induced AD. We conducted a literature review to examine current evidence regarding the impact of bowel dysfunction

and (bowel care-induced) AD on the QoL of individuals with SCI.

**Methods:** In this systematic review, five databases (Pubmed, Web of Science, CINAHL, PsychINFO, and EMBase; March 2021), were searched to identify peer-reviewed articles assessing the influence of neurogenic bowel dysfunction or AD on QoL after SCI. Two independent reviewers screened titles, abstracts, and then full-text articles, for inclusion. QoL data were extracted and QoL measures classified as validated or unvalidated.

**Results:** Our search identified 1,375 unique titles, of which 65 met inclusion criteria after review of the titles/abstract/full text. Of the studies included, 44 used validated QoL measures while 21 used unvalidated measures. The Neurogenic Bowel Dysfunction (NBD) Score measures the severity of bowel dysfunction and bowel care-associated QoL for individuals with SCI, and was used by 3 papers. The weighted average of the NBD score from 454 individuals was  $9.4 \pm 5.1$  (mean+standard deviation) or “Minor-Moderate” severity. Twelve studies measuring the influence of AD on QoL were identified, revealing an adverse impact of AD on QoL, and highlighting that the impact of AD on QoL is not well represented in the literature.

**Conclusion:** Our results provide an aggregate view into the complex relationships between bowel dysfunction, AD, and QoL. Ultimately, these insights will enable better identification of lynchpin concerns in bowel management to improve QoL for those living with these devastating secondary complications of SCI.

### **What are the COVID-19 pandemic related lived-experiences of individuals with Spinal Cord Injury?**

*Simpson, E., Miller, W.C., Schmidt, J., Borisoff, J., Mortenson, W.B.*

**Objectives:** COVID-19 related restrictions and recommendations have impacted everyone. Especially those living with a disability, such as individuals with a spinal cord injury (SCI), whose physical abilities and health care needs may make pandemic related changes more challenging. The objective of this study was to explore COVID-19 pandemic related lived-experiences of individuals with an SCI.

**Methods:** This study used an interpretive phenomenological methodology. Semi-structured

interviews were the primary means of data collection. These were conducted in May and June of 2020, roughly 2-3 months into the pandemic. Transcript data were analysed using a phenomenological methodology.

**Results:** We interviewed 22 participants with SCI, the mean age was 54 years, and nine were females. We identified three themes: 1) *Experiencing changes to daily life* described how new rules had impacted everyday life and usual routines. 2) *Struggling with new challenges* explored some of the negative experiences of the pandemic. 3) *Being resilient in the face of a new normal*, conveyed the resilience participants exhibited despite challenges.

**Conclusion:** Although our findings indicate some positive changes and highlight the strengths that many individuals with SCI have, they also accentuate issues with ableism within the medical system. Certain changes were made primarily because able-bodied individuals needed them, and several COVID-19 changes were made without consulting individuals with disabilities. The findings emphasise the need for increased dialogue with people in the SCI community about their ongoing pandemic related needs.

## The role and potential of rehabilitation sciences in the road to recovery from COVID-19

*Farrukh Chishtie, Ben Mortenson and Patricia Campbell*

The COVID-19 pandemic is a rapidly evolving global threat with more than 3.5 million deaths to date, an ongoing rise in cases and rise of variants. The ensuing and continuing tragedies combined with the social, health, and economic impacts of mitigation efforts to slow disease transmission via shifting human relations (to limit exposure using preventive practices), such as social distancing, call for careful studies of this present crisis from interdisciplinary and multidisciplinary perspectives. Vaccines have also been recently developed with varying but high levels of efficacy, and sections of various populations are being inoculated globally. While these interventions are being carried out, Rehabilitation Sciences (RS) are engaged and will be playing a key role in management of COVID-19 and future pandemics. The ensuing longer-term care for the “long haulers” (also termed as long COVID-19 and chronic COVID-19 populations) is estimated to be 10-40% of the acute population, which may also include those with pre-existing disabilities and also mean an

increasing role of RS, as long-term care becomes relevant and important in these cases.

**Objectives:** With these considerations, in this talk, I will outline my upcoming PhD thesis dissertation research which is aimed to study the present and evolving role of RS in the management of COVID-19 in the context of the British Columbia (BC) response, ongoing and upcoming delivery of health services to affected populations, especially long COVID-19 populations.

## eHealth literacy and health literacy among community-dwelling individuals with Spinal Cord Injury

*Gurkaran Singh, Bonita Sawatzky, Laura Nimmon, and Ben Mortenson*

**Objectives:** The objectives of this study were to (1) evaluate health and eHealth literacy levels among individuals with spinal cord injury (SCI) and (2) identify relationships between health literacy, eHealth literacy and sociodemographic factors.

**Methods:** As part of a larger mixed-methods study, 50 individuals with SCI were recruited across Canada. Online survey data were collected on participants' health literacy, eHealth literacy, and sociodemographic characteristics. The average age of participants was 49 years old; half of participants were female, and 11 participants experienced non-traumatic SCI. Statistical tests including correlation analyses, independent samples t-tests, Mann-Whitney U tests, and One-way ANOVA tests were performed on the data.

**Results:** Participants demonstrated moderate levels of eHealth literacy (31.6 out of 40) and health literacy (17.6 out of 20). A significant, positive correlation (95% C.I.) was found between eHealth literacy and health literacy ( $p=0.03$ ). Significant, positive correlations were found between health literacy and sociodemographic factors, including income ( $p=0.04$ ) and education ( $p=0.03$ ). A significant, negative correlation was found between health literacy and time since injury ( $p=0.03$ ). Individuals who were employed demonstrated significantly greater eHealth literacy than individuals who were unemployed ( $p=0.01$ ). Individuals living with someone demonstrated significantly greater health literacy than individuals living alone ( $p=0.01$ ).

**Conclusion:** No previous studies we are aware of have evaluated perceived eHealth literacy and health literacy among people with SCI. This study



demonstrated the diverse range of eHealth literacy levels in SCI populations and how this, and other factors, may impact an individual's ability to self-manage and adopt eHealth technologies.

### **Multimorbidity on health care utilization in persons with non-traumatic spinal cord injury**

*Heather Hong, Nader Fallah, PhD, Di Wang, Abhi Savaliya, Suzanne Humphreys, Jessica Parsons, Christiana Cheng, Vanessa Noonan.*

**Introduction:** A new multimorbidity index (MMI) measuring the presence/absence of 30 comorbidities/complications, e.g. diabetes, osteoporosis, and/or spasticity was developed and applied to understand health care utilization (HCU) in persons with traumatic spinal cord injury (TSCI). However, this MMI has not yet been applied to understand HCU in persons with non-traumatic SCI (NTSCI).

**Objective:** To determine the impact of MMI on HCU in persons with NTSCI over a 12-month period.

**Methods:** Using the 2011-2012 SCI Community Survey, personal factors, environmental factors, MMI and HCU (needed care received/not received) were evaluated. Multivariable analysis was conducted to determine the effect of MMI on HCU.

**Results:** Of 412 NTSCI participants, 322 (78%) received needed care (Group1) and 89 (22%) did not receive needed care (Group2). 360 (87%) participants visited at least one health care professional, with a mean frequency of contact being 47.5 times (SD 101.7). The mean frequency of not receiving care was 24.3 times (SD 112.6), which was primarily due to a long wait time (47%). The mean MMI was significantly lower in those that received care (Group1) compared to those who did not received care (Group2), 11.8 vs. 14.6 ( $p < .0001$ ). Moreover, a high MMI was significantly associated with not receiving needed care ( $p = 0.021$ , OR 1.1, 95% CI 1.01-1.16).

**Conclusion:** MMI plays a significant role in HCU in persons with NTSCI. We identified that a higher MMI is significantly correlated with not receiving needed care. These results can be used to better understand and improve the health care needs for individuals with NTSCI.

### **Cryoneurotomy of lateral pectoral nerve**

*Jack Scobie, Paul Winston*

**Objectives:** Spasticity is a common and difficult to manage complication of cerebral palsy that significantly impacts patient function and quality of life. This case study reports a 15-year-old male with quadriplegic cerebral palsy, GMFCS 5, who presented with significant bilateral adducted and internally rotated shoulders as a component of generalized spasticity necessitating the use of percutaneous cryoneurotomy.

**Methods:** The patient's lower limb spasticity had been treated with botulinum toxin A injections; however, the shoulder region was spared due to concerns of toxin spread and aspiration risk. Following diagnostic nerve blocks, the patient underwent bilateral cryoneurotomies of the right and left lateral pectoral nerves lasting 3.5 minutes for each lesion.

**Results:** One month after the cryoneurotomies, the ROM had improved from 86° to 133° on the right and 90° to 139° on the left. Improvements in range of motion were retained at 9 months post-procedure. At 8.5 months following the cryoneurotomies, the caregiver reported improvements in upper body dressing, upper body washing, transferring, and the ability of the patient to remain sitting in his wheelchair for extended periods of time.

**Conclusion:** Cryoneurotomy may be an effective procedure for improving shoulder range of motion and specific functional outcomes for caregivers of patients with spasticity arising from cerebral palsy.

### **Noninvasive chronic spinal stimulation as multi-session therapy to improve cardiovascular function after Spinal Cord Injury**

*Kiran Pawar, Rahul Sachdeva, Tamila Kalimullina, Paolo Go, Andrei V. Krassioukov*

**Objective:** Spinal Cord Injury (SCI) is a devastating condition which results not only in sensory and motor deficits but also in autonomic dysfunctions that permanently impact the quality of life. Majority of individuals with cervical or high-thoracic SCI suffer from devastating cardiovascular impairments due to disruption of cardio-autonomic control, leading to life-threatening conditions such as autonomic dysreflexia (AD). On a daily basis, a common

challenge faced by individuals with SCI is of unstable blood pressure (BP) control, with high risk of AD episodes i.e. rise in BP up to 300 mmHg in response to daily routine stimuli (e.g. full bladder), which may lead to cerebral hemorrhage, seizures and can be fatal. The current strategies to manage BP involve pharmacological agents which are slow acting with prolonged effects. The objective of this study was to develop and test noninvasive and clinically relevant spinal cord stimulation as a multi-session therapy to improve BP in a rat model of SCI.

**Methods:** Adult male Wistar rats received a complete transection SCI at third thoracic spinal segment. After injury rats divided into three groups. Group 1 received daily transcutaneous spinal cord stimulation (TCSCS) five days per week and group 2 received TCSCS on alternate days (3 days per week). Control group did not receive TCSCS. TCSCS was started 5 days post SCI and was delivered at 30Hz, 1ms pulses in awake rats by self-adhesive electrodes placed on the skin at mid thoracic levels below the lesion (i.e. T4/5 levels) for total 30 minutes with two 15 minute sessions and 5 minutes break in between. After four weeks of TCSCS, rats were implanted with a wireless BP telemeter. One day later, beat-by-beat BP and heart rate were recorded at rest as well as during colorectal distension (a visceral stimulus that reliably induces experimental AD).

**Results:** In the control group with no electrical stimulation, colorectal distension induced severe autonomic dysreflexia (50 mmHg rise in systolic BP). However, severity of autonomic dysreflexia was mitigated in daily TCSCS group (32 mmHg rise in systolic BP) as well as in alternate day TCSCS group (37 mmHg rise in systolic BP). One-way ANOVA and Tukey's multiple comparisons test showed significant difference in control vs daily TCSCS ( $p < 0.020$ ) and control vs alternate day TCSCS ( $p < 0.001$ ). No significant difference was observed between daily TCSCS and alternate day TCSCS groups.

**Conclusion:** Noninvasive TCSCS (daily and alternate day) as a multi-session therapy improved cardiovascular dysfunction after SCI.

## Hand sensibility and functions after median and ulnar nerve injuries: A systematic review

*Liheng Chen, Emmanuel Ogalo, Chloe Haldane, Sean G. Bristol, Michael J. Berger*

**Objectives:** To investigate which tests of hand sensibility correlate with functional outcomes in patients with upper limb traumatic nerve injuries, and to assess if the general construct of hand sensibility is related to patients' functions.

**Methods:** MEDLINE, Embase, and CCRCT were searched in May 2020. Eligible studies reported on inferential association between sensibility tests and functions for adults with upper limb nerve repair. Database search yielded 2356 records. Fifteen publications were included. Data extraction captured demographics, surgical procedure, sensibility tests, and functional assessments.

**Results:** Fifteen publications with 849 patients in total were reviewed. Levels of evidence were level II (n=3), III (n=3), IV (n=9). All publications reported on median and/or ulnar nerve injuries. Monofilament tests correlated with SF-36, pick-up test, function domain of PRWHE Questionnaire, and more. Static and moving two-point discrimination had significant and non-significant correlations with ADLs or pick-up test. Data for area localization and object/shape identification were equivocal as well. No data was found for Ten test and vibration tests. Rosen score's sensory domain correlated with ADLs and PRWHE function domain. MRC sensory scale was also found related to pick-up test, return to work status, and DASH questionnaire.

**Conclusions:** Monofilament tests allow practitioners to gather sensibility data relevant to patients' overall recovery of functions after upper limb nerve trauma. For two-point discrimination and other sensibility tests, an improvement in test performance does not necessarily translate to improved hand function. Findings from the composite scales indicate that the general construct of hand sensibility is related to functions.

## Feasibility of quantitative ultrasound as a predictor of upper limb strength in healthy controls

*Mark Hwang, Joshua W. Giles, Colin Day, Erik Bedard, Michael J. Berger*

**Objective:** Muscle strength is an important marker of function in individuals with neuromuscular disorders. However, routine methods of measuring strength are unreliable and difficult to access. Ultrasound imaging is a non-invasive, inexpensive, and easily accessible method to evaluate muscle by detecting changes such as decrease in muscle mass and increased non-

contractile tissue. The purpose of this study is to determine whether numerical measures obtained from ultrasound images of upper limb muscles correlate with strength testing results obtained from dynamometer.

**Methods:** Twelve healthy volunteers (25.3±5.0 years) participated in the study. Muscle thickness, echointensity, and cross-sectional area of first dorsal interosseous (FDI), and muscle thickness of biceps brachii and triceps brachii were measured with B-mode ultrasound. The maximum voluntary contraction strength of index finger abduction, elbow flexion, and elbow extension was measured with a custom dynamometer.

**Results:** FDI muscle thickness ( $r = 0.679$ ;  $p = 0.0003$ ) and cross-sectional area ( $r = 0.543$ ;  $p = 0.006$ ) showed statistically significant moderate correlations with finger abduction strength. Echointensity ( $r = 0.25$ ;  $p = 0.23$ ) showed no significant correlation. Muscle thickness of biceps brachii ( $r = 0.588$ ;  $p = 0.006$ ) and triceps brachii ( $r = 0.887$ ;  $p < 0.0001$ ) showed statistically significant moderate correlations with elbow flexion and extension strength, respectively.

**Conclusions:** Ultrasound measurement of muscle thickness correlated most strongly with maximal voluntary contraction. Echointensity may not be a robust parameter to predict muscle strength. Our results suggest that ultrasound-derived measures of muscle thickness may be the parameter that is best reflective of strength.

### Exploring access to interprofessional care in British Columbian neuro-rehabilitation outpatient programs: A qualitative study

*Nathan Chen, Andre Prescott, Paul Winston*

**Purpose:** British Columbia (BC) lacks a standardized approach to interprofessional collaboration within neuro-rehabilitation outpatient programs (NROPs). The purpose of this cross-sectional study was to examine how Physical Medicine and Rehabilitation specialists (physiatrists) are connected to NROPs, the forms of collaboration used, and highlight initiatives to improve these services. **Methods:** We interviewed healthcare providers specializing in rehabilitation on NROPs and the forms of interprofessional collaboration used. **Participants:** We interviewed 15 rehabilitation-focused providers from different regions of BC including Greater Vancouver, Vancouver Island and BC Interior.

**Results:** Physiatry and NROPs were different services requiring two distinct referrals. Interprofessional collaboration in NROPs varied across BC. Providers commonly collaborated using informal communication methods and, less frequently, weekly team meetings. Strategies currently being developed to connect physiatrists and NROPs include piloting on-site allied health professions at spasticity clinics, merging physiatry and NROP referral into one document, and setting up new NROPs mandated for interprofessional collaboration. Metrics such as length of stay, Functional Independence Measure and patient satisfaction surveys have been proposed to provide evidence for the benefits of interprofessional collaboration in rehabilitation. **Discussion:** Variations in interprofessional collaboration is partially attributed to the lack of therapy services covered by the BC Medical Services Plan. The lack of BC-specific data to support interprofessional collaboration calls for quality improvement initiatives to reduce wait times and improve access to rehabilitation services. **Conclusion:** Interprofessional collaboration in BC NROPs is largely dependent on the advocacy of rehabilitation-focused providers without the formal support of the BC healthcare system.

### Describing the subjective well-being of people with disabilities, older adults, and families during the phase one restriction of the COVID-19 pandemic

*Pegah Derakhshan, William Miller, Elham Esfandiari, Somayyeh Mohammadi, Gordon Tao, Isabelle Rash, Ben Mortenson*

**Objectives:** COVID-19 restrictions have impacted Canadian's daily activity. This change in daily routine is further exacerbated among those living with disabilities, older adults, or families with school-age children. There is currently minimal knowledge of how the pandemic has affected the wellbeing of these groups. This study aims to describe the wellbeing (e.g., resilience, depression, anxiety, boredom) in daily and social activities of these groups.

**Methods:** This cross-sectional study represents time-one data from a larger longitudinal study. A Qualtrics survey was sent out during the first phase of the COVID-19 pandemic to individuals with self-identified disabilities (e.g., /spinal cord injury, stroke, and other), older adults, and families with the school-age child.

**Results:** The mean (SD) age of participants (n=82) was 59.1 (14.1), and 51.2% of them were female. Sixty-two individuals had a disability (including 27 individuals with stroke, 22 with Spinal cord injury, and 13 with other disabilities) and 10 had a family with school-age children. Clinically relevant anxiety (HADS score of  $\geq 8$ ) was indicated in 28 patients (34.1%) and depression in 13 (15.9%). The mean score of resilience and boredom of participants were 73.0 (13.7) from 100 and 87.3 (37.0) from 203, respectively.

**Conclusion:** This study identifies those individuals with disabilities, older adults, and families with school-age children have experienced issues with well-being due to the pandemic. This study helps to enlighten the magnitude of the challenge for these vulnerable individuals. Adequate policy responses are required to these group needs and mitigate the potential for widening the health and social inequities.

### **The translational potential of a noninvasive neuroprosthesis for blood pressure control following spinal cord injury: Preclinical evidence with a case report**

*Rahul Sachdeva, Tom E. Nightingale, Kiran Pawar, Tamila Kalimullina, Adam Mesa, Arshdeep Marwaha, Alison Williams, Tania Lam, Andrei V. Krassioukov*

**Objective:** Majority of individuals with Spinal cord injury (SCI) above T6 suffer from autonomic dysreflexia (AD), where the BP can rise in response to daily stimuli (e.g. a bowel routine), with life-threatening consequences. The objectives were to test spinal cord transcutaneous stimulation (TCS) in mitigating AD in rats, and demonstrate its clinical potential in an SCI individual.

**Methods:** Pre-clinical: Wistar rats received a T3 SCI. 8 weeks later, BP and heart rate were recorded during AD induced by colorectal distension. TCS was delivered at T6/7. Clinical: an individual with cervical SCI received digital anorectal stimulation (DARS) to trigger AD. TCS was applied at mid-thoracic region.

**Results:** Pre-clinical: Colorectal distension induced severe AD was prevented if TCS was turned on prior to distension ( $55 \pm 16$  vs.  $13 \pm 21$  mmHg rise in BP). TCS also ameliorated AD when initiated during the episode. Clinical: DARS resulted in AD (27mmHg). However, it was prevented when TCS was applied (4.5 mmHg). Similarly, TCS applied during a pre-triggered

episode of AD mitigated the severity (18mmHg vs 5mmHg).

**Conclusion:** TCS is a clinically adaptable therapy for cardiovascular dysfunction after SCI. The acute results warrant more sophisticated investigation of TCS as a long-term rehabilitative approach.

### **“One step at a time, one day at a time”: Life profiles of individuals with disabilities across the first year of the COVID-19 pandemic**

*Rinni Mamman, Somayyeh Mohammadi, William B. Mortenson, Isabelle Rash, Elham Esfandiari, William C. Miller, Julia Schmidt*

**Objective:** To identify profiles of different life pathways over the course of the first year of the COVID-19 pandemic among people with disabilities.

**Methods:** In this longitudinal qualitative study, sixty-one participants with either a spinal cord injury, stroke, or other disabilities were interviewed at four timepoints. These time points paralleled restriction changes as mandated by the public health services in British Columbia, Canada. To generate profiles, interviewers created vignettes as reflections of the interviews conducted for each participant. These vignettes were then analysed to identify groupings of different life pathways experienced over time.

**Results:** Our analysis identified three interlinked profiles: 1) ‘Staying contented during COVID’ describes a “keep calm, carry on” attitude where minimal impact of the pandemic was observed, 2) ‘Seizing the reins’ describes the positive routines that individuals have established by “filling the gaps” with meaningful new activities, and 3) ‘Feeling restrained by a straitjacket’ examines the increasing frustrations and deterioration experienced by individuals in their daily life.

**Conclusion:** This study presents a novel method to identify profiles of differing life pathways and facilitates understanding of the experience of individuals with disabilities during the first year of the COVID-19 pandemic.

### **Testing a new measure of function for youth**

*Rosemary Cheung, Candace Ho, Skye Barbic*

**Introduction:** Canadian youth experiencing mental illness and problematic substance use encounter

barriers in accessing services and face high levels of functional impairments (Hetrick et al., 2017). To serve this group better, understanding the scope of functional problems youth experience is of utmost importance. A patient-reported outcome measure developed from the perspective of young Canadians can best capture the continuum of function they experience (Coulter, 2017). To date, we are unaware of any existing measure of function for Canadian youth.

**Objectives:** Based on previous research and item development (Barbic Under review), this study will test if the new measure of function is fit for purpose to measure function in a clinical and non-clinical sample of young Canadians.

**Methods:** Canadians aged 16-24 will be invited to complete a survey containing the new function measure and other evidence-based assessments. Working alongside youth-patient partners, we will use traditional and modern psychometrics to examine the measure for reliability, clinical meaning, and model-fit.

**Results:** We will present the preliminary results of Canadian youths completing the study and provide suggestions for how the new measure can be used in clinical practice.

**Conclusions:** By determining the fitness of purpose of this new measure, this study will provide preliminary evidence for a set of items that can be used in clinical practice to guide further assessment and inform intervention effectiveness. The measure has the potential to make a significant contribution to the quality of services that youth with mental illness and substance use access across Canada.

## Telerehabilitation for improving lower extremity recovery post-stroke: A systematic review protocol

*Sarah Park, Ada Tang, Courtney Pollock, Brodie Sakakibara*

**Objective:** To describe telerehabilitation interventions for lower extremity recovery following a stroke and to quantitatively assess their effects on clinical outcomes of physical function and impairment, activities, and participation.

**Method:** A systematic review of relevant electronic databases (MEDLINE, Embase, CINAHL, PsycINFO, Cochrane) between inception and March 2021 will be undertaken to identify published interventional studies in English. Studies comparing the effect of one

type of telerehabilitation to another or usual care for individuals with stroke living in the community will be included. Clinical outcomes that will be assessed will be those that are typically measured pre-post rehabilitation. Two reviewers will independently screen search results, extract data and assess each study's methodological quality using the PEDro scale and risk of bias using the Cochrane Risk of Bias. Meta-analyses will be performed if sufficient data exists. Sensitivity analyses will be performed by removing studies with low methodological quality, and subgroup analyses may be performed if data allow by stratifying papers based on demographic (e.g., age, sex) or stroke (e.g., stroke severity) factors.

**Result:** The various telerehabilitation interventions currently used to improve lower extremity recovery will be summarized and their effects will be evaluated on salient outcomes used in stroke recovery.

**Conclusion:** This review will help shape the wider body of work within stroke telerehabilitation specifically for lower extremity. Our results will inform future research as well as clinical practice; it will be used to identify knowledge gaps, factors influencing efficacy, and inform experimental design of new telerehabilitation studies.

## Effects of exercise interventions on cardiac structure, function, and mechanics in individuals with chronic motor-complete spinal cord injury

*Shane J.T. Balthazaar, Tom E. Nightingale, Katharine D. Currie, Andrei V. Krassioukov*

**Objective:** Spinal cord injury (SCI) is a debilitating and life-altering condition. Increased morbidity and mortality in this population, primarily of cardiovascular disease origins, appear to be caused by inactivity-related illnesses. Regular exercise has been shown to decrease cardiovascular risk factors and improve cardiac mechanics in uninjured individuals. Left ventricular (LV) twist represents the mean longitudinal gradient of the difference in clockwise and counter-clockwise rotation of the left ventricular apex and base, a phenomenon that links systolic contraction with diastolic relaxation. There is less conclusive evidence showing the efficacy and utility of exercise interventions on LV mechanics in individuals with cervical and upper-thoracic SCI. The aim of this study is to compare the effects of manually-assisted Body Weight-Supported Treadmill Training (BWSTT) and moderate-to-vigorous intensity

Arm-Cycle Ergometry Training (ACET) on LV indices using echocardiography in individuals with SCI.

**Design/Methods:** A prospective, randomized, single-blinded clinical trial was used to compare the effects of BWSTT versus ACET on LV indices. Eleven participants (aged  $37 \pm 11$  years; 9 males, 2 females) with chronic motor-complete SCI (C4-T6, AIS A-B) were randomly assigned to ACET ( $n = 6$ ) and BWSTT ( $n = 5$ ) groups. Pre-training echocardiography data was obtained, with measurements repeated following 72 sessions of BWSTT or ACET training. A Mann Whitney U Test was used to assess statistical significance between intervention groups at baseline and following six months of training. A Wilcoxon-Signed Ranks Test was used to assess statistical significance within each intervention group.

**Results:** Following ACET, LV twist [18 (15,22) to 21 (17,24),  $P = 0.043$ ], LV mechanical indices of mid circumferential systolic strain rate [-0.91 (-0.98,-0.81) to -1.80 (-2.10,-1.68),  $P = 0.028$ ], mid circumferential diastolic strain rate [1.15 (1.03,1.49) to 2.09 (1.58,2.47),  $P = 0.043$ ], and left ventricular (LV) early diastolic filling velocity increased [0.61 (0.49,0.75) to 0.71 (0.58,0.82),  $P = 0.027$ ]. There were no significant changes in LV indices for the BWSTT group.

**Conclusions:** ACET increased LV early diastolic filling velocities and mechanical indices. These data provide exploratory evidence that ACET may improve LV mechanics and diastolic function in individuals with chronic, cervical or upper-thoracic, motor-complete SCI.

### **Bodily health and bodily integrity capabilities of students with autism spectrum disorder**

*Tahmineh Mousavi*

**Objective:** The purpose of this study was to explore the views of school staff about Bodily Health and Bodily Integrity capabilities of students with Autism Spectrum Disorder (ASD). These capabilities refer to being healthy and being able to move freely from place to place. Semi-structured interviews with 12 school staff (teaching and non-teaching staff) in Tehran, Iran, were conducted and thematically analyzed.

**Results:** Two themes emerged: Nutrition Education and Sexual Health Education. The findings showed that children with ASD have difficulties maintaining good Bodily Health and Bodily Integrity capabilities.

**Conclusion:** The findings highlight the roles of

teachers and the importance of having an interprofessional approach to foster students' Bodily Health and Bodily Integrity capabilities. Although improving these capabilities is important, the current curriculum, managing time, and workload priorities may compete with this goal.

### **Rectal lidocaine reduces autonomic dysreflexia severity after experimental spinal cord injury**

*Rahul Sachdeva, Tamila Kalimullina, Kiran Pawar, Andrei V Krassioukov*

**Objective.** Spinal cord injury (SCI) results in life-altering autonomic dysfunctions such as impairments in gastrointestinal and cardiovascular control. Up to 98% of individuals with SCI report gastrointestinal issues ranging from incontinence to constipation. Gastrointestinal disease burden is not just debilitating on its own, the shared spinal circuitry allows noxious stimuli from the colon (e.g., fecal impaction) to trigger rapid, uncontrolled blood pressure (BP) surges, a condition called autonomic dysreflexia (AD). Rectal application of anesthetic lubricant, lidocaine has been clinically recommended during bowel care to reduce AD severity by mitigating sensory input. However, some clinical studies have reported contradicting evidence i.e., increased cardiovascular disease burden with lidocaine use. To resolve this conflict of opinion, present study evaluated the application of rectal lidocaine during simulated bowel routine to reduce AD severity using a clinically relevant animal model.

**Methods.** Wistar rats received a complete transection (T3) that results in severe AD, and a wireless BP transducer implant six weeks later. Hemodynamic assessments were conducted at rest and during colorectal distention (which simulates bowel impaction and reliably induces AD).

**Results.** Rectal application of both 2% and 10% lidocaine significantly reduced AD severity by 32% and 50% respectively ( $34 \pm 13$  mmHg and  $25 \pm 16$  mmHg vs  $50 \pm 15$  mmHg  $\Delta$ systolic BP) compared to control ( $F(2,30) = 22.73$ ,  $p < 0.0001$ ).

**Conclusion.** Although clinical research remains conflicted on the use of rectal lidocaine in mitigating AD severity, our unambiguous pre-clinical experiments

## Physician-perceived barriers and facilitators to the management of mental health complications after mild traumatic brain injury

Noah Silverberg, Thalia Otamendi, Amanda Dulai, Ripenjoy Rai, Jason Chhina, Anna MacLellan, Pierre-Paul Lizotte

**Objective:** Mild traumatic brain injury (mTBI) has become a public health concern due to high incidence rates, potential for long-term health consequences, and considerable financial burden. Prolonged symptoms and disability after mTBI are often attributable to mental health complications. Recent clinical practice guidelines for mTBI management call on family physicians (FPs) to proactively screen and initiate treatment for mental health complications, but available evidence suggests that this does not happen consistently. We aimed to identify physician-perceived barriers and facilitators to early management of mental health complications following mTBI.

**Methods:** Semi-structured interviews based on the Theoretical Domains Framework (TDF) were conducted with 11 FPs. Interview transcripts were analyzed using directed content analysis and the TDF domains as a coding guide.

**Results:** Facilitators included FPs' perceptions to have an important role in post-mTBI mental health care (TDF domain: *professional role and identity*) and expectations that proactive diagnosis leads to better patient outcomes (*beliefs about consequences*). Barriers included difficulties in finding accessible referral streams for specialty care (*environmental context and resources*), a lack of awareness of evidence-based knowledge and tools to guide their practice (*knowledge*), and patient characteristics or diagnostic ambiguities that decrease confidence in detecting and treating mental health complications (*beliefs about capabilities*).

**Conclusions:** Multiple TDF domains should be considered when designing interventions to improve FP adherence to post-mTBI mental health management guidelines. FPs could benefit from accessible and easily implemented resources to manage mental health conditions, tailored treatment recommendations, and systemic changes that formalize referral processes to mental health specialists.

## Barriers and facilitators to changing bowel care practices after spinal cord injury: A theoretical domains framework approach

Vera-Ellen M. Lucci, Rhyann C. McKay, Christopher B. McBride, Maureen S. McGrath, Rhonda Willms, Heather L. Gainforth, Victoria E. Claydon

Improvement to bladder, bowel, and sexual function are prioritized by individuals with spinal cord injury (SCI). Bowel care is often associated with high levels of dissatisfaction, decreased quality of life, and acts as a potent trigger for cardiovascular complications in high-level SCI. Despite dissatisfaction, 71% of individuals report using the same bowel care routine for at least the past five years, highlighting a disconnect between bowel care dissatisfaction and changing care routines to optimize bowel care.

Using an integrated knowledge translation approach, we aimed to investigate the barriers and facilitators to making changes to bowel care in individuals with SCI guided by the Behaviour Change Wheel and using the Theoretical Domains Framework (TDF). Semi-structured interviews were conducted with individuals living with SCI (n=13, mean age 48.6±13.1 years) and transcribed verbatim (interview duration 31.9±7.1 minutes). Barriers and facilitators were extracted, deductively coded using TDF domains, and inductively analyzed for themes within each domain. Changing bowel care after SCI was heavily influenced by four TDF domains: environmental context and resources; beliefs about consequences; social influences; and knowledge. All intervention functions and policy categories were considered viable intervention options. Human (61%) and digital platforms (33%) of delivery were identified as preferred methods for intervention delivery.

Modifying bowel care is a multi-factorial behaviour. These findings will support the systematic development of future interventions aimed at supporting individuals with SCI in making changes to their bowel care and will assist in the systematic development of future interventions aimed at making changes to optimise bowel care

## **Local analgesics for management of autonomic dysreflexia during medical procedures in individuals with spinal cord injury: A systematic review**

*Whitley Sheehan, Katherine Gray, Laura McCracken, Rahul Sachdeva, Andrei Krassioukov*

**Objective:** To conduct a systematic review of evidence on the use of local analgesics for prevention of AD during medical procedures in individuals with SCI.

**Methods:** MEDLINE, CINAHL, CENTRAL, Cochrane Reviews, PsycInfo, Embase, and Web of Science databases were used for keyword searches to identify all English-language studies evaluating the efficacy of local analgesics for preventing AD in individuals with SCI. Article screening, data extraction, and methodological quality assessment were completed by two independent reviewers and compared for agreement. Patient demographics, procedures that triggered AD, local analgesic use and AD outcomes were recorded.

**Results:** Six studies that were either RCTs or quasi experimental were included. Four studies investigated the use of rectal lidocaine, one studied intravesical bladder instillation of lidocaine, and one study involved topical application of lignocaine/prilocaine cream to the skin. Of the studies on rectal lidocaine, two found that lidocaine was effective in reducing AD severity, one found it was ineffective, and one found that lidocaine worsened AD. The study on intravesical lidocaine found it prevented AD, but the study on lignocaine/prilocaine cream found it was ineffective.

**Conclusion:** RCTs and quasi experimental studies on the use of local analgesics for preventing AD in individuals with SCI had small sample sizes and controversial findings. There is a strong need for a definitive clinical trial that has an appropriate sample size and is well monitored. There is presently no compelling evidence for removing the recommendation for the use of lidocaine from the AD management clinical practice guidelines.