13th Annual Spotlight on Research Breakfast

Presented by the Glenrose Rehabilitation Hospital
and the University of Alberta

PTSD: LOOKING FORWARD - LOOKING BACK

List of Posters/Abstracts

WEDNESDAY, NOVEMBER 22, 2017
HALL D, SHAW CONFERENCE CENTRE
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POSTER ABSTRACTS

AR – Applied Research; CI – Clinical Innovation

On behalf of the Spotlight on Research Breakfast Planning Committee, we would like to thank everyone who submitted poster abstracts to this year’s event. Without your support, this poster symposium would not have been possible!

NOTE: Click on the poster title to view on Pages 8-31.

DISCLAIMER: While the abstracts have been slightly modified for consistency, each abstract has been predominantly printed exactly as originally submitted.
DEVELOPING COMPUTERIZED ADAPTIVE TESTS TO IMPROVE THE EFFICIENCY OF PATIENT-REPORTED OUTCOME ASSESSMENT: CLINICALLY FEASIBLE PROCEDURES

Erin McCabe, Faculty of Rehabilitation Medicine, University of Alberta; Dr. Douglas P. Gross, Professor, Department of Physical Therapy, University of Alberta; Dr. Okan Bulut, Assistant Professor, Department of Educational Psychology, University of Alberta

Background: Patient-reported outcome measures (PRO) are considered valuable source of information. A clinically useful PRO will balance efficiency (quick administration), while maintaining precision (capturing individual variation) in measuring various health outcomes (e.g. physical function, quality-of-life). Computerized adaptive testing (CAT) can achieve these aims. In CAT, patience receive a unique set of items from a large item bank targeted towards their own health status. The individualized test produces a reliable measurement with far fewer items than traditional questionnaires.

Objective: To demonstrate procedures to develop a computerized-adaptive PRO.

Method: We used the items in ‘Lower Extremity Functional Scale’, the Medical Outcomes Study Short Form-36 ‘Role-Physical’, and ‘Physical-Function’ subscales to create CAT for physical functioning. We analyzed an existing dataset of responses (n=1,429) to the scales, collected from workers with lower extremity impairment. First, we calibrated the items on the same metric, using item Response Theory. Then we used computer simulations to design the CAT, and to evaluate the measurement precision of CATs of varying lengths (20 items, 12 items, 8 items, 5 items). Result: Comparing the CAT to the three questionnaires (34 items total), we found that a CAT of 8 items in length was sufficient to maintain 95% of measurement precision. If greater precision is desired (99%), 20 items would be sufficient. We developed a CAT for physical function that is fully functional, and ready for implementation into clinical practice.

Conclusion: CATs are an efficient method of PRO measurement. We demonstrated how practitioners can develop and implement CATs using freely available online platforms.

A DECISION MAKING TOOL FOR THE PRIORITIZATION OF CLINICAL PRACTICE ENHANCEMENT INITIATIVES IN OCCUPATIONAL THERAPY

Yolan Parrott, Clinical Practice Lead, Occupational Therapy, Glenrose Rehabilitation Hospital

Background: Improvements in clinical practice support enhanced quality of care and improved patient/family outcomes. Competing demands for resources, readiness for change, local culture and alignment with site, zone and provincial priorities are some of the factors that lend to difficulty prioritizing and selecting clinical practice initiatives. Objective: To design a tool to systematically review and qualify clinical practice initiatives to support prioritization and selection. Method: The Hexagon Tool (Blasé et al. 2013) provided a foundation for development of the tool. Additionally, a review of the literature and Insite provided a list of potential questions for consideration. These questions were blind reviewed and rated with regards to importance. Questions which were unanimously rated as important/vital were included and weighted accordingly. Questions with 2/3rds agreement were reviewed and discussed to determine inclusion and weight. The draft tool was tested using previously selected initiatives to assess usefulness. Result: The project review tool consists of 18 questions organized by need, fit, evidence, capacity, readiness and resources. Initial trial suggests that the tool augments information decision making. The draft tool will be further trialed in upcoming initiative selection activities to allow for further evaluation and refinement based upon participant feedback and outcomes of the decision making process. Conclusion: The Clinical Practice Initiative review tool encourages reflection upon meaningful considerations to support the identification of projects that are clinically relevant and conducive to successful implementation. To effectively use the project review tool general knowledge about the initiative and context is required.

MISSION BEFORE SELF: THE WARRIOR ETHOS AND UNLIMITED LIABILITY'S IMPACT ON SOLDIER MENTAL HEALTH SEEKING

Monica Hinton, Social Worker, National Defence, Royal Roads University

Background: According to Sareen et.al, (2016), military members are 32% more likely than civilian Canadians to have suicidal thoughts and 64% more likely to plan their suicide. In response to this dire public health concern, suicide prevention has been a top priority for the Canadian Armed Forces (CAF). Despite the availability of mental health services for soldiers,
military members are not accessing the plethora of supports available to them (Sareen, et al. 2017). In 2002, it was reported that one-third of CAF members did not access treatment-related services despite acknowledging the need for help (Fiketoglu, et al. 2008; Sharp, et al. 2015). Stigma is reported most frequently as a barrier to accessing services for mental health issues though how it influences the use of mental health services is unclear (Green, 2007; Langston, 2007; Warner, 2008; Vogt, 2011; Sharp, et al. 2015). **Objective:** Engage military personnel who experience barriers to accessing mental health services. **Method:** Participatory action research is proposed. A reciprocal process of sharing, exploration of perceptions and experiences of military members and care providers from CAF bases across the country is planned. Weekly audiotaped group meetings are proposed and a journal of the research process will be kept. **Result:** Research that informs CAF suicide intervention and prevention programs, retention of military personnel and how decreasing the stigma of accessing mental health services fosters the resilience of serving members is my aim. **Conclusion:** By actively engaging stakeholders, the current challenge our CAF members face when accessing mental health services will be the site of change.

**SORB17-04 (CI)**
**TIME TO START ASKING: SEEKING PATIENT AND FAMILY FEEDBACK WHEN IMPLEMENTING AN ELECTRONIC MEDICAL RECORD**

**Dr. Jennifer Klein,** Healthcare Improvement Specialist, Glenrose Rehabilitation Hospital; **Lisa Froese,** Site Director, Glenrose Rehabilitation Hospital; **Erane McManus,** Manager, Communications Disorders, Glenrose Rehabilitation Hospital; **Jocelynne Nouque,** eCLINICIAN Site Lead, Glenrose Rehabilitation Hospital

**Background:** Patients and families are integral members of the healthcare team, and their active participation is encouraged in all aspects of care. As such, the Glenrose Rehabilitation Hospital (GRH) eCLINICIAN team decided to include patients and their families when evaluating our eCLINICIAN electronic medical record (EMR) implementation process for all outpatient services in spring, 2017. Formal evaluations of EMRs rarely address patients’ and families’ views of EMR use. **Objectives:** A patient and family survey was created to examine this population’s understanding and experience of the EMR at the Glenrose. **Method:** The survey incorporated elements of a patient survey developed by Addictions and Mental Health (2016), relevant limited publications, as well as feedback obtained by a staff survey and focus groups. Once the survey was developed, the following GRH groups were consulted: two patient advisors (i.e., former GRH patients), EMR Core Business Group, Healthcare Improvement Team, and senior management. However, a challenge arose as GRH doesn’t have a system to contact patients and families electronically and mailings were costly. The project team collaborated with GRH Volunteer Services to assist with survey completion. Twelve GRH-trained volunteers approached patients and caregivers awaiting appointments. **Results:** We received 74 completed surveys. Key findings include: 1) 81% would like to be shown their health care information from the EMR during appointments; and 2) 1 in 3 reported not being satisfied with how much they were told about the privacy of their EMR data. By asking patients and families about their experience with the use of EMR during visits, we were able to gain insight into their experiences, perceptions and expectations. These findings can inform practice that ensure optimal use of EMR with respect to patients’ and families’ experiences in future implementations of Clinical Information Systems across AHS. Patient satisfaction with EMR was a complex phenomenon and difficult to measure. Satisfaction questions were reworded as some patients and families worried that their dissatisfaction with the use of EMR would reflect poorly on clinicians. While involving volunteers was a positive experience, limiting the number of volunteers would have saved time in orientation. Volunteers needed to be mindful survey completion did not delay appointment start times. **Conclusion:** Survey findings provide targeted information for upcoming implementations and ongoing EMR use. Educational materials for patients, families, and staff regarding benefits of EMR, information contained within it, and privacy considerations will be updated using these results.

**SORB17-05 (CI)**
**USING AN ALGORITHM TO ENHANCE COLLABORATION IN SHOULDER IMPAIRMENT REHABILITATION ON AN INPATIENT MUSCULOSKELETAL UNIT**

**Barbara-Lynne Furler,** Clinical Practice Lead, Physical Therapy, Glenrose Rehabilitation Hospital; **Yolan, Parrott,** Clinical Practice Lead, Occupational Therapy, Glenrose Rehabilitation Hospital

**Background:** Collaborative practice and clear communication between Occupational and Physical Therapy were essential in implementing best practice for management of shoulder impairments. Historical work division between disciplines, misconceptions, varied skill sets and anxiety were identified as potential barriers to practice change. Strategic
communication methods were necessary to overcome barriers and apply new procedures. **Objective:** Our objective was to develop a defined algorithm to clearly represent responsibilities for collaboration and communication between disciplines. **Method:** Through a series of systematic discussions involving Occupational and Physical Therapists and management, unanimous agreement was reached regarding algorithm process and content. Success will be assessed in late fall of 2017 using chart audits and staff surveys aimed at investigating communication, collaboration and adherence to practice change. Feedback from frontline clinicians will be sought regularly by their respective clinical practice leads. **Result:** The algorithm was intentionally designed as a one-page quick reference. Combining visual ‘paths’ and written information, it clearly and concisely outlines expected outcomes while eliminating sources of confusion. Staff expectations are defined, reducing anxiety and allowing them to successfully embrace new responsibilities. Informal feedback has been positive to date with a few minor changes in process required. **Conclusion:** A universal method for clearly communicating new practices and expectations is beneficial in preparing for change and improving patient experiences. The algorithm re-defined practice roles which included discrete and overlapping activities while highlighting the goals and anticipated outcomes of implementation. Given the early success of this model, adapting it to suit different projects is recommended when embarking on future interdisciplinary clinical practice work.

**SORB17-06 (CI)**
A RETROSPECTIVE STUDY EXAMINING PRESSURE INJURY RISK FACTORS IN REHABILITATION PATIENTS WITH SPINAL CORD INJURY

**Dr. Rebecca Charbonneau,** Medical Lead, Spinal Cord Injury & General Neurology Program, Glenrose Rehabilitation Hospital/University of Alberta; **Michelle Wallace,** Patient Care Manager, Spinal Cord Injury & General Neurology Program, Glenrose Rehabilitation Hospital; **Dr. Cyndie Koning,** Healthcare Improvement Specialist, Glenrose Rehabilitation Hospital; **Marcy Cwiklewich,** Registered Nurse, Glenrose Rehabilitation Hospital

**Background:** The development of pressure injuries (PI) is a significant complication of spinal cord injury (SCI). Individuals with an SCI who develop PI have reduced quality of life and decreased participation in activities. In addition, patients that develop PI have a significantly higher number of healthcare professional consultations. PI may account for one quarter of the cost of care for patients with SCI, and are a significant reason for increased length of stay and re-hospitalization. Locally, the efforts using implementation science to bridge the gap from guidelines into clinical practice at the Glenrose Rehabilitation Hospital resulted in a decrease of PI development after admission. It is unknown what patient or institutional factors might be strongly associated with the development of PI. **Objectives:** The purpose of this study was to identify patient and clinical factors most strongly associated with an SCI patient’s risk for developing PI during rehabilitation.

**Method:** This is a retrospective cohort study. Investigators used data on 197 patients admitted to an adult SCI unit from 2012 to 2015 in the Knowledge Mobilization Network database. For patients with PI stage 2 or greater, additional data was collected regarding SCI specific etiology, co-morbidities, and risk factors for the development of PI as identified by the interdisciplinary team including physical, cognitive, and psychological aspects. **Results:** 51 (25.9%) patients had at least one PI greater than stage 2 during admission. Most patients had the PI present on admission (80.1%). Having a PI is significantly associated with initial Braden score. The presence of diabetes, psychological or cognitive impairments, pain, obesity, and low weight, are correlated with the development of PI. **Conclusion:** Identification of PI risk factors has important implications to guide individual care plans, enhance vigilance, and alert clinicians for the need of targeted patient interventions and education of those at high probability for development of PI.

**SORB17-07 (AR)**
INTERNATIONAL MEDICAL GRADUATES WITHIN THE CANADIAN CULTURAL MEDICAL CONTEXT

**Olga Szafran,** Associate Director (Research), University of Alberta; **Dr. Jean Triscott,** Director, Division of the Care of the Elderly, Department of Family Medicine, University of Alberta; **Dr. Earle Waugh,** Professor Emeritus, University of Alberta; **Dr. Jacqueline Torti,** Research Assistant, University of Alberta; **Dr. Martina Barton,** Clinical Assistant Professor, University of Calgary

**Background:** International medical graduates (IMGs) are a heterogeneous group of learners with distinct ethnicities, religions, and cultural backgrounds. IMGs come from various countries with differing medical education standards, societal values, and professional codes of conduct. **Objective:** This study examined strengths and challenges that IMG family medicine residents encounter in becoming culturally competent within the Canadian medical context, as perceived by those who teach and work with them. **Method:** This was a qualitative, exploratory study employing focus groups and interviews. Ten academic/community family physicians, 13 health professionals, and 4 family medicine residents affiliated
with the University of Alberta and University of Calgary took part in the study. Participants identified perceived strengths and challenges that IMG family medicine residents encounter within the Canadian medical context and areas for learning. Focus group/interview data were transcribed and analyzed thematically. **Result:** Study participants identified that IMG residents possess strengths in four areas: (1) clinical/medical – knowledge of global diseases, strong physical exam/procedural skills; (2) education – highly educated, specialty knowledge; (3) cultural – multilingual, different cultural perspectives; (4) personal – mature, exhibit perseverance. Challenges were identified in five areas: (1) language – difficulty with language nuances/writing; (2) clinical/practice – limited experience with Canadian lab tests/medications, limited mental health awareness; (3) educational – hierarchical/didactic learning approach, challenges with ethical issues and computer technology; (4) cultural – challenges with gender roles and diverse populations; (5) personal – struggle with loss of professional identity/status, later stages of life issues. The need for education related to communications skills, ethics, confidentiality, and cultural competencies was noted. **Conclusion:** IMG family medicine residents bring the strength of diverse perspectives and experiences. When transitioning into the Canadian medical context, IMG residents are perceived to face a broad range of challenges, including those related to cultural differences between their home country and western cultures. An understanding of these challenges can facilitate the development of teaching resources to make the transition easier.

**SORB17-08 (AR)**

**OLDER PEOPLE AND THEIR FAMILIES’ PERCEPTIONS ON INTERPROFESSIONAL TEAMS**

**Dr. Sheny Dahlke,** Assistant Professor, Faculty of Nursing, University of Alberta

**Background:** Although interprofessional teams are promoted as a means to provide quality, safety and efficiencies in care, little is known about how interprofessional teams work with older people and their families. **Objective:** To examine older people and families’ perceptions about how interprofessional teams interacted with them. **Method:** Naturalistic inquiry using qualitative descriptive methods was conducted. Interviews were conducted with 17 people that comprised 10 families. The families had experiences with teams in a variety of settings, such as community, residential care, and hospital. Data were analyzed using inductive content analysis. NVivo was use to record preliminary codes. Analysis included comparing and contrasting families’ experiences. **Result:** Families’ perceptions about interprofessional team collaboration with them were based on: their witnessed interactions between team members; the manner in which professionals communicated with them; and the older person’s report of their experience. Families valued the opportunity to provide information about their family member that would enhance person-centered care. They also valued communication about the older persons’ condition and felt reassured that their family member would receive appropriate care when they saw evidence of interprofessional communication. **Conclusion:** The findings from this study suggest that if interprofessional teams communicate regularly with families about care, they are more likely to incorporate older peoples’ needs. Further research to gain a deeper understanding of how best to support interprofessional teams’ communication with older people and their families is needed.

**SORB17-09 (CI)**

**TRANSITIONS IN CARE**

**Lisa Jensen,** Corporate Director, Covenant Health; **Dr. Lesley Charles,** Care of the Elderly Physician, Covenant Health; **Claire Johnson,** Research Coordinator/Transition Coordinator, Covenant Health

**Background:** Much research has been done on how to smooth the transition home from hospital by identifying patients at high risk for readmission and coordinating discharge. **Objective:** To facilitate smoother discharge from the medicine units at the Grey Nuns Community Hospital (GNCH; Edmonton) for high-risk discharges and prevent hospital readmission. **Method:** Phase 1 utilized expert consensus from the Covenant Transition Steering and Working Groups and literature review to design a risk assessment tool, and the components of a scripted telephone call. A pilot was undertaken to validate the efficacy of the risk assessment tool June 2016. Phase 2 includes the intervention of the risk assessment tool and follow-up telephone calls 48 hours after discharge. **Result:** The pilot used a modified LACE tool. N=40. Using 19 as a cut off it identified 16 patient as high risk. When the original LACE was applied with a cut off of 13, 13 patients were identified as high risk. Thus the added length of the modified LACE did not yield much and the decision was made to use the original LACE in Phase 2 for patients discharged home from the medicine/geriatric and stroke units. The scripted telephone call focuses on whether the patient: understands the discharge instructions, picked up medications, if referred for equipment picked up, and if
referred to home care have heard from them. The study has partnered with home care, the local PCN and primary care physicians (PCP) as well as pharmacy to support the patients. Data and Decision Support supplemented the evaluation framework. **Conclusion:** The initial phase 1 of this study has helped inform the risk assessment tool and telephone call/supports needed to facilitate smooth discharge home for high risk patients.

**SORB17-10 (AR)**

**QUANTIFICATION OF POSTURAL CONTROL DURING SITTING USING SYSTEM IDENTIFICATION**

Kshitij Agarwal, University of Alberta; Alireza Noamani, University of Alberta; Dr. Hossein Rouhani, Assistant Professor, Faculty of Engineering, University of Alberta; Dr. Albert Vette, Assistant Professor, Faculty of Engineering, University of Alberta

**Background:** Elderly individuals and those affected by neuromuscular disorders are not able to independently maintain seated balance. As a result, these individuals are limited in performing daily living activities, and are susceptible to an increased risk of falling and secondary health complications. Non-disabled individuals apply a control strategy for seated balance that minimizes effort and muscle fatigue. Identifying such control strategy improves our mechanistic understanding of seated balance performance and can lead to the development of therapies or assistive technologies utilizing closed-loop functional electrical stimulation (FES). **Objective:** We aim to quantify, using advanced system identification techniques, the rigid body dynamics, neural control scheme, activation dynamics, and mechanical control scheme of non-disabled individuals during upright sitting. **Method:** 15 participants were perturbed while sitting using both mechanical perturbations (mild disturbance at the base of support) and sensory perturbations (rotation of virtual visual scene and base of support). Body kinematics, muscle activity, and ground reactions were recorded during the perturbations. The mechanical perturbations were used to identify active (neural) and passive (mechanical) control schemes, whereas the sensory perturbations were used to identify the rigid body dynamics and activation dynamics. **Result:** The active and passive control schemes, rigid body dynamics, and activation dynamics are currently modelled using a proportional-integrative controller, an inverted pendulum, and a second-order, critically damped system, respectively. **Conclusion:** We are identifying the control scheme that non-disabled individuals apply to maintain seated balance. This model will be used in the future to develop closed-loop FES therapy and technologies for affected individuals.

**SORB17-11 (AR)**

**DIFFERENCES IN RATE OF SPEECH AS A FUNCTION OF GENDER: A REPLICATION STUDY**

Teresa Hardy, Speech-Language Pathologist, Glenrose Rehabilitation Hospital/University of Alberta; Jessica Frankel, University of Alberta; Brianne Haeusler, University of Alberta; Dr. Carol Boliek, Professor, Faculty of Rehabilitation Medicine, Department of Communication Sciences & Disorders, University of Alberta

**Background:** Communication feminization training helps transgender women to modify communication behaviors so others correctly perceive their gender. Various aspects of communication are thought to act as a cue to gender, including rate of speech (RoS). The current research is inconclusive regarding gender differences in RoS and the only studies that have included transgender individuals used a reading task. A narrative task may be more ecologically valid as it more closely resembles day-to-day conversation. **Objective:** To investigate gender differences in RoS in a conversation-like context. **Method:** Participants from three gender identity groups (i.e., cisgender women, cisgender men, and transgender women) were recorded retelling the story of a short cartoon. Their descriptions were transcribed and the total number of syllables in the sample was counted. Rate of speech was calculated by dividing total syllables by the length of the description (in seconds). **Result:** A one-way between subjects analysis of variance (ANOVA) revealed no significant differences in RoS between any of the gender groups $F(2,37) = .978, p = .385$. Mean RoS for all speakers was 3.46 syllables/second (SD = .499). **Conclusion:** A one-way between subjects analysis of variance (ANOVA) revealed no significant differences in RoS between any of the gender groups $F(2,37) = .978, p = .385$. Mean RoS for all speakers was 3.46 syllables/second (SD = .499).

**SORB17-12 (AR)**

**DIFFERENTIAL HEALTH BURDEN AND CLINICAL RISKS ASSOCIATED WITH TYPES OF OBESITY IN KNEE OSTEOARTHRITIS**

Kristine Godziuk, Faculty of Rehabilitation Medicine, University of Alberta; Dr. Carla Prado, Assistant Professor, Department of
Agricultural, Food and Nutritional Science, University of Alberta; Dr. Linda Woodhouse, Associate Professor, Department of Physical Therapy, Faculty of Rehabilitation Medicine, University of Alberta; Dr. Mary Forhan, Assistant Professor, Department of Occupational Therapy, Faculty of Rehabilitation Medicine, University of Alberta

**Background:** Knee osteoarthritis (OA) can lead to severe pain and disability that necessitates surgical joint replacement (called a total knee arthroplasty/TKA). Demand for TKA in Canada has risen, creating challenges in appropriately prioritizing patient selection. Screening for TKA eligibility in Alberta is based on clinical evaluation and obesity classified using body mass index (BMI). Controversial evidence of increased TKA surgical infection risk when BMI ≥ 30 kg/m² has led to subjectivity in risk stratification and varied approaches. Some individuals are considered ineligible for surgery based on BMI, with advice to lose weight and return for re-assessment. However BMI does not enable distinction of body composition phenotypes that influence surgical risk and recovery. Sarcopenic obesity, a phenotype of low skeletal muscle mass and high adiposity, is associated with increased infection rates and extended rehabilitation in other clinical scenarios. This condition may be present in adults with knee OA, impacting TKA outcomes yet missed by BMI. Further investigation is warranted.

**Objective:** Our research program aims to identify the prevalence of sarcopenic and non-sarcopenic phenotypes of obesity in adults assessed for TKA eligibility. Differences in quality of life, physical function, and surgical outcomes will be compared between these phenotypes. Additionally, the accuracy of current consensus diagnostic criteria for sarcopenia will be tested.

**Method:** A two phase prospective study was developed based on a systematic literature review and focused meetings with stakeholder organizations. **Result:** Research results will expand knowledge on the prevalence, impact and identification of sarcopenic obesity in knee osteoarthritis, and contribute to improved TKA risk stratification and osteoarthritis management for adults with obesity.

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**SORB17-13 (AR)**

**EVALUATION OF 3D PRINTED SPINAL BRACE FOR THE TREATMENT OF ADOLESCENT IDIOPATHIC SCOLIOSIS**

Kenwick Ng, University of Alberta; Dr. Edmond Lou, Associate Professor, Department of Electrical and Computer Engineering, University of Alberta; Dr. Kajsa Duke, Associate Professor, Department of Mechanical Engineering, University of Alberta; Melissa Tilburn, Certified Orthotist, Glenrose Rehabilitation Hospital; Andreas Donauer, Certified Orthotist and Prosthetist, Glenrose Rehabilitation Hospital

**Background:** Adolescent Idiopathic Scoliosis (AIS) is a three-dimensional spinal deformity. Currently, bracing is the only proven non-surgical treatment. However, brace manufacturing technology has not changed in the last 40 years.

**Objective:** To evaluate 3D printed spinal braces for the treatment of AIS.

**Method:** Two 2.54mm thick 3D printed braces made of ULTEM1010, and Nylon12 were manufactured. The braces were evaluated by two experienced orthotists based on feasibility of modification, attachment of accessories and breakage with excessive bending. Flexibility of the 3D printed braces for donning and doffing had been simulated and tested. Furthermore, the weight, labor time and material cost of the 3D printed braces were compared with a traditional spinal brace.

**Result:** Both 3D printed braces were modifiable, trimmed to shape, had adequate stiffness and attached with lining and buckles. Nylon12 brace was better as it did not have sharp breakage. 2.54 mm thickness provided sufficient strength compared to the traditional 4 mm standard brace. Simulation of 3 months of donning and doffing for the braces demonstrated retention in structural integrity. The 3D printed brace was thinner, lighter, required less labor time to manufacture, but the cost of the 3D printed material was higher. Nevertheless, the overall cost is lower.

**Conclusion:** The Nylon12 3D printed brace has standard brace characteristics, but it may be more comfortable to wear. However, the effectiveness of the 3D printed brace still needs to be further investigated under clinical trials.

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**SORB17-15 (AR)**

**FUNCTIONAL, IMPULSE-BASED QUANTIFICATION OF PLANTAR PRESSURE PATTERNS IN TYPICAL ADULT GAIT**

Dr. Martha Funabashi, Research Associate, Alberta Health Services; Justin Lewicke, Motion Analyst, Glenrose Rehabilitation Hospital; Dr. Albert Vette, Assistant Professor, Department of Mechanical Engineering, University of Alberta; Dr. Sukhdeep Dulai, Associate Professor, Department of Surgery, University of Alberta

**Background:** Dynamic pedobarography is used to measure the change in plantar pressure distribution during gait. Clinical methods of pedobarographic analysis lack, however, a standardized, functional segmentation or require costly motion capture technology and expertise. Furthermore, while commonly used pedobarographic measures are mostly based on peak pressures, progressive foot deformities also depend on the duration the pressure is applied, which can be quantified
via impulse measures. **Objective:** We aimed to: (1) develop a standardized method for functionally segmenting pedobarographic data during gait without the need for motion capture; (2) compute pedobarographic measures that are based on each segment's vertical impulse; and (3) obtain a normative set of such pedobarographic measures for non-disabled gait. **Method:** Pedobarographic data was collected during gait from sixty adults with normal feet. Using the maximum pressure map for each trial, an expert and novice rater independently identified the hallux, heel, medial forefoot, and lateral forefoot and computed nine normalized vertical impulse measures from the pedobarographic time series. **Result:** The Heel-to-Forefoot Balance was 33.3±6.4%, the Medial-Lateral Forefoot Balance (with hallux) 58.9±10.4%, the Medial-Lateral Forefoot Balance (without hallux) 53.1±9.9% and the Hallux-Medial Forefoot Balance 21.3±9.6% (mean±standard deviation). The intra-class correlation coefficient for the two raters ranged between 0.88 and 0.99. **Conclusion:** We developed a simple, stand-alone method for pedobarographic segmentation that is mechanistically linked to relevant anatomical regions of the foot. The normative impulse measures exhibited excellent inter-rater reliability. This normative dataset is currently used in the clinical assessment of different foot deformities and gait impairments, and in the evaluation of treatment outcomes.

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**SORB17-16 (CI)**

**QUALITY IMPROVEMENT PROJECT ELIMINATES DELAYED-ONSET, PROGRESSIVE, SENSORY, BILATERAL PERMANENT HEARING LOSS AFTER EARLY CARDIAC SURGERY**

Dr. Charlene Robertson, Pediatric Consultant, Glenrose Rehabilitation Hospital; Dr. Karin Bork, Audiologist, Glenrose Rehabilitation Hospital; Gerda Tawfik, Pharmacist, Stollery Children's Hospital; Gwen Bond, Nurse Coordinator, Neonatal & Infant Follow-Up Clinic, Glenrose Rehabilitation Hospital

**Background:** Childhood delayed-onset, progressive, sensory, bilateral permanent (PHL) has been documented to occur following severe respiratory failure, including after Extracorporeal Membrane Oxygenation. Our past studies using severity-of-illness markers implicated bolus furosemide as a possible ototoxic cause of this type of PHL. **Objective:** To investigate how rapidly intravenous furosemide was being given to neonates at the time of complex cardiac surgery and to ensure that the rate of administration adhered to best practice. **Method:** From 1996-2016, the Western Canadian Complex Pediatric Therapies Follow-up Program with registered pediatric-experienced audiologists followed 152 survivors after single ventricle repair at six weeks of age or less. Hearing status was documented until age 4.5 years. A Quality Improvement (QI) Project in 2007-2008 consisted of Parenteral Drug Monograph review, observation of furosemide administration, and survey of knowledge about ototoxicity. Prediction of a change in PHL after the QI used Multiple Logistic Regression (Firth) with Odds Ratios (OR). **Result:** Audiologists found 17.2% of 99 survivors born in 1996-2008 had this type of PHL. The QI project resulted in a monograph revision, educational program, and survey. **Conclusion:** Rapid IV administration of bolus furosemide within the context of severe illness can lead to PHL which may be progressive and severe. Adhering to best practice prevents this disability.

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**SORB17-17 (AR)**

**CONTAINMENT PRODUCTS AND QUALITY OF LIFE IN MEN WITH URINARY INCONTINENCE: EXPLORATORY, MIXED METHODS STUDY**

Cody Lindeman, Faculty of Medicine & Dentistry, Department of Medicine, Geriatrics Division, University of Alberta

**Background:** Urinary incontinence (UI) is estimated to affect one in ten men. Little is known about how pads affect quality of life (QoL). **Objective:** This exploratory study assessed the feasibility of a formal trial of pad use and QoL in men, and provided insight into men's perception of UI and pads. **Method:** Quasi-experimental, mixed methods study. Men, ≥18 years with UI and had never used pads were recruited by a wide advertising campaign. Individuals with faecal incontinence and cognitive impairment were excluded. QoL, demographic, incontinence-severity, and pad satisfaction questionnaires were administered at baseline and six weeks later. Participants were given a six-week supply of pads, and invited to participate in a semi-structured interview. **Result:** Nine participants of mean age 69 (16) were included. **Baseline mean (SD):** ICILUTSQoL = 31.0 (5.5), EQ-SD= 83.3 (11.8), 6 weeks mean (SD): ICILUTSQoL = 33.3 (7.3), EQ-SD= 86.5 (9.4), Effect size, dzICILUTSQoL = 0.35, EQ-SD= 0.29. Finding first-time pad users proved difficult, as pads are readily accessible in stores. Qualitative interviews revealed pad design as a challenge. Some men expressed concern about the tight undergarments needed to hold the
pads in place. Men viewed UI as a sickness and viewed pads and male UI as a stigmatized and hidden subject. They found pads improved their confidence in public. **Conclusion:** This exploratory study provided valuable information from which a formal fully powered trial can be planned to obtain a greater understanding of the stigma surrounding male UI and pad usage, and some of the barriers men encounter when searching for solutions was obtained.

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**SORB17-18 (CI)**  
**NEW-ONSET INCONTINENCE IN HOSPITALIZED OLDER PATIENTS (NO-HOPE)**

**Peter Anto Johnson**, University of Alberta; **Stephanie Gartner**, Research Assistant, University of Alberta; **Dr. Saima Rajabali**, Clinical Trials Research Coordinator, Division of Geriatric Medicine, University of Alberta; **Dr. Adrian Wagg**, Professor, Healthy Ageing, Division Director, Geriatric Medicine, University of Alberta

**Background:** Hospital stay is a major risk factor for new-onset urinary incontinence (UI). Between 10–21% of hospitalized adults report UI. New-onset UI is relatively understudied in acutely hospitalized older persons. Moreover, a high rate of inappropriate usage of continence aids is reported in hospitals, despite proper usage mandates. **Objective:** The objectives of this study were to identify risk factors for new-onset UI and describe continence management in hospitalized older adults reporting continence prior to admission. **Method:** Patients ≥70 years, within 48 hours of admission to an in-patient unit were screened. Questionnaires (reported Edmonton Frail Scale (rEFS); Barthel Index (BI); Charlson Comorbidity Index (CCI); Montreal Cognitive Assessment (MoCA)) were administered. Those incontinent, having indwelling catheter before admission, cognitively impaired, mechanically ventilated or fully dependent for care were excluded. Weekly hospital visits and a telephone follow-up after discharge were performed to document changes in continence status. Variables were analyzed with descriptive statistics. **Result:** Of the 83 patients screened, 13 were recruited. Length of stay, hospital procedures, transfers and physician/family visits were common reasons for exclusion. Patients scored mild to not frail on rEFS, had <5 comorbidities and MoCA scores between 22-30. Most were fully independent (n=7; BI score: 100). Patients not fully independent (n=6) scored low for stairs, mobility or both. Of the three patients who developed incontinence, two had indwelling catheters and one was placed on diapers to manage UI. Following discharge, both catheterized patients remained incontinent, managing with caregiver assistance at home. The other patient remained on diapers following discharge. **Conclusion:** Further recruitment is ongoing to assess risk factors and management of new-onset UI in hospitalized older adults.

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**SORB17-19 (AR)**  
**DESIGN AND INTEGRATION OF AN INEXPENSIVE WEARABLE TACTOR SYSTEM**

**Katherine Schoepp**, Research Assistant, BLINC Lab, University of Alberta; **Michael Roy Dawson**, Research Engineer, BLINC Lab, University of Alberta; **Dr. Jason Carey**, Professor, Associate Dean of Programs & Planning, University of Alberta; **Dr. Jacqueline Hebert**, Associate Research Chair, Clinical Rehabilitation; **Associate Professor, Division of Physical Medicine and Rehabilitation, BLINC Lab, University of Alberta

**Background:** Most commercial myoelectric prostheses do not provide sensory feedback to amputee users. Mechanotactile feedback provides modality-matched sensory information, but has yet to be evaluated in real-world tasks; a wearable platform is needed to facilitate this evaluation. **Objective:** To develop an inexpensive, wearable, mechanotactile feedback system that can be retrofit onto existing prosthetic components to provide tactile information to a prosthetic user. **Method:** The development of the tactor-integrated prosthesis included the (i) evaluation of sensors that can be retrofit onto existing commercial terminal devices, (ii) design and evaluation of custom mechanotactile tactors, and (iii) design of a custom electronics controller which translates sensor input to tactor output. The system was evaluated with a participant with a trans-humeral amputation. Socket vacuum pressure was monitored. Two novel metrics were applied without specific user training; Grasping Relative Index of Performance (GRIP) and Gaze and Movement Assessment (GaMA). **Result:** The tactor-integrated prosthesis performed well technically and maintained suction fit. Socket vacuum pressure fluctuated up to 10 kPa during grasp, with greater vacuum pressures observed during standing tasks compared to seated. Preliminary evaluation with novel metrics did not show significant differences, however average forces applied by the prosthetic hand were shown to be lower while feedback was active, suggesting some grasp modulation. **Conclusion:** Sensors, tactors, and electronics were designed and integrated onto a commercial prosthetic arm. The wearable device allowed evaluation in a real-world environment, where preliminary testing demonstrated that the system functioned well technically. Future evaluation may include training, additional tasks, and evaluation with participants who have undergone
**SORB17-20 (AR)**

**OCCURRENCE AND TYPES OF CHILDHOOD PERMANENT HEARING LOSS AFTER EARLY COMPLEX CARDIAC SURGERY**

**Dr. Karin Bork,** Audiologist, Glenrose Rehabilitation Hospital; **Beatrice To,** Audiologist, Glenrose Rehabilitation Hospital; **Hope Valeriote,** Audiologist, Glenrose Rehabilitation Hospital; **Dr. Charlene Robertson,** Pediatric Consultant, Glenrose Rehabilitation Hospital

**Background:** Early diagnosis of childhood Permanent Hearing Loss (PHL) is critical to communication and literacy.  
**Objective:** To determine the occurrence rate and types of PHL after early cardiac surgery.  
**Method:** This prospective inception cohort (1996-2015) study after complex cardiac surgery with cardiopulmonary bypass at age 6 weeks or less provides long-term audiology follow-up by registered pediatric-experienced audiologists at 6-8 months post-surgery, age two years, and as required thereafter to complete diagnoses. PHL at any frequency (500 to 4000 Hz) is defined as responses of >25-decibel hearing level in either ear. Occurrence rates are given as percentages of assessed survivors with 95% confidence intervals (CI). Types include permanent conductive and sensorineural losses. Prospectively collected surgical and demographic data for individual children were entered into multivariate logistic regression to determine predictors of PHL; odds ratios (OR) are given.  
**Result:** Survival was 706(83.4%) of 841 children; follow-up, 691(97.9%). 41 children had PHL, 5.9% (95%CI 4.3%, 8.0%); 17(41.5%) with syndromes/genetic abnormalities. Of 41, 4 had permanent conductive loss (1 bilateral); 37, sensorineural loss [29 bilateral (28 moderately-severe to profound), 20 sloping]. By cardiac defect, PHL rates were: bi-ventricular, 4.0% (95%CI 2.5%, 6.1%); single ventricle, 10.8% (95%CI 6.8%, 16.1%). Prediction ORs were: syndromes/genetic abnormalities, 8.603(95%CI 3.929, 18.838); single ventricle defect, 4.317(95%CI 2.035, 9.084); and prolonged ventilation, 1.030(95%CI 1.014, 1.045).  
**Conclusion:** PHL is common after early complex cardiac surgery. Over 40% with PHL have known syndromes/genetic abnormalities, but others do not have easily identifiable risk indicators. Early cardiac surgery should be considered a risk indicator for PHL.

**SORB17-21 (CI)**

**FABRICATION OF STOLLERY EXTERNAL ROTATION ABDUCTION THERMOPLASTIC SHOULDER ORTHOSIS (SERATSO)**

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**Background:** The most common obstetrical brachial plexus injury pattern is the upper trunk, which can result in significant shoulder and elbow dysfunction. After surgery, patients are typically placed in a sling and swath with the shoulder internally rotated and adducted, which reinforces muscle imbalance. However, positioning the shoulder in external rotation and abduction allows for secondary releases and soft tissue lengthening, while not placing any additional stress on the repair.

**Objective:** This paper outlines the fabrication of the Stollery External Rotation Abduction Thermoplastic Shoulder Orthosis.

**Method:** The SERATSO is fabricated pre-operatively and modified to achieve desired post-operative arm position. Orthosis wearing schedule depends on surgery and ranges from 3 to 12 weeks. Material costs range from $150 to $180 and total time required is two hours for therapist and 3 hours for assistant for fabrication, intra-operative fitting, and post-operative check.

**Result:** From 2008 to 2015, the SERATSO design has been used in 28 secondary procedures with children from 3.5 to 8 years old. Since 2013, this design was used 12 times for primary nerve transfers and grafts for infants ranging from 9 to 11 months old. Orthosis compliance has been 100% with no orthosis failures. The SERATSO design decreases time a patient is anaesthetized, requires minimal dressing, and allows visual inspection. When appropriate the orthosis can be removed for hygiene, exercises, and weaned from use.  
**Conclusion:** This robust orthosis design has withstood many children participating in functional activities and play. Parents appreciate the durable design, the ability to remove orthosis for skin care, and the customized aesthetic decorations.

**SORB17-22(AR)**

**SOCIAL MARKETING THEORY AS A FRAMEWORK TO PROMOTE UPTAKE OF SLEEP-CONDUCIVE MUSIC BY POST SECONDARY STUDENTS**
Background: Sleep deficiency is a prevalent problem among post-secondary student (PSS) populations and has serious negative consequences for physical, cognitive, and psychological well-being. However, in a survey of 1,294 University of Alberta students, 31.3% reported listening to music four or more times a week as a non-pharmacological sleep intervention (NPSI).

Objective: The objective of this study is to measure the uptake of sleep-conducive music (SCM) as an evidence-based NPSI in PSS populations. As influencing sleep behavioural change is not a straightforward process, we will test the use of social marketing principles as a study recruitment and intervention delivery vehicle.

Method: An online survey will be the selected method of data collection in this study, a fast, cost-effective tool able to reach a large sample size. Recruitment and intervention delivery will occur through posters, designed based on social marketing and graphic communication principles, and campus-wide emails. Materials: A survey tool to measure the uptake of the intervention has been developed, and participants will complete the Pittsburgh Sleep Quality Index and the Epworth Sleepiness Scale, two standardized self-reported sleep questionnaires to measure sleep quality before and after uptake of the intervention.

Result: The challenge of this study is to influence students’ behaviour on a campus-wide level, to take up SCM listening practices, and the use of social marketing principles appear to present an evidence-based approach to promote prosocial behavior change.

RESILIENT ECOCLOGIES: AN INTERSECTIONAL INVESTIGATION OF TRAUMA AS EXPERIENCED BY CANADIAN ARMED FORCES MEMBERS

Capt Ashley Collette, Team Lead of Psychosocial Department, Royal Roads University & Canadian Armed Forces

Background: The CAF Surgeon General’s Integrated Health Strategy (2017) states that 22.3% of CAF members who are medically released from the CAF are as a result of PTSD. Despite a dominant cultural discourse focused on pathological outcomes that may result from trauma and crisis, psychological resilience following crisis is the norm. Many people recover from potentially traumatic events, and some reflect that they grow psychologically as a result of the struggle with trauma.

Resilience in the psychological and social sciences has historically been conceptualized as an individual trait that offers protection against exposure to chronic and acute stress. It has focused almost exclusively on the individual as the unit of analysis, even though many of the factors associated with resilient outcomes (like social support) are not within the person. A systems-oriented understanding of resilience decenters the individual as the primary unit of analysis and shifts the focus to an examination of person-in-environment. Understood this way, the study of resilience becomes primarily focused on interdependent transactions between individual and context, and an individual’s response to stress is seen as something that takes place in the relational context of interactions with other humans and the surrounding social and physical ecology. The proposed research asks the following: What are the factors that support sustainable resilience and posttraumatic growth for members of the CAF? Objectives: The aim of the proposed research is to discover the ways in which members of the CAF interact with their environment in order to find pathways to sustainable resilience and posttraumatic growth. Method: Participatory Action Research is proposed. A collaborative process where co-construction of reality by researcher and research participants is proposed as a legitimate source of knowledge generation. Result: The anticipated results of the proposed research are intended to inform health care interventions, leadership practices, and CAF policies that support and promote sustainable resilience and posttraumatic growth for members of the CAF experiencing crisis and extreme stress. Conclusion: A social ecological understanding of resilience in the CAF to inform policy and program development related to psychological and social wellness.

CONSISTENCY OF SIMULTANEOUS SLEEP ACTIGRAPHY MEASUREMENTS COMPARING ALL FOUR LIMBS OF PATIENTS WITH PARKINSON’S DISEASE

Vineet Prasad, University of Alberta; Dr. Cary Brown, Professor, Faculty of Rehabilitation Medicine, Department of Occupational Therapy, University of Alberta

Background: Wrist actigraphy is a form of objective sleep measurement that has gained a central role in sleep research and clinical settings. Although actigraph data is available for sleep disorders concerning medical and neurobehavioral
disorders, the literature identifies that sensitivity of actigraph data in studies of persons with Parkinson disease (PWPD) is not robust. Guidelines for actigraphy recommend placing the monitor on the non-dominant wrist, however, this potentially will be the most involved limb for someone with Parkinson disease and so alternative placement would be preferred. To date, there are few studies of sleep actigraphy use for PWPD, and specifically, no research to explore the degree of variability in actigraphy findings when comparing simultaneous readings from all four limbs (upper/lower, dominant/non-dominant limb).

**Objective:** This study aimed to determine the degree of sleep actigraph score variation in PWPD when placed simultaneously on all the four limbs. **Method:** Four participants were recruited and wore a sleep actigraph (ActiGraph wGT3X-BT) on each limb for seven nights. The within-participant data from the four actigraphs were compared to determine the degree of consistency. **Result:** For all participants sleep efficiency (SE) and total sleep time (TST) were higher in the lower limb than upper limb. There was no notable difference in all of the measured sleep variables between the dominant arm and non-dominant arm. **Conclusion:** Simultaneous actigraphy measurement did not reveal a notable difference in sleep variables between dominant and non-dominant arms. However, a discrepancy was seen between the measured sleep variables in upper limbs and lower limbs.

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**SORB17-25(AR)**

**RECONSTRUCTION AND POSITION ACCURACY OF 3D ULTRASOUND-CAMERA SYSTEM FOR ADOLESCENT IDIOPATHIC SCOLIOSIS SURGERY**

**Dr. Andrew Chan,** University of Alberta; **Dr. Eric Parent,** Assistant Professor, Faculty of Rehabilitation Medicine, University of Alberta; **Dr. Edmond Lou,** Associate Professor, Department of Electrical and Computer Engineering, University of Alberta

**Background:** Adolescent idiopathic scoliosis is a spinal deformity involving lateral curvature and axial rotation of the spine. Severe scoliosis requires surgical treatment involving insertion of screws through narrow spinal pedicles to secure the spine to instrumentation. High accuracy is required to prevent neurological injury or vascular injury. 3D ultrasound has been proposed as a non-ionizing method to provide image guidance for insertion of screws. **Objective:** The objective of this study is to determine the accuracy of reconstructions and positions from a custom 3D ultrasound-optical motion capture guidance system. **Method:** An Ultrasonix ultrasound imager was used to acquire images. Optitrack Prime 13W cameras provided location information of those images, with software developed in Matlab to generate 3D reconstructions and localize the model within the capture volume. Measurements ranging from 5-25mm and 5-35° on four high resolution 3D-printed phantoms were compared with physical measurements. Positional accuracy of reconstructions was evaluated, comparing virtual phantom position with physically measured positions. **Result:** Reconstruction accuracies from linear measurements were: 0.55±0.15mm across the ultrasound aperture direction (X-direction), 0.10±0.05mm along the penetration direction (Y-direction) and 0.55±0.15mm along the transducer movement direction (Z-direction). Angular accuracies were: 0.70±0.30° in the X-Y plane, and 0.65±0.30° in the Z-Y plane. Positional accuracies from 75 measurements were 0.20±0.10mm in the X-direction, 0.15±0.10mm in the Y-direction and 0.20±0.15mm in the Z-direction. **Conclusion:** The custom 3D ultrasound system has reconstruction accuracies of 0.55mm and 0.70° and position accuracies of 0.20mm, meeting the clinical standard of 1mm and 5° for image guidance in pedicle screw insertion.

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**SORB17-26(CI)**

**ANALYSIS OF THE SPINAL FLEXIBILITY INDICES ON CHILDREN WITH ADOLESCENT IDIOPATHIC SCOLIOSIS (AIS)**

**Mahdieh Khodaei,** Department of Radiology and Diagnostic Imaging, University of Alberta; **Dr. Rui Zheng,** Research Associate, Department of Surgery, University of Alberta; **Dr. Lawrence Le,** Clinical Professor, Department of Radiology and Diagnostic Imaging, University of Alberta; **Dr. Edmond Lou,** Associate Professor, Department of Electrical and Computer Engineering, University of Alberta

**Background:** Adolescent idiopathic Scoliosis (AIS) is a 3D spinal deformity. Knowing spinal flexibility (SF) is important because it helps clinicians to have better treatment planning. New indices were developed to differentiate postural and structural components to provide true SF information. **Objective:** This study reported the reliability of the indices which indicated how postural and structural components affect SF. **Method:** 108 AIS subjects were recruited. Ultrasound scans on spine were acquired at standing, normal prone, maximum right or left or both prone side-bending postures. Prone bending relative to standing index (BRSI) (traditional method), normal prone relative to standing index (PRSI) (new-postural component), and the differences between BRSI and PRSI which reports B-PRSI (new-structural component) were introduced. Two raters involved in this study. The 3 indices measurements from both raters were compared by using the intra-class correlation.
coefficient (ICC) [2, 1]. The standard errors of measurements (SEM) of the indices were reported. **Result:** Both raters identified 173 curves. The (ICC [2, 1] and SEM) values of BRSI, PRSI, and B-PRSI were (0.94, 0.04), (0.70, 0.06) and (0.87, 0.07), respectively. The average PRSI and B-PRSI were (0.45 ± 0.21, 0.52 ± 0.22) and (0.95 ± 0.59, 0.87 ± 0.58) for R1, and R2, respectively. This meant around 50% and 90% of curve correction was obtained by changing from standing to prone and by applying the bending force in prone position, respectively. **Conclusion:** The PRSI and B-PRSI showed moderate (0.70) and high (0.87) reliability. Also, the PRSI and B-PRSI differentiated the postural and structural components of SF which might provide better information to clinicians.

**SORB17-27(CI)**

**EFFECT OF PAD USE ON QUALITY OF LIFE IN WOMEN WITH URINARY INCONTINENCE**

**Megan McCreary,** Division of Geriatric Medicine, University of Alberta; **Dr. Saima Rajabali,** Clinical Trials Research Coordinator, Division of Geriatric Medicine, University of Alberta; **Dr. Kathleen Hunter,** Associate Professor, University of Alberta; Nurse Practitioner, Glenrose Rehabilitation Hospital; **Dr. Adrian Wagg,** Professor, Healthy Ageing, Division Director, Geriatric Medicine, University of Alberta

**Background:** Urinary incontinence (UI) is a common condition affecting 10-44% of adult women. Many delay seeking healthcare or do not seek it at all and instead rely on pads to manage their incontinence. Yet, despite their wide usage, little is known about how pad use affects quality of life (QoL). **Objective:** This study aimed to investigate the effect of pad use on QoL in women naive to incontinence product use. **Method:** This quasi-experimental, mixed methods study consisted of a quantitative assessment of QoL followed by a qualitative phase of semi-structured interviews. Participants were recruited using print and digital media. Women ≥18 years with UI and had never used pads were included. Women with faecal incontinence and cognitive impairment were excluded. Questionnaires on demographics, UI severity, and QoL were administered at baseline and 6 weeks later. Women received a 6 week supply of pads. **Result:** Preliminary analysis was conducted on 18 women. The mean (SD) age was 61 (17.2) years and had moderate UI (mean (SD) Sandvik severity score 4.8 (2.1)). Finding first-time pad users proved difficult. Qualitative data suggested that a feeling of security when wearing pads was common. Some felt their reduced anxiety allowed them more time to focus on the task at hand. Despite these described benefits, cost of pads was still an important factor. **Conclusion:** Further recruitment is ongoing to assess the significance of the effect of pad use on women’s QoL.

**SORB17-28(AR)**

**PARENT AND CLINICIAN AGREEMENT IN EARLY BEHAVIOURAL SIGNS OF AUTISM: A HIGH-RISK SIBLING COHORT**

**Dr. Lori-Ann Sacrey,** Research Associate, Autism Research Centre, Glenrose Rehabilitation Hospital; **Dr. Lonnie Zwaigenbaum,** Co-Director, Autism Research Centre, Glenrose Rehabilitation Hospital

**Background:** Identifying early impairments in children who will subsequently be diagnosed with Autism Spectrum Disorder (ASD) is crucial to ensure that they gain timely access to interventions that will improve functional outcomes. **Objective:** The purpose of this study was to examine parent and clinician agreement for early signs of ASD. **Method:** Participants: High-risk infants (HR) siblings without ASD diagnosis (HR-N; n = 155) and HR siblings with a diagnosis of ASD (HR-ASD; n = 68). Assessments: The Autism Observation Scale for Infants (AOSI; Bryson et al., 2008), and the Autism Parent Screen for Infants (APSI; Sacrey et al., 2016), which was modeled in content from the AOSI. Statistical Analyses: The APSI and AOSI were compared using independent t-test analyses. Agreement was analyzed using intraclass correlations (ICC). **Result:** ICC indicated poor agreement between parents and clinicians. Item-level analysis of the t-tests indicated: (1) six items predicting diagnostic outcomes on both the AOSI and APSI, (2) six items were informative on the APSI only, and (3) seven of the items were not informative on either assessment. **Conclusion:** Prospective parent report is informative for early signs of ASD by 12 months and complements what may be observed during a clinical assessment. Thus, some clinically informative behaviour may be more likely detected by parents based on their day-to-day observations than during a brief clinical visit.

**SORB17-29(AR)**

**THE SHORT QUANTITATIVE CHECKLIST FOR AUTISM IN TODDLERS (Q-CHAT-10) AS A RAPID SCREEN FOR ASD**

**Sarah Raza,** Department of Pediatrics, University of Alberta; **Dr. Lori-Ann Sacrey,** Research Associate, Autism Research
Result: The phenotype (HR-BAP) on the Q-CHAT-10 was compared between groups (HR-ASD, HR-BAP, HR-TD) at 18 and 24 months using one-way ANOVAs.

Method: Participants included 90 high-risk (HR) infants with an older sibling with ASD, stratified into three groups: (1) HR toddlers with an ASD diagnosis at 36 months (HR-ASD; n=19); (2) HR toddlers who meet the criteria for the broader autism phenotype (HR-BAP; n=31); and (3) HR toddlers without ASD or BAP (i.e., typically developing (HR-TD; n=40). Performance on the Q-CHAT-10 was compared between groups (HR-ASD, HR-BAP, HR-TD) at 18 and 24 months using one-way ANOVAs.

Result: Higher total score on the Q-CHAT-10 differentiated the HR-ASD group from HR-N and LR groups at both 18 (q<0.001) and 24 months of age (q<0.001). Estimates of sensitivity and specificity were 0.78 and 0.55 at 18 months, and 0.87 and 0.56 at 24 months, respectively. Conclusion: While the Q-CHAT-10 was able to distinguish groups of children with ASD from other HR toddlers who are TD or who exhibit the BAP, individual classification by the Q-CHAT-10 for ASD versus not ASD was relatively poor in this limited sample. Thus, individual classification was not sufficient to support screening in this HR sibling cohort.

SORB17-30(AR)
DOES STRONG DESIRE TO VOID ACT AS A SOURCE OF DIVERTED ATTENTION IN HEALTHY ADULTS?

Rachael Morrison, Research Assistant, University of Alberta; Dr. William Gibson, Assistant Professor, Division of Geriatrics, University of Alberta; Dr. Adrian Wagg, Professor, Healthy Ageing, Division Director, Geriatric Medicine, University of Alberta

Background: It is well recognized that urinary urgency, the feeling of a strong desire to void (SDV) that is difficult to defer, is associated with an increase in the risk of falls in older adults. Objective: As part of a larger program of research investigating the reasons for this association, we aimed to assess whether the sensation of urge, the strong desire to pass urine, is a source of diverted attention in young, healthy volunteers. We hypothesized that the SDV acts as a source of diverted attention, leading to deterioration in a simultaneously-performed cognitive task. Method: 26 participants completed Trail Making Test B as well as Simple Reaction Time tests under three conditions: undistracted, distracted and SDV. The participants completed another cognitive task simultaneously and consumed fluids until they had reached the strongest point of urinary urgency they could handle for the distracted and SDV conditions respectively. Result: Paired t-test analysis revealed a significant difference between the undistracted (M=43.30, SD=19.01), and distracted (M=110.63, SD=56.38) conditions (p=0.001) with the distracted condition having a lower mean. No significant difference was noted between undistracted and SDV (M=44.29, SD=13.17) conditions (p>0.05). For the SRT test, the undistracted condition (M=371.93, SD=58.04) was significantly lower than that of the distracted condition (M=624.83, SD=250.80), (p=0.001), and the SDV condition (M=420.98, SD=83.67), (p=0.006). Conclusion: The SDV caused a deterioration in cognitive performance similar to distraction, which supports the idea that urge is distracting. However, the deterioration in performance was not as strong as when participants were asked to do another cognitive task simultaneously.

SORB17-31(CI)
PATIENT PREFERENCES FOR CONTINENCE CARE AT END OF LIFE: A QUALITATIVE STUDY

Nicholas Smith, Research Assistant, Department of Geriatrics, University of Alberta; Dr. Saima Rajabali, Clinical Trials Research Coordinator, Division of Geriatric Medicine, University of Alberta; Dr. Kathleen Hunter, Associate Professor, Faculty of Nursing, University of Alberta; Dr. Robin Fainsinger, Professor, Faculty of Medicine and Dentistry, University of Alberta

Background: Urinary incontinence, constipation and faecal incontinence are common at the end of life, and the burden of these symptoms may surpass that of pain. Generic end of life guidance about symptom management state patient preferences should be followed; however, little is known about what patient preferences are for continence care at the end of life. Objective: To determine what approaches to continence care palliative care patients prefer. Method: This is a qualitative exploratory study using individual semi-structured interviews. Patients in palliative care units in Edmonton who were incontinent and had sufficient cognitive function were identified by staff and were asked to participate. Interviews focused on the continence care preferences of the participants. Interviews were conducted until saturation was reached,
and were recorded and transcribed verbatim. Following a conventional content analysis approach, two researchers coded the interviews independently, and then collaborated to develop the coding framework and identify the themes.

**Result:** Fourteen patients were recruited, 7 males and 7 females (mean age = 73 years). Most participants did not recall being asked about their preferences of care. Many were not concerned with loss of dignity or embarrassment as many had accepted their situation. Staying clean and avoiding pain was a greater concern at end of life. Having to wait for staff to go the washroom or be changed caused patients pain and misery. **Conclusion:** Preferences of care varied based on the individual; however, patient preferences and concerns are important for healthcare providers to incorporate when developing a personalized continence care strategy at end of life.

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**SORB17-32(AR)**

**ACTIVE ENGAGEMENT IN MATHEMATICS FOR CHILDREN WITH DISABILITIES: A COMPARISON OF TECHNOLOGY FOR HANDS-ON LEARNING**

Dr. Kim Adams, Assistant Professor, Faculty of Rehabilitation Medicine, University of Alberta; Bonnie-Lynn David, Special Education Teacher, ICAN Centre, Glenrose Rehabilitation Hospital; Paola Esquivel, Faculty of Rehabilitation Medicine, University of Alberta; Robert Morgan, Faculty of Education, University of Alberta

**Background:** School mathematics pedagogy promotes the use of manipulatives, such as buttons or blocks, for learning early concepts. Children with physical disabilities may have difficulty grasping or holding these objects. Thus, these children may have a lower performance in mathematics. Assistive technology (AT) can support children with disabilities to accomplish tasks in their role as student. Two AT strategies could give students increased independence when handling manipulatives. Students could a) control a Lego Mindstorms Robot to move concrete manipulatives, or b) access a computer to manipulate virtual objects. **Objective:** a) To document the performance and experience of students as they use both AT strategies for the learning of mathematics, and; b) To assess the strengths and limitations of each AT strategy. **Method:** Participants will be trained in how to use the AT strategies. In the baseline phase, each participant will observe or direct a helper doing the manipulation. In the intervention phase, the student will use both AT methods alternately to solve mathematics problems adapted from educational resource books. We have had three participants so far and are currently looking to recruit three more. The Lego Mindstorms robot is controlled via specialized software design, and we are using commercially available software for virtual manipulative activities. **Result:** This research hopes to enhance mathematics curriculum for children with physical disabilities and provide practical information for teachers using AT in the classroom. **Conclusion:** It is expected that each AT strategy affords some opportunities for mathematics learning, while potentially limiting others. This study is investigating these in detail.

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**SORB17-33(AR)**

**IMPACT OF BALANCE EXERCISES ON RECOVERY OF OLDER ADULTS AFTER HIP FRACTURE: A SYSTEMATIC REVIEW**

Camila Lima, University of Alberta; Dr. Martha Funabashi, Research Associate, Alberta Health Services; Dr. Monica Perracini, Professor, Universidade Cidade de Sao Paulo; Sydnie Weber, University of Alberta; Dr. Lauren Beaupre, Professor, Faculty of Rehabilitation Medicine, Department of Physical Therapy, University of Alberta

**Background:** Balance exercises are of great importance for patient mobility when recovering from hip fracture. Nevertheless, the investigation of balance interventions should be better described to allow clinicians to transfer the evidence into clinical practice. **Objective:** To systematically review the characteristics and dimensions of balance exercises included in hip fracture rehabilitation programs and their impact on patient outcomes. **Method:** Electronic and manual searches were conducted on OVID, EMBASE, CINAHL, Web of Science and Proquest. We included randomized controlled trials with older adults recovering from hip fracture in which rehabilitation programs included balance exercises. Methodological quality was assessed using the Physiotherapy Evidence Database scale (PEDro). **Result:** We found 1573 studies; 22 protocols from 27 studies with high to moderate methodological quality were included. Almost 45% of protocols were conducted exclusively at home and 41% included interventions in the sub-acute phase of rehabilitation. All protocols described the intervention’s frequency and 59% the intensity (progression). Only 6 protocols intentionally included balance exercises. Seventeen protocols included only one dimension of balance, of which 63% were related to anticipatory adjustments and center of gravity stability. Specific balance assessment was included in 15 studies, and 6 studies reported some improvement on balance. **Conclusion:** To date, balance exercises have been poorly described in rehabilitation clinical trials hindering transfer of evidence into clinical practice. Additionally, not all balance dimensions were included in
rehabilitation protocols, which could limit recovery, particularly related to balance recovery, which is important for fall reduction.

**SORB17-34(CI)**
SOCIAL ABCs FOR TODDLERS WITH SUSPECTED AUTISM: EVALUATION OF A PARENT-MEDIATED INTERVENTION

Dr. Lonnie Zwaigenbaum, Co-Director, Autism Research Centre, Glenrose Rehabilitation Hospital; Monica Naber, Psychologist, Autism Research Centre, Glenrose Rehabilitation Hospital; Sanne Jilderda, Psychometrist, Autism Research Centre, Glenrose Rehabilitation Hospital; Dr. Lori-Ann Sacrey, Research Associate, Autism Research Centre, Glenrose Rehabilitation Hospital; Sarah Raza, Autism Research Centre, Glenrose Rehabilitation Hospital

**Background:** Dr. Lonnie Zwaigenbaum and his team are conducting a randomized control trial (RCT) to evaluate a parent-training program rooted in Pivotal Response Treatment called Social ABCs. Social ABCs is a relatively low-resource, efficacious intervention with potential to be a cost-effective means of intervening at the first signs of possible ASD. In a previous RCT, this program resulted in improved functional speech and reciprocal smiling in toddlers who have clinical concerns for ASD. Parents also reported significant gains in self-efficacy following completion of the intervention. The current study is developed to evaluate whether an attention training program can enhance the effectiveness of Social ABCs.

**Objective:** The current study will test whether an attention component we have added, paired with Social ABCs, leads to greater language and social gains compared to the standard Social ABCs intervention.

**Method:** In this RCT, families are randomly assigned to receive attention training or placebo training before the full Social ABCs program. Both groups receive Social ABCs following the attention/placebo phase, where parents are coached by members of our research team in strategies to target their child’s communication and development.

**Result:** We hope to find that the attention-training component to this intervention will improve attention, engagement and may offer additional benefits to the improvements seen using standard Social ABCs.

**Conclusion:** Social ABCs is relatively low-cost intervention with potential to be easily implemented in community settings, and could be further enhanced by attention training prior to commencing intervention.

**SORB17-35(AR)**
COMPARING SOCIAL COMMUNICATION ABILITY IN BOYS AND GIRLS WITH AUTISM SPECTRUM DISORDER (ASD)

Olivia Conlon, University of Alberta; Dr. Joanne Volden, Professor, Department of Communication Sciences & Disorders, University of Alberta

**Background:** Autism spectrum disorder (ASD), characterized by deficits in social communication (SC), is found in 4:1 M:F ratio. This ratio has sparked questions about whether girls present with subtler symptoms. Because competence in SC requires integration of social, cognitive and linguistic skill, it is vulnerable to subtle differences in functioning making sensitive assessment tools imperative. Previous research found no gender differences in SC but the assessments used were not sensitive to SC. SC can be examined through a narrative. The Expression, Reception and Recall of Narrative Instrument (ERRNI) is an assessment examining participants’ ability to tell and understand a story. Standard scores (SS) are calculated for Ideas (story elements) and Comprehension.

**Objective:** To examined (1) whether the ERRNI revealed SC differences between boys and girls with ASD; (2) the nature of any differences found.

**Method:** Thirteen boys and 13 girls, all with ASD, were matched on IQ, age, and language-level. They were administered the ERRNI and follow-up detailed transcript analysis (DTA) of their narratives was conducted.

**Result:** Significant differences were found on ERRNI Ideas SS, where girls included more salient story elements than boys. DTA revealed significant differences in pragmatics and semantics, where girls avoided pragmatic errors and enriched their narratives.

**Conclusion:** ERRNI Ideas SS were significantly better in girls than boys and DTA suggests that semantic enhancement and pragmatic difficulty may be the source. The ERRNI is useful to identify gender differences in SC in children with ASD and DTA is important to understand the nature of these differences.

**SORB17-36(CI)**
IMPROVING SELF-REGULATION IN ADOLESCENTS WITH FASD: AN INTERVENTION STUDY

Vannesa Joly, Research Assistant, University of Alberta; Aamena Kapasi, University of Alberta; Dr. Jacqueline Pei, Associate
Background: Fetal Alcohol Spectrum Disorder (FASD) is a diagnosis assigned to individuals exposed to alcohol prenatally and presenting with various physical, cognitive, and behavioral impairments. Individuals with FASD often demonstrate impaired executive functioning, making it difficult for them to regulate their behavior. The Alert Program® is an evidence-based intervention for children designed to increase self-regulation (SR) through various sensory strategies, however this approach has not been evaluated for adolescents with FASD. **Objective:** To determine whether a 12-week intervention using an adapted Alert Program® improved the SR of adolescents with FASD, as indicated by baseline and post-intervention test scores on the Adolescent Self-Regulatory Inventory (ASRI), which measures self-reported SR in adolescents. Higher ASRI scores indicate stronger SR. **Method:** Eleven adolescents with FASD completed the intervention and were compared with eleven wait-list participants. Total, long-term, and short-term regulation ASRI score differences were compared pre- and post-intervention. **Result:** Using independent and paired t-tests, no significant pre- and post-test differences in total scores were found for the intervention group (t(20) = .356, p = .147) in analysis of the preliminary data. An increase of mean scores was noted for intervention participants (total change = 3.09) compared to the waitlist group scores (total change = .73), indicating possible group level improvements. This positive trend will be examined more conclusively as more data is collected. **Conclusion:** Application of a SR intervention specific to adolescents with FASD may foster SR within this population. Increasing SR in adolescents with FASD may help these individuals stay focused and may ultimately improve adverse outcomes.

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**SORB17-37(AR)**

**PTSD IN FAMILIES OF CHILDREN WITH OPEN HEART SURGERY EARLY IN LIFE**

Gwen Bond, Nurse Coordinator, Complex Pediatric Therapies Follow-Up Program, Glenrose Rehabilitation Hospital; Erica Rodrigues de Miranda Queiroz, University of Alberta; Dr. Ari Joffe, Clinical Professor, Department of Pediatrics, University of Alberta Hospital; Pediatric Intensivist, Stollery Children’s Hospital, Co-Chair CPTFP, PICU, Stollery Children’s Hospital, Complex Pediatric Therapies Follow-Up Program; Dr. Charlene M.T. Robertson, Professor Emeritus, Department of Pediatrics, University of Alberta Hospital; Director, CPTFP, Complex Pediatric Therapies Follow-Up Program (CPTFP), Glenrose Rehabilitation Hospital

**Background:** Having a child admitted to the pediatric intensive care unit (PICU) can be a stressful traumatic life event that may be complicated by posttraumatic stress disorder (PTSD) in parents. Although there are few studies, a recent review suggests that rates may be >20%, with mothers at the highest risk. Parental wellbeing during their child’s particularly vulnerable ‘early years’ can have long-lasting effects on academic, social and emotional potential. **Objective:** To determine the prevalence of PTSD in parents of young infants that have had heart surgery. **Method:** As part of the Complex Pediatric Therapies Follow-Up Program (CPTFP) questionnaires in regards to parental stress were administered to 49 parents with children having had complex cardiac surgery at <6 weeks of age. The Impact of Event Scale – Revised has 22 questions that measure the effect of life stress, everyday traumas and acute stress. Scores of 24-32 indicate a clinical concern, 33-36 represents a probable diagnosis of PTSD, and >37 suggests an impact that could last 10 years. **Result:** 20% of the parents had scores >37; 5% scores33-36; 18% scores24-32; and 57% scores <24. The parents with scores >37 had children with higher total number of hospital days (100+71 vs 57+53; p=.039). **Conclusion:** Our study confirms a high rate of PTSD, probably PTSD, and clinical concern among parents of children that had cardiac surgery early in infancy. These preliminary results will provide added incentive to prioritize prevention, detection and treatment of PTSD in parents.

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**SORB17-38**

**THE DEVELOPMENTAL TRAJECTORY OF EXECUTIVE FUNCTION IN ADOLESCENTS WITH FASD AND PAE: IMPLICATIONS FOR INTERVENTION**

Allison McNeil, Department of Educational Psychology, University of Alberta; Kathryn Kryaska, Research Assistant, Department of Pediatrics, University of Alberta; Dr. Jacqueline Pei, Associate Professor, Department of Educational Psychology, University of Alberta; Dr. Carmen Rasmussen, Associate Professor, Department of Pediatrics, University of Alberta; Gail Andrew, Assistant Clinical Professor, Department of Pediatrics, University of Alberta; Medical Director, FASD Clinical Services, Glenrose Rehabilitation Hospital

**Background:** Executive function (EF) in adolescence is influenced by interactions between the maturational trajectories of frontal lobe neurophysiology and vascularization, and the social and academic demands of pubertal life. The development of SR can also be influenced by the management of emotional, interpersonal, and academic stressors. Adolescents with Fetal Alcohol Spectrum Disorder (FASD) and Prior Abruptes Exposure (PAE) may experience difficulties in SR due to neurodevelopmental deficits in EF. **Objective:** To examine the development of SR in adolescents with FASD and PAE. **Method:** Eleven adolescents with FASD and 11 age-matched controls completed a 12-week SR program. The SR program utilized a variety of strategies to increase self-regulation, including sensory integration and relaxation techniques. **Result:** The results indicated significant improvements in SR for adolescents with FASD. The changes in SR were associated with improvements in academic performance and social functioning. **Conclusion:** The SR program was effective in improving SR in adolescents with FASD, and may provide a promising intervention for individuals with FASD and PAE.
**Background:** Neuropsychological deficits related to prenatal alcohol exposure (PAE) have been identified in areas of IQ, executive functioning (EF), memory and learning, and adaptive functioning among individuals with Fetal Alcohol Spectrum Disorder (FASD). However, there is limited research examining the developmental trajectories of neuropsychological functioning in FASD, particularly with regard to EF. **Objective:** We examined the developmental trajectory of EF in individuals with FASD and PAE including changes in metacognition, behavior regulation, and overall global EF skills. **Method:** Assessment data from children and adolescents previously diagnosed with FASD (n = 13) and PAE (n = 2) was collected over three time points spanning 11 years (Mean age 7.7 years, 13 years, and 18.8 years). EF was measured using the Behavioral Rating Inventory of Executive Function (BRIEF) parent report. A repeated measures ANOVA was used to compare the development of metacognition, behavioural regulation, and overall global EF skills over time. **Result:** Metacognitive skills became more impaired over time F(2,8) = 5.35, p = .019, but no changes were found on behavior regulation or overall global EF skills, p > .05. **Conclusion:** Deficits in metacognitive skills in individuals with FASD and PAE became more pronounced throughout childhood and adolescence. Behaviour regulation and overall global EF skills remained poor across all three time points. Early implementation of interventions aimed at supporting metacognitive skills (e.g., working memory support) is recommended.

**SORB17-39(AR)**

**KINEMATIC INSIGHTS FROM A GAZE AND MOVEMENT METRIC FOR UPPER-LIMB FUNCTION: NORMATIVE AND PROSTHETIC COMPARISON**

Aïda Valevicius, University of Alberta; Quinn Boser, University of Alberta; Ewen Lavoie, University of Alberta; Dr. Craig Chapman, Assistant Professor, University of Alberta; Dr. Patrick Pilarski, Assistant Professor, Department of Physical Medicine & Rehabilitation, University of Alberta; Dr. Albert Vette, Assistant Professor, Faculty of Engineering, University of Alberta; Dr. Jacqueline Hebert, Associate Research Chair in Clinical Rehabilitation, Associate Professor, Division of Physical Medicine and Rehabilitation, BLINC Lab, University of Alberta

**Background:** The evaluation of advanced upper-limb prosthetic devices is limited since current outcome metrics may not be sensitive enough to detect compensatory movements and control strategies. **Objective:** To assess upper-body compensatory movements in a prosthetic user while completing two novel functional tasks and compare to a normative benchmark. **Method:** Kinematic data from 20 healthy participants and 10 prosthetic users with a transradial or transhumeral amputation were analyzed. The following degrees of freedom (DOF) were included in the analysis: trunk flexion-extension, abduction-adduction, and axial rotation; shoulder flexion-extension, abduction-adduction, and internal-external rotation; elbow flexion-extension and pronation-supination; and wrist flexion-extension and ulnar-radial deviation. The range of motion (ROM) was extracted from joint angle trajectories for each examined DOF. End-effector metrics included time to task completion, maximum hand velocity, time and percent to peak velocity, and number of movement units. **Result:** Joint kinematics and end-effector metrics where substantially different between normative and prosthetic performance. The prosthetic users exhibited increased ROM in trunk flexion-extension; shoulder abduction-adduction and internal/external rotation. Velocity peaks occurred earlier during reach and grasp movements, indicating a prolonged deceleration phase. Prosthetic users displayed longer movement times, however, with more years of experience, joint kinematic and end-effector metrics were closer to normative behavior. **Conclusion:** These preliminary results suggest that a range of quantitative information can be extracted from a kinematic analysis of prosthetic users. Investigating movement strategies and creating therapeutic interventions that make upper-body movements trend towards normative functional motion could have the potential to reduce the risks of overuse injuries.

**SORB17-40(C1)**

**A COMPLEMENTARY THERAPY FOR OSI: INTEGRATING SELF-MEDIATION WITH EQUINE ACTIVITIES**

Jim Marland, Co-Founder, Registered Psychologist, Can Praxis; Dr. Randy Duncan, Researcher, Can Praxis; Steve Critchley, Co-Founder, Mediator, Can Praxis

**Background:** Starting in March, 2013, 4.5 years were spent pilot testing a three-phase equine assisted therapy (EAT) program intended to help couples suffering from operational stress injuries (OSI), including post-traumatic stress disorder (PTSD). **Objective:** Originally, the target population was couples where the active member or veteran of the Canadian Armed Forces (CAF) displayed poor treatment progress in recovering from their OSI, due to their clinical picture consisting of behavioural issues and relationship conflict. Subsequently, the program expanded to include couples from all first responder
organizations struggling with OSI. **Method:** The Phase I intervention integrates ground-based equine activities with a practical self-mediation process. Success is examined based on clients having had an opportunity to use the self-mediation process for a minimum of three months. The Phase II and III sessions incorporate a riding component and build upon the communication techniques from Phase I. A series of self-report survey instruments are used to evaluate perceived reduction in interpersonal conflict and improvements in personal relationships. **Result:** Follow-up findings are based on 38.8% of clients (162 of 418), an average of 10.7 months post Phase I. Results indicate that 147 (90.7%) clients experienced improvement in their personal and family relationships. The goal is to acquire sufficient data to validate this EAT program and the associated survey instruments. **Conclusion:** Further pilot testing along with subsequent publication of progressive results are required to meet the goal of being acknowledged by Veterans Affairs Canada and other first-responder organizations as an evidence-based therapy option for OSI, including PTSD.

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**SORB17-41(AR)**

**A METHOD TO REMOVE MOVING PLATFORM INERTIAL EFFECTS FROM FORCE PLATE SIGNALS**

Jeremy Hall, Graduate Research Assistant, Department of Biomedical Engineering, University of Alberta; Brad Roberts, Graduate Research Assistant, Department of Biomedical Engineering, University of Alberta; Dr. Jacqueline Hebert, Associate Research Chair, Clinical Rehabilitation; Associate Professor, Division of Physical Medicine and Rehabilitation, BLINC Lab, University of Alberta; Dr. Albert Vette, Assistant Professor, Faculty of Engineering, University of Alberta

**Background:** Force and moment data acquired from force plates embedded in moving platforms will contain artifacts due to platform acceleration, called force plate inertial components. Therefore, kinetic data can only be reliably obtained from a stationary platform. While force plate inertial components can be estimated and removed from the data, the inertial properties of the system need to be known. **Objective:** Our objective was to: develop a method for estimating inertial properties for any instrumented platform; estimate those properties specifically for the extended CAREN; and validate the estimates with a new dataset. **Method:** To estimate the inertial properties of the CAREN, unloaded ‘estimation trials’ (i.e., without a human user) consisting of ramp-and-hold perturbations were executed. To validate the obtained estimates, unloaded ‘validation trials’ consisting of random perturbations were executed. Force, moment, and platform motion were recorded. Inertial properties are estimated by minimizing the error between the measured and computed inertial forces or moments (estimation trials). Mean estimates of the inertial properties are validated by calculating the coefficient of determination ($R^2$) between the measured and computed forces or moments when keeping the inertial properties fixed (validation trials). **Result:** Data has been collected using the described protocol. Following the proposed method, the inertial properties of the CAREN will be quantified. For the validation trials, $R^2$ will be provided. **Conclusion:** A method is being developed to estimate the inertial properties of moving systems. These can be used for removing inertial components from force plate signals, yielding reliable estimates of ground reactions in dynamic biomechanical research and clinical assessments.

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**SORB17-42(CI)**

**GAIT STABILITY ASSESSMENT USING WEARABLE SENSORS**

Hosein Bahari, University of Alberta; Dr. Juan Forero, Faculty of Engineering, University of Alberta; Dr. Albert Vette, Assistant Professor, Faculty of Engineering, University of Alberta; Dr. Jacqueline Hebert, Associate Research Chair, Clinical Rehabilitation; Associate Professor, Division of Physical Medicine and Rehabilitation, BLINC Lab, University of Alberta; Dr. Hossein Rouhani, Assistant Professor, Faculty of Engineering, University of Alberta

**Background:** Falls are leading cause of injuries and deaths among older population. Loss of balance can be characterized based on the relative motion between the body center of mass (COM) and its base of support (BOS). Stability of the human body during walking, as a dynamical system, can be characterized using measures such as maximum Lyapunov exponent, maximum Floquet multiplier, and long-range correlation. **Objective:** The objective of this research is to investigate how these general measures of stability correlate with the biomechanical modeling of the loss of balance characterized based on the body COM motion states during gait. **Method:** First, we developed a seven-segment model of human body during walking. We used an optimization routine to find the margins of stability based on any given COM motion states (position and velocity) and physiological and environmental constraints. Second, we calculated maximum Lyapunov exponent, maximum Floquet multiplier, and long-range correlation for a number of gait parameters. Third, we collected motion data using motion capture system during perturbed and unperturbed walking using wearable sensors in CAREN system and
investigated the correlation between margins of stability and other stability measures. **Result:** The outcome of this research will be outcome parameters that quantify the risk of falling for a range of age and pathological conditions based on the motion data during gait. Our ultimate goal is to introduce methods to measure these outcome parameters using wearable technologies as inexpensive and easy-to-use devices in order to transfer this knowledge to clinical settings for routine clinical practice.

**SORB17-43(CI)**

**DIGITAL STORYTELLING IN PERSONS WITH DEMENTIA: EXPRESSIONS OF PERSONHOOD THROUGH LEGACY-MAKING**

Dr. Lili Liu, Professor & Chair, Faculty of Rehabilitation Medicine, Department of Occupational Therapy, University of Alberta; Dr. Ely Park, Sessional Instructor, University of Alberta; Hollis Owens, Simon Fraser University; Dr. David Kaufman, Professor, Simon Fraser University

**Background:** A digital story is a multimedia format consisting of voice, image and music that describes a person’s life. Digital stories can help people with cognitive impairment to reminiscence and communicate through the use of family photos, film clips, music and audio narration. The creation of digital stories in persons with early dementia can engage caregivers with client experiences, thereby supporting client self-expression and sense of identity. **Objective:** (1) To determine the feasibility of co-creating digital stories, using an online video editor, by persons in early to moderate stages of dementia. (2) To describe the types of content chosen by the participants, and the ways they express their personhood or individuality. **Method:** Participants with dementia were recruited in Vancouver (n=6), Edmonton (n=7) and are being recruited in Toronto. In sessions over 8-10 weeks, a researcher co-created stories with participants in small groups or one-on-one. We used WeVideo (http://wevideo.com) to create the digital stories. **Result:** Vancouver, n=6, 4 male, 2 female, age range: 63-91 years, mean 80 years. Edmonton, n=7, 4 male, 3 female, ages ranged from 69-80 years, mean 75 years. Digital stories ranged from 3 to 7 minutes. All but one were narrated by storyteller. **Conclusion:** It was feasible for people with dementia to co-create digital stories. All content were biographical and related to storytellers’ roles that represented one’s identity. Themes included family, personal accounts of war, travel, and sports that bridged generations. Digital format of stories made them feasible share as legacy with social connections.

**SORB17-44(AR)**

**SIMULATED SENSORY MOTOR PROTHESIS TO INVESTIGATE PROSTHETIC SENSORY FEEDBACK USING ABLE-BODIED INDIVIDUALS**

Tarvo Kuus, Department of Mechanical Engineering, University of Alberta; Michael Rory, Dawson, Research Engineer, BLINC Lab, University of Alberta; Katherine Schoepp, Research Assistant, BLINC Lab, University of Alberta; Dr. Jason Carey, Professor, Department of Mechanical Engineering, University of Alberta; Dr. Jacqueline Hebert, Associate Research Chair, Clinical Rehabilitation; Associate Professor in Division of Physical Medicine and Rehabilitation, BLINC Lab, University of Alberta

**Background:** Powered hand exoskeletons are an emerging technology to assist individuals with impaired hand function. A number of hand exoskeletons have been designed; however, the majority have not been supported by patient oriented criteria, or validated in patient populations. **Objective:** To define patient and clinician expectations for an assistive hand exoskeleton device, and to evaluate agreement between patient needs and current hand exoskeleton development. **Method:** Interviews were completed with patients and clinicians at the Glenrose Rehabilitation Hospital who might benefit from or interact with a hand exoskeleton device. Patients were recruited from stroke, spinal cord injury, and peripheral nerve injury populations. Six clinicians and eight patients were interviewed in small groups or individually. Interview questions included: 1) design criteria questions; aimed at establishing specific design requirements, and 2) open discussion questions; intended to help the researchers appreciate interviewees’ views on advanced assistive technology, and visions of a hand exoskeleton device. Additionally, three patients were asked to return for a second session where hand characteristics such as range of motion and force required to flex/extend fingers were recorded, to further quantify design requirements. **Result:** Interview responses and hand measurements were analyzed to extract patient oriented criteria for a hand exoskeleton, on factors such as available grasp patterns, bulkiness, and force generation. **Conclusion:** Qualitative and quantitative data was collected to develop an understanding of patient expectations and needs for an assistive hand exoskeleton. This work has the potential to help to inform future development of hand exoskeleton devices and improve their probability of success.
ESTABLISHING PATIENT ORIENTED DESIGN CRITERIA FOR AN ASSISTIVE POWERED HAND EXOSKELETON

Quinn Boser, BLINC Lab, University of Alberta; Dr. Jonathon Schofield, BLINC Lab, University of Alberta; Michael Rory, Dawson, Research Engineer, BLINC Lab, University of Alberta; Dr. Jacqueline Hebert, Associate Research Chair, Clinical Rehabilitation; Associate Professor, Division of Physical Medicine and Rehabilitation, BLINC Lab, University of Alberta

Background: A common perceptual problem associated with Parkinson’s disease (PD) is difficulty matching an appropriate effort level with audible speech/voice loudness. In other words, perception of their own loudness by persons with PD is not accurate and as a result they produce a quiet voice instead of an audible voice. Treatment involves coaching people with PD to increase effort level, helping them re-condition their vocal mechanism (larynx, pharynx, lungs) and teaching them to use greater effort (especially abdominal breath support) than they think they should. **Objective**: To examine the effect of a group voice and singing therapy program on the vocal QOL and speech intelligibility of people with PD using two self-assessment questionnaires. **Method**: A single group pretest-posttest study design was used (n=28). Participants completed questionnaires before and after attending two 90-minute sessions/week for 6 weeks. The changes in scores between pretest and posttest were compared with repeated measures MANOVA using the SPSS software. **Result**: Both questionnaires were significant but the effect size for the Speech Intelligibility Inventory (SII) was much greater. The questions on the SII ask the respondent how others perceive his/her speech, whereas the Voice Related Quality of Life (V-RQOL) questions focus on only the person’s perception of his/her speech. **Conclusion**: Feedback from others about speech/voice appears to be a better indicator of improvement than just self-perception of speech/voice for people with PD.

USING DIVERSE ANATOMICAL SITES FOR HAPTIC EXPLORATION: AN EXPLANATORY PILOT STUDY

Lina Becerra, Research Assistant, University of Alberta; Ruiz Alejandra, University of Guadalajara; Heather Capel, University of Alberta; Javier Castellanos, Research Assistant, University of Alberta; Dr. Kim Adams, Assistant Professor, Faculty of Rehabilitation Medicine, University of Alberta;

Background: Haptic exploration occurs when people manipulate objects and use their sense of touch to determine the physical properties of objects and is dependent on specific hand movements. For this reason, it may be difficult for children with physical disabilities, who have limited hand control, to learn about object properties through haptic exploration. They may, however, use different anatomical sites (i.e. head, arms or feet) to control assistive technology. Robotic haptic teleoperation systems allow manipulation and sensation of objects at a distance through an effector. These systems may allow children with physical disabilities to perform haptic exploration and learn about object properties. **Objective**: To examine the effects of using a low tech device, resembling a robotic end effector, to explore how typically developing children and adults used different anatomical sites to explore object properties and make perceptual comparisons. **Method**: A perceptual comparison was performed by four typically developing children and five adults. This pilot exploratory study used a cross over design where participants did five perceptual comparisons (size, shape, weight, roughness and hardness) with four anatomical sites (head, arm, hand and foot). **Result**: Children and adults were accurate when making perceptual comparisons using different anatomical sites and an effector. They were also able to perform the required exploratory procedures to determine each dimension. **Conclusion**: Results showed that haptic systems could be useful to children with physical disabilities. These results can inform future studies and haptic systems development so that the experiences of children with physical disabilities using assistive technology can be enhanced.

A RATING SCALE FOR MENTAL HEALTH MOBILE APPLICATIONS FOR OLDER ADULTS

Peyman Azad Khaneghah, University of Alberta; Dr. Lili Liu, Professor & Chair, Faculty of Rehabilitation Medicine, Department of Occupational Therapy, University of Alberta; Dr. Eleni Stroulia, Industrial Research Chair, Service Systems Management, University of Alberta; Noellannah Neubauer, University of Alberta

Background: There are numerous mental health mobile applications (apps) available to the public. People can download these apps from online app markets. Few mental health apps are designed to take into consideration age-related
cognitive, perceptual and sensory changes. Currently, there are no scales to help users rate the quality of mental health apps. **Objective:** The objective of this study was to create a scale that clinicians, mental health community organizations and app developers can use to rate the quality of mental health apps for older adults. **Method:** A 2 phase multi method design was used. In phase 1, representatives from different stakeholders such as older adults, clinicians, and app developers, participated in two focus groups to identify items of the scale. The literature on technology usability was used to guide the focus groups. In phase 2, which is still in progress, the relevance and adequacy of the items of the scale were evaluated by a panel of experts using a Delphi survey method. **Result:** Subscales identified from the literature and focus groups are ease of use, usefulness, appearance, compatibility, and cost. Phase 2 of the study (relevance and adequacy of items) is still in progress. **Conclusion:** The scale can be used for clinical, research and App development purposes. It can help organizations and clinicians to identify appropriate health apps for older adults. Researchers can use the scale to better classify apps in systematic reviews. App developers can use this scale to design health-apps that are usable by older adults.

**SORB17-48(C1)**

**A NOVEL PERFORMANCE ASSESSMENT TOOL FOR THE CAREN SYSTEM**

*Juan Forero*, Glenrose Rehabilitation Hospital; *Jeremy Hall*, University of Alberta; *Dr. Jacqueline Hebert*, Associate Research Chair, Clinical Rehabilitation; *Associate Professor in Division of Physical Medicine and Rehabilitation, BLINC Lab, University of Alberta; Dr. Albert Vette, Assistant Professor, Faculty of Engineering, University of Alberta

**Background:** The Computer-Assisted Rehabilitation Environment (CAREN) system represents an ideal environment for training balance and mobility in high performance populations such as military personnel. However, there are currently no standardized methods that measure functional improvement over time on the CAREN. As a consequence, it is difficult to decide when an individual has reached a level of "maximal performance" or performance levels required to safely re-engage in military activities. **Objective:** We have developed a Performance Assessment Tool (PAT) for the CAREN that is sensitive to identifying balance and mobility impairments, as well as high-level gait deviations. By harvesting the diverse capabilities of the CAREN, the PAT has been designed with minimal ceiling effects to assess patients of any level of performance to be assessed. **Method:** After deconstructing the most relevant outcomes measures used in the clinic, we generated a series of 136 individual modules to test balance and performance during standing and walking. We then developed and programmed a series of tasks to be run on the CAREN as games to collect data related to balance and performance while participants are engaged in playing. Initially, ten able-bodied individuals, free of chronic or acute pain with complete, pain-free active and passive range of motion of the lower extremities, have participated in this study. **Result:** Data from 10 able-bodied participants has been collected and partially analyzed. From the preliminary results observed from the data, we have been able to obtained detailed information about balance strategies for two different tasks: single leg standing and single leg forward stepping. From the data, we were able to distinguish the differences in foot lifting and weight shifting used by the participants when lifting one leg to with the goal to stand in one leg or to step forward. Weight shifting was found to be larger when stepping, which requires a very small lift of the foot, compared to when standing in one leg, which resulted in much larger foot lift. **Conclusion:** Because measurements are quantitatively recorded by the CAREN system and not subjectively appraised by the experimenter, we obtained very consistent results in our data. The PAT allows to measure otherwise unobservable measures that would help clinicians identify specific deficits on their patients. The additional information of balance and performance provided by the PAT for the clinicians can facilitate not only improvement of CAREN treatment but also patient treatment in general. Accordingly, the tool will form the basis for studying the effects of CAREN interventions to make the most effective use of this new technology.

**SORB17-49(AR)**

**ALBERTA CAREGIVER COLLEGE**

*Carol Wilson*, Manager, Learning and Development Centre and Autism Research Centre, Glenrose Rehabilitation Hospital

**Background:** The Glenrose Rehabilitation Hospital (GRH), Alberta Health Services (AHS) has long been a champion of leadership and innovation in meeting the learning needs of staff, physicians, volunteers, patients, family members, and caregivers. Alberta Caregiver College® (ACC®) is a GRH resource and education program first developed in 2001. **Objective:** ACC® is designed to equip caregivers to provide optimum care, to provide information on various resources, and to build confidence and self-reliance of caregivers. Caregivers are also provided with strategies and suggestions for
Two on-line courses were developed and evaluated; Conclusion and learning delivery modalities.

Discussion which resulted in tangible recommendations for learning opportunities, and identifying specific education topics and health outcomes and is well regarded in the literature. Caregiver education needs were identified through a focus group.

In conclusion, our research team on the Infant Sibling Study is interested in learning more about how to identify the earliest signs of ASD, and better support infants and families through intervention.

**SORB17-50(CI)**

**INFANT SIBLING STUDY: EVALUATION OF ATTENTION AND EMOTIONAL REGULATION IN THE EMERGENCE OF AUTISM**

Dr. Lonnie Zwaigenbaum, Co-Director, Autism Research Centre, Glenrose Rehabilitation Hospital; Jana Roberto, Psychometrist, Autism Research Centre, Glenrose Rehabilitation Hospital; Dr. Lori-Ann Sacrey, Research Associate, Autism Research Centre, Glenrose Rehabilitation Hospital; Sarah Raza, Autism Research Centre, Glenrose Rehabilitation Hospital

**Background:** The Infant Sibling Study is a cross-Canada study examining the early signs of ASD in siblings who have a diagnosis of ASD. One of the main goals of sibling research is to inform earlier diagnosis for children with ASD.

**Objective:** Dr. Lonnie Zwaigenbaum and his team will be continuing to see younger siblings of children with ASD, along with younger siblings who do not have an older sibling with ASD (i.e., no family history of ASD), starting at 6 months of age. Our new research goals are based on what we have learned from this study to date. **Method:** We will be examining how infant siblings regulate their emotions and how emotional regulation influences the development of communicative ability. As part of this study, parents/guardians and their infants are seen at 5 visits (once every 6 months until 3 years of age). At each visit we ask about the infant sibling’s development and any concerns the parents may have. We also look at the infant sibling’s participation in play-based activities, and measure the child’s heart rate and breathing when playing with the parent and/or researcher. **Result:** The aim of the study is to look at behavioural and physiological markers of ASD.

**Conclusion:** In conclusion, our research team on the Infant Sibling Study is interested in learning more about how to identify the earliest signs of ASD, and better support infants and families through intervention.

**SORB17-51(AR)**

**FUNCTIONAL ABILITY EVALUATION DURING DAILY PHYSICAL ACTIVITIES USING WEARABLE SENSOR TECHNOLOGY**

Milad Nazarahari, Research Assistant, University of Alberta; Dr. Hossein Rouhani, Assistant Professor, Faculty of Engineering, University of Alberta;

**Background:** Increase in life expectancy and population growth resulted in an aging population and increased the burden of health care costs on the healthcare system. At the same time, investigations showed that quantification of daily physical activities (PAs) enables us to evaluate the functional ability of people with limited mobility. The previous research works are (1) unable to detect a wide range of PAs using a single sensor, and (2) not robust among various movement habits.

**Objective:** This study aims to develop a robust approach based on a chest-mounted inertial sensor to identify a broad range of PAs. **Method:** An experimental study has been performed in a free-living environment with ten healthy participants who completed various daily physical activates. Trunk inclination was used as a robust measure to detect the postural transitions. A particular acceleration pattern can be observed during sit-to-stand/stand-to-sit transitions and be used for accurate classification of these transitions. Walking periods were detected from the successive peaks of the acceleration pattern above a predefined threshold. **Result:** While lie-to-sit, sit-to-leave, and stand-to-sit transitions were identified with an accuracy of 100% sit-to-stand transitions were classified with an accuracy of 99% among all participants. Also, walking periods were correctly distinguished and the number of steps counted with the accuracy of 95% or higher in different walking speeds. **Conclusion:** Body postures were classified with high accuracy using features originated from the biomechanical nature of the postural transitions. Moreover, this approach showed robustness among different participants.
SORB17-52(AR)
THE RELATIONSHIP BETWEEN SLEEP AND COGNITION AMONG CHILDREN WITH PERINATAL STROKE

Dr. Lisa Smithson, University of Calgary; Dr. Adam Kirton, Professor, University of Calgary; Dr. Jacqueline Pei, Associate Professor, Department of Educational Psychology, University of Alberta; Dr. John Andersen, Associate Professor, Faculty of Medicine & Dentistry, Department of Pediatrics, Glenrose Rehabilitation Hospital; Dr. Jerome Yager, Professor, Research Director, Neurosciences, Faculty of Medicine & Dentistry, University of Alberta; Dr. Brian Brooks, Pediatric Neuropsychologist, University of Calgary; Kathleen O'Grady, Glenrose Rehabilitation Hospital; Anne Dmytryshyn, Stollery Children's Hospital; Ed Armstrong, University of Alberta; Dr. Carmen Rasmussen, Associate Professor, Department of Pediatrics, University of Alberta

Background: Increase in life expectancy and population growth resulted in an aging population and increased the burden of health care costs on the healthcare system. At the same time, investigations showed that quantification of daily physical activities (PAs) enables us to evaluate the functional ability of people with limited mobility. The previous research works are (1) unable to detect a wide range of PAs using a single sensor, and (2) not robust among various movement habits.

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Result: While lie-to-sit, sit-to-lie, and stand-to-sit transitions were identified with an accuracy of 100%, sit-to-stand transitions were classified with an accuracy of 99% among all participants. Also, walking periods were correctly distinguished and the number of steps counted with the accuracy of 95% or higher in different walking speeds.

Conclusion: Body postures were classified with high accuracy using features originated from the biomechanical nature of the postural transitions. Moreover, this approach showed robustness among different participants.

SORB17-53(AR)
ROTATOR CUFF TEARS AND CONCOMITANT NERVE INJURY: PREVALENCE AND MANAGEMENT

Dr. KM Chan, Professor, Faculty of Medicine & Dentistry, Division of Physical Medicine & Rehabilitation, University of Alberta; Dr. J Beveridge, Dr. MWT Curran, Dr. MJ Morhart, Dr. JL Olson, F Ramazani

Background: Concomitant rotator cuff tears can have major functional impact in patients with upper extremity nerve injury. The purpose of this study is to determine the prevalence of rotator cuff tears in all patients with upper extremity nerve injury. Additionally, we also examine how these injuries are managed at present as delayed rotator cuff repair are associated with poor functional outcomes.

Method: Patients referred to Central and Northern Alberta Peripheral Nerve Injury Program at the Glenrose Rehabilitation Hospital with traumatic brachial plexus, suprascapular or axillary nerve injuries between 2000 and 2016 were reviewed. Data on demographics, clinical diagnosis, severity and management of the rotator cuff tears were analyzed.

Result: Out of a total of 111 patients with nerve injuries in the upper limb, 100 were due to trauma. Patients were predominantly male (85%). Twenty-nine percent (n=29) had concomitant rotator cuff injury. Of these, 41% (n=12) were full thickness and 31% required repair. Time to repair was highly variable (116 +/- 115 days (mean ±sd)). This was most frequently due to delays in diagnosis of tendon tear.

Conclusion: The prevalence of co-existing rotator cuff tears in our population of upper extremity nerve injury patients is substantially higher than previously reported. Approximately 1/3 of these patients required rotator cuff repair but the timing of surgery was highly variable. Since delayed tendon repair is known to be associated with poor outcomes, to avoid delays, a high index of suspicion of concomitant rotator cuff tear and early imaging are needed.

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