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EDUCATION (PATIENT OR RESIDENT)

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“LET’S TALK ABOUT SEX”. IMPROVING SEXUAL HEALTH FOR STROKE REHABILITATION INPATIENTS: A QUALITY IMPROVEMENT PROJECT

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Context: Sexual health greatly contributes to quality of life. There is evidence that stroke survivors want to learn and talk about sexual health, but are not given information. In keeping with the Canadian Best Practice Recommendations for Stroke Care, this project aimed to provide all stroke rehabilitation inpatients with the opportunity to discuss sexual health concerns with healthcare providers at West Park Healthcare Centre, a Toronto community-affiliated rehabilitation hospital. *Methods:* Plan-Do-Study-Act methodology was used as the project framework. Gap analysis of baseline practice was conducted via staff member interviews and retrospective chart reviews. Process mapping identified potential time points for sexual health discussion and education. A standardized script for occupational therapists to discuss sexual health with patients was developed by consensus and was implemented at the time of initial assessment. A patient education brochure addressing sexual health after stroke was created. Percentage of patients provided with the opportunity to discuss sexual health during rehabilitation was used as the process measure. Patient feedback was collected via a modified Minute Survey. *Results:* In the first month of implementation, 53% of patients ($n=15$) were provided with the opportunity to discuss sexual health concerns and were directed to education resources available, compared with 0% at baseline. Additional data over time will provide further evidence whether the project met its objective. *Conclusions:* Sexual health is an important but infrequently discussed issue for stroke survivors. This quality improvement project shows promise for the successful implementation of Canadian Best Practice Recommendations for Stroke Care with respect to sexual health. *Keywords:* Quality Improvement, Sex Education, Stroke.

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CREATING AN ONLINE MUSCULOSKELETAL (MSK) WEB RESOURCE: INITIAL QUANTITATIVE AND QUALITATIVE FEEDBACK

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Objective: To evaluate physicians’ initial impressions and feedback on the introduction of a new online resource for musculoskeletal (MSK) clinical skills teaching, and evidence based medicine (EBM) (www.mskmedicine.com). *Methods:* Following the launch of the MSK site a convenient sample of physicians (from Physiatry, Sport Medicine and Orthopedics) were asked to provide both quantitative and qualitative feedback via an online forum. Physicians provided quantitative ratings for several elements addressing: Ease of use and general layout of the website; the clinical skills videos audio clarity and video quality; EBM summaries usefulness and quality of information; and overall general impression. Users also had an opportunity to provide qualitative feedback for each component and these responses were grouped by theme to be analyzed. *Results:* Overall physicians consistently ranked the usability of the site high with the users agreeing the site has a “simple and clean” interface. One user however disagreed that the site was “responsive and quick”. All users agreed that the clinical videos were well filmed and accurate, and that the EBM section provided a useful interface for presenting research

evidence. Qualitative feedback mainly involved comments regarding the layout and responsiveness of the site and in general were positive in nature. *Conclusions:* Initial impressions indicate that physicians feel mskmedicine.com provides a user-friendly interface, and its content is accurate and useful. Further evaluation of users’ impressions is ongoing and will include student focus groups. *Keywords:* musculoskeletal, medicine, feedback.

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TIMELY STROKE EDUCATION: LONGITUDINAL EDUCATIONAL NEEDS OF STROKE SURVIVORS IN TRANSITION

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Context: One of the Canadian Stroke Best Practice Recommendations is that education must be addressed at all stages across the continuum of care for stroke survivors [Evidence Level A]. However, there is little evidence supporting how to provide education at different time points across the continuum. *Methods:* Five patients attending inpatient stroke rehabilitation and transitioning to outpatient rehabilitation at the same institution were interviewed using 1:1 semi-structured interviews at 3 points in time: inpatient, outpatient and community settings. Transcripts were recorded, transcribed and are currently being analyzed using qualitative framework analysis. Based on Cameron and Gignac’s “Timing It Right” framework, the data is being coded to identify emergent themes related to stroke education from patients’ experiences and to determine the influence of different stages of stroke care. *Results:* In this pilot sample, 4 preliminary themes have emerged; 1) Education as generalized vs individualized experiential learning; 2) Education as normalization, reassurance, support, hope, empowerment; 3) Importance of framing/timing and emphasis of education; and 4) Patient preferences of learning. Each theme is being analyzed using the “Timing It Right” framework in order to assess stroke survivors’ education needs across the continuum of care. *Conclusion:* A new education series for stroke survivors was implemented based on the preliminary results of this pilot research study, and will continue to be guided by further research results. This study may provide some guidance to other stroke education series in rehabilitation and across the continuum of care. *Keywords:* Patient Education as Topic, Stroke, Rehabilitation.

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MEDICAL STUDENT SUMMER CLINICAL EXTERNSHIP IN PM&R: A STUDENT’S EXPERIENCE

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Physical medicine and rehabilitation (PM&R), also known as physiatry, is a medical specialty that is lesser-known to medical students. One reason that medical students have a lack of knowledge about PM&R may be due to its limited exposure during medical school. The dual purposes of this article are to increase student exposure to PM&R and to highlight a clinical training opportunity for medical students. PM&R is a medical specialty concerned with the diagnosis and treatment of patients with neurological and musculoskeletal conditions, with a focus on restoring function and quality of life. The Medical Student Summer Clinical Externship (MSSCE) is a program offered by the Association of Academic Physiatrists for medical students with a strong desire to work with patients in the field of PM&R. I took part in the MSSCE at the University of Pittsburgh Medical Center in the summer of 2014. Participating in this program and gaining clinical exposure to PM&R was an important and valuable stepping-stone for me, and I would highly recommend the MSSCE to medical students who are interested in the field of PM&R. To increase student exposure to the specialty, PM&R departments can consider becoming a

sponsor site for the MSSCE and taking on a medical student during the summer. *Keywords:* Students, Medical, Education, Medical, Clinical Clerkship.

CASE REPORTS

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PAGING DR. HOUSE—DIAGNOSING AMYLOIDOSIS ON A NEUROSPINAL REHABILITATION UNIT, A CASE REPORT

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Context: Amyloidosis is a disease characterized by the extracellular pathologic deposition of insoluble amyloid fibrils in various tissues and organs. Light chain (AL) amyloidosis, the most common type of systemic amyloidosis, is a rare disease with an incidence of 5 to 12 people per million per year. *Case summary:* A 44-year-old socially marginalized man was discharged from hospital following a neck hyperextension injury and C3–7 posterior laminoplasty for presumed central cord syndrome. He was admitted to the inpatient neurospinal rehabilitation unit following recurrent acute care presentations in the post-operative period, with vague complaints of pain and weakness. Upon further review, a one-year history of progressive arthralgias and constitutional symptoms was uncovered. There were no significant neurologic deficits on exam. However, musculoskeletal examination revealed a large joint polyarthritis with complex joint effusions and peri-articular soft tissue masses. As he was homeless, he remained on the neurospinal rehabilitation service to facilitate the diagnostic workup. After puzzling several medical specialists, he was diagnosed with free kappa light chain multiple myeloma with secondary light chain amyloidosis. He was then transferred to the hematology service to begin chemotherapy. *Conclusion:* We present a rare case of AL amyloidosis with multiple myeloma diagnosed in a rehabilitation setting. The often nonspecific and vague symptoms associated with AL amyloidosis frequently lead to delays in diagnosis. In addition to an untimely neck hyperextension injury, which complicated the presenting picture, several social determinants of health likely contributed to the delay in diagnosis in this case. *Funding Acknowledgment:* Not funded. *Keywords:* Amyloidosis, Social Determinants of Health, Social Marginalization, Multiple Myeloma, Central Cord Syndrome.

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PREMENSTRUAL DYSPHORIC DISORDER AS A CAUSE OF AGGRESSIVE BEHAVIOUR FOLLOWING ACQUIRED BRAIN INJURY

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Context: Challenging behaviours following brain injury are common and difficult to manage. Appropriate management requires appropriately diagnosing the underlying pathology of these behaviours. Known and unknown pre-existing mental illnesses may be contributing factors. We present a case of premenstrual dysphoric disorder (PMDD) as a cause of challenging aggressive behaviours following brain injury. *Findings:* A 19-year-old female was admitted to the neurorehabilitation unit following hypothermic cardiac arrest and sequelae resulting in a hypoxic/ischemic brain injury. During her admission, recurrent episodes of severe aggression and mood disturbances resulting in suicidal behaviours, as well as physical harm to herself and others were observed. These episodes were observed over 4 months and

occurred approximately every 23–26 days, starting within 1–3 days of her menstrual cycles and resolving within 3 days of starting her menses. Her aggressive behaviours were resistant to conservative efforts including a comprehensive behaviour modification plan, environmental modifications, antidepressant and antipsychotic medication. Because these interventions were ineffective, she frequently required the use of physical restraints and one-on-one monitoring. A diagnosis of PMDD was made and continuous oral contraceptive medication in addition to depot clopixol injections were initiated. This mitigated her cyclical behavioural escalations, improved rehabilitation efforts, and improved her own safety as well as others on the unit. *Conclusion:* A thorough history of premorbid conditions is essential in managing challenging behaviours and may require diagnosing previously unknown conditions. In female pre-menopausal patients with cyclical behaviour escalations after brain injury, a diagnosis of PMDD or premenstrual syndrome should be considered. *Keywords:* Premenstrual Dysphoric Disorder, Brain Injury, Aggression.

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COMPLEX REGIONAL PAIN SYNDROME TYPE 1 FOLLOWING SPONTANEOUS DEVELOPMENT OF AN IDIOPATHIC SUBDURAL HEMORRHAGIC STROKE AND EMPYEMA IN AN ADOLESCENT PATIENT

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Context: Complex regional pain syndrome (CRPS) type 1 affecting the hemiplegic upper extremity following stroke is well documented in adults, but has not been described in pediatric populations. We present a case of pediatric complex regional pain syndrome type-1 following acute complex hemorrhagic stroke. *Findings:* A 15-year-old male was admitted to hospital for acute decreased level of consciousness preceded by several days of left-sided headache, photophobia, phonophobia, intermittent aphasia, and progressive loss of dexterity in the right upper extremity. A diffuse left subdural hemorrhage with subfalcine extension, 1 cm of midline shift was discovered and required surgical evacuation wherein frank pus and hemorrhagic clot were uncovered. On post-operative day three a slightly reddened, minimally swollen, warm, antalgic right upper extremity with reduced and disproportionately painful active and passive upper extremity mobility was found. In addition, hyperalgesia, allodynia, and hyperpathia responses to pinprick and light touch were detected. No other signs, symptoms or investigations suggesting an alternate diagnosis were found. Prednisone 40 mg daily and pregabalin 100 mg bid were started with a partial response within 48 hours, and complete resolution of CRPS symptoms by 72 hours. Prednisone was continued for a full 10-day course and was discontinued without weaning. Pregabalin was continued for one month for persistent right upper extremity paresthesias. *Conclusion:* CRPS type 1 is a known etiology after stroke in adults, but has not been described in the pediatric population and should be considered in the pediatric population with painful upper extremities following acute stroke. *Keywords:* Complex Regional Pain Syndrome Type 1, Stroke, Pediatric.

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UPPER EXTREMITY AMPUTATION FOR REFRACTORY COMPLEX REGIONAL PAIN SYNDROME: A CASE REPORT

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Context: Amputation is widely debated in treatment of Complex Regional Pain Syndrome (CRPS). There is no formal recommendation regarding amputation in current guidelines. Several recent studies have documented outcomes post amputation. Recurrence rates of CRPS are 27–48% in the residual limb but with potential migration to other limbs. Incidence of phantom pain is 41–77%, occurring im-

mediately up to a year later. Upper extremity prosthetic use is low, at 23%. Quality of life is not well studied. *Findings:* A 35-year-old male requested right upper extremity amputation for refractory CRPS following 4th metacarpal fracture. Presentation included intractable pain, allodynia, and massive swelling to the proximal forearm. Assistance was required with activities of daily living (ADLs), and he was unable to work. Pharmacologic, physical, psychological and interventional therapies were ineffective. Multidisciplinary assessment involved plastic surgery, physiatry, psychiatry, and occupational therapy. Four goals were established: pain reduction, improved function in ADLs (with or without prosthesis), return to employment and driving. Transhumeral amputation level was determined by the team and patient, proximal to the level of sensory abnormality. Extended pre and postoperative regional anesthesia reduced pain dramatically; however within 2 weeks of amputation, phantom pain was as severe as preoperative CRPS pain. There was no recurrence or migration of CRPS during rehabilitation. Long-term outcomes will be monitored. *Conclusion:* Pain reduction has been unsuccessful in this patient, with CRPS pain replaced by debilitating phantom pain. Patients should be informed of amputation risks, particularly recurrence of CRPS and phantom limb pain. *Keywords:* amputation, complex regional pain syndrome, phantom pain.

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CARDIAC REHABILITATION IN PATIENTS WITH COMPLICATED INFECTIVE ENDOCARDITIS

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Objective: To study effect of cardiac rehabilitation in patients with complicated infective endocarditis (IE). *Participants:* Case series of 99 patients with complicated IE, aged 19–72 years who received cardiac rehabilitation. *Methods:* The study was based on clinical and para-clinical tests in patients with complicated IE. Participants were divided according to severity of heart failure (HF) before and after rehabilitation. The cardiac rehabilitation was provided individually to each patient in accordance to psycho-educational and exercise training algorithm. *Results:* Toxic-infectious syndrome and HF were dominant in clinical picture. Blood culture specimens were positive in 51.5% (45% Staphylococcus, 37% Streptococcus) and negative in 48.5%. Echocardiography detected the presence of endocardial lesion (74.5%), vegetations (68%), “hiatus” prosthetic valve (26%), chords rupture (21%) and valves rupture (3%). There were detected myocardial abscesses in 4.5%, embolization in 15% and valve impairment in 97% (52.5% aortic, 44.5% mitral). According to NYHA criteria, severity of HF depended on the expansion of heart chambers, degree of valves insufficiency and size of vegetation and consisted of 62% for class IV, 27% for class III and 11% for class II. After rehabilitation, 15% of patients were transferred from class IV to III and 23% of patients moved from class III to II. *Conclusions:* The severity of HF in IE is determined by high incidence of cardiac complications and complexity of effective treatment. Therefore, appropriate selection of individual cardiac rehabilitation can decrease severity of HF. The above-mentioned strategy has to be widely applied in patients with complicated IE. *Keywords:* Complicated Infective Endocarditis, Cardiac Rehabilitation, Heart Failure.

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A MISSED DIAGNOSIS OF TRAUMATIC PIRIFORMIS SYNDROME AFTER MULTIPLE INTERVENTIONAL SPINAL PROCEDURES

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Background: Piriformis syndrome occurs when the piriformis muscle causes irritation of the sciatic nerve, resulting in pain and dysesthesias in the sciatic nerve distribution. At times, it can be difficult to differentiate piriformis syndrome from sacroiliac joint arthropathy, lumbar radiculopathy, or lumbar facet arthropathy. *Case Description:* We present a 42-year-old woman with a one-year history of severe left lower back and gluteal pain radiating down to the left lower extremity with parenthesis in the same distribution after a motor vehicle accident. Prior to suspicion of piriformis syndrome, she had undergone sacroiliac joint injections, lumbar discography, diagnostic lumbar facet joint injections (medial branch blocks), and electrodiagnostic testing of the lower limbs, all without significant positive findings or benefits. A fluoroscopy-guided injection of the left piriformis muscle with local anesthetic provided temporary complete relief of her pain. She subsequently received a botulinum toxin A injection to the left piriformis muscle under fluoroscopic guidance. *Assessment/Results:* At 6-month follow-up visit, she reported complete resolution of her symptoms. *Discussion:* We discuss history, physical exam, attempted treatments including multiple fluoroscopy-guided interventional spine procedures, and her final diagnosis and treatment of piriformis syndrome. *Conclusion:* When examining a patient with pain predominantly in the gluteal region with radiation down the lower extremity, piriformis syndrome should be considered as a differential diagnosis earlier in the course to eliminate unnecessary tests, invasive procedures and radiation. Botulinum toxin A injection into the piriformis muscle may be an effective treatment for recalcitrant piriformis syndrome, providing long-lasting relief. *Keywords:* Piriformis syndrome, Sciatica, Botulinum Toxins Type A.

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REHABILITATION PROCESS OF 5-FLUOROURACIL INDUCED SEVERE ENCEPHALOPATHY IN A PATIENT WITH DIHYDROPYRIMIDINE DEHYDROGENASE DEFICIENCY

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Background: 5-Fluorouracil (5-FU), a widely used chemotherapy drug, can cause acute and delayed central neurotoxicity. In the setting of a deficiency of dihydropyrimidine dehydrogenase (DPD), it often leads to severe encephalopathy and/or death. The progression and recovery process of 5-FU induced severe encephalopathy is unclear given the limited number of the survivors. *Case Description:* A 42-year-old woman with stage III colon cancer, who received one dose of chemotherapy containing 5-FU, developed severe encephalopathy and coma within a few weeks. She was found to have a homozygous DPD mutation and was later on transferred to a tertiary brain injury rehabilitation unit for intensive and comprehensive inpatient rehabilitation. *Assessment/Results:* 10 months after the initial insult, she has remained medically stable and has shown minimal mental status improvement after multiple trials of different neurostimulants, neuroprotectants, aggressive supportive measurements, and intensive neurorehabilitation. Follow-up brain MRI showed severe progressive leukoencephalopathy with continued increase in volume loss. *Discussion:* A literature review was conducted on 5-FU induced encephalopathy with an emphasis on the possible disease mechanism, treatments, and disease progression. *Conclusion:* Despite the overall poor prognosis of 5-FU induced neurotoxicity in the setting of severe DPD deficiency, our case was able to survive the initial insult and sustained multiple trials of neuroagents resulting in a slight improvement in neurological function. *Keywords:* Fluorouracil, Neurotoxicity Syndromes, Dihydropyrimidine dehydrogenase Deficiency.

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DIFFUSION WEIGHTED IMAGING AND MAGNETIC RESONANCE ANGIOGRAPHY FINDINGS OF OPALSKI SYNDROME: A CASE REPORT

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Context: In stroke patients, Opalski Syndrome is characterized by ipsilateral hemiplegia in addition to features of a lateral medullary (Wallenberg) syndrome. It has been hypothesized to result from inferior extension of ischemia from the lateral medulla to the upper cervical corticospinal fibers, caudal to the pyramidal decussation. Proposed etiologies for this rare syndrome include vertebral artery occlusion, stenosis, or dissection; as well as vascular compression of the medulla. Radiographic studies are now elucidating the anatomical basis for this clinical stroke syndrome. To the best of our knowledge, diffusion-weighted imaging (DWI) findings of Opalski Syndrome have been reported in only five cases and concurrent abnormal magnetic resonance angiography (MRA) findings have only been reported in twocases. **Findings:** We present radiographic features of a woman admitted for inpatient neurorehabilitation, who was clinically found to have features consistent with Opalski Syndrome. DWI imaging 26 days post-stroke confirmed a left posterolateral medullary infarct with inferior extension to C2, suggesting ischemic involvement of the corticospinal tract. T1/T2 weighted images and MR angiography identified a left vertebral artery thrombus at the proximal intracranial portion, with inferior extension to C1. **Conclusions:** This report adds evidence for the anatomic basis of ipsilateral hemiparesis in lateral medullary syndrome, providing direct support for a hypothesis of caudal corticospinal tract involvement. This is one of very few reported cases of Opalski Syndrome in which DWI imaging identified the appropriate ischemic territory for lateral medullary syndrome, and MRA imaging concurrently identified an associated vertebral artery etiology. **Funding Acknowledgement:** None. **Keywords:** Lateral Medullary Syndrome, Magnetic Resonance Imaging, Vertebral Artery.

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RESULTS AND NEUROREHABILITATION CHALLENGES OF NERVE TRANSFER SURGERY FOR PERONEAL NERVE TRAUMA

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Introduction: Nerve transfer is one surgical option that can be employed following severe nerve injury. In general, results of nerve surgery with long grafts (i.e. >6 cm) have been poor and motor outcomes disappointing. The tibial nerve transfer to the peroneal nerve procedure relies on the patient's ability to adapt the activation of a plantar flexor to perform dorsiflexion. This requires two main components: (i) successful re-innervation of the target muscle tibialis anterior (TA) and (ii) neuroplasticity. **Results:** We describe five cases of severe peroneal nerve injury and the outcome at two years. All patients were young males (mean age 22.4, with a traumatic posterior dislocation of the knee, who underwent orthopedic ligamentous reconstruction. The mean time to subsequent nerve repair was 6.6 months. Nerve transfer used two branches of the tibial nerve supplying gastrocnemius and transferred to the peroneal nerves to (TA and peroneus longus) extended by a short sural nerve grafts (mean 4.5 cm). Only one subject regained antigravity dorsiflexion (DF) at two years follow-up. Three of the five patients continued to use an AFO long term. Despite the fact that over 50% of subjects demonstrated re-innervation, this did not translate into functional dorsiflexion. EMG of TA at one year post surgery revealed successful re-innervation (nascent motor units), and

were activated only with plantarflexion, in three of the five subjects. **Conclusion:** The outcomes from nerve transfer using an ankle plantar flexor in peroneal nerve palsy are generally poor and underscore the neurorehabilitation challenges, of re-innervation and neuroplasticity. Recovery of function requires more than peripheral nerve re-growth ("axon number"), but also reorganization of the brain to appropriately activate the desired muscle. **Keywords:** Nerve injury, Peroneal Nerve Transfer, Outcome.

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AN UNUSUAL CASE OF INCOMPLETE ANTERIOR INTEROSSEOUS NERVE SYNDROME

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Context: Anterior interosseous nerve syndrome (AINS) is a rare proximal median neuropathy characterized by motor deficits involving flexor pollicis longus (FPL), lateral flexor digitorum profundus (FDP) and pronator quadratus (PQ), usually in the absence of sensory deficits. The aetiology is unclear, with support in the literature for both anatomical nerve compression and inflammatory neuritis. We report a novel case of traumatic, incomplete AINS with electrodiagnostic (EDX) evidence of concomitant mononeuropathies at the site of trauma. **Findings:** A 28-year-old female was referred for EDX evaluation following a five-week history of isolated right thumb weakness, precipitated by the shearing force of a heavy shopping bag sliding down her anterior forearm from antecubital fossa to wrist crease. Manual muscle testing revealed grade 0/5 strength at the 1st interphalangeal joint (IPJ), with normal strength in 2nd and 3rd distal IPJ flexion and forearm pronation. First IPJ flexion was present with tenodesis at the wrist. Sensation was intact in all peripheral nerve distributions. Nerve conduction studies demonstrated reduced amplitudes of medial and lateral antebrachial cutaneous sensory nerve action potentials and conduction slowing distal to the cubital tunnel for the ulnar motor study. Electromyography demonstrated mild active denervation with no voluntary recruitment in FPL and rapidly firing motor units in PQ. **Clinical Relevance:** This constitutes the first report of traumatic, incomplete AINS with concomitant mononeuropathies, displaying mixed demyelinating and axonal features on EDX. Profound weakness of the FPL following trauma underscores the importance of testing tenodesis to exclude tendon rupture. **Funding Acknowledgement:** None. **Keywords:** peripheral neuropathy, electromyography, anterior interosseous nerve syndrome.

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TREATMENT AND REHABILITATION IN ERYTHROMELALGIA, A NOVEL APPROACH TO A VOLTAGE-GATED SODIUM CHANNELOPATHY: A CASE OF BURNING RED FEET.

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Background: Erythromelalgia is a rare cause of burning red feet, marked by erythema, blistering, and increases in skin temperature. It can be very disabling during flares and a challenge to treat. The recently discovered gain-in-function mutation of the SCN9A gene, which encodes for the voltage gated sodium channel Nav 1.7, has improved our understanding. **Objectives:** To highlight the clinical and electrodiagnostic features of painful neuropathies, the importance of genetic testing, and to discuss management and rehabilitation strategies in a case of erythromelalgia. **Case:** A 49-year-old female with one year of progressively painful burning feet, blistering and marked erythema, made worse with exercise, warmth, and alcohol. She is

an insulin dependent diabetic with retinopathy, and neuropathy, and was diagnosed with a painful small fibre neuropathy. Interestingly, her mother has a very similar clinical disorder. Genetic testing confirmed a mutation in the SCN9A gene. Treatment included neuropathic pain strategies: topical agents, aspirin, tricyclics, carbamazepine, pregabalin, gabapentin, duloxetine, and intravenous lidocaine and ketamine. Mexilitene and intradermal botulinum toxin have resulted in the greatest degree of sustained pain relief and reduction in flares to date. *Conclusion:* This case illustrates key clinical and electrodiagnostic features of erythromelalgia, and when to consider genetic testing to focus on treatments directed at sodium channels. The etiology of why botulinum toxin A would be effective in neuropathic pain remains speculative and includes reduced afferent input to decrease central sensitization and or an interruption in the sympathetic-nociceptive coupling by a direct action on nociceptive fibres. *Keywords:* Neuropathic pain, erythromelalgia, botulinum toxin, sodium channelopathies.

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PRIVATE AND PUBLIC ENGAGEMENT IN A PILOT COMMUNITY-BASED EXERCISE PROGRAM FOR PERSONS WITH DISABLING NEUROLOGICAL CONDITIONS

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Context/Objective: Persons with neurological impairments experience barriers to accessing physical activity despite the known health benefits of regular exercise. At our site, health region rehabilitation inpatient and outpatient rehabilitation day services provide time-limited therapy and activity programs for adults with neurological impairments. New strategies are needed for improving long-term accessibility to physical activity for persons with disability after discharge from hospital-based rehabilitation services. Our objective is to describe the process of establishing a pilot professionally-supported community exercise program accessible to persons with disabling conditions. *Findings:* Initially, a group of rehabilitation therapists and their manager created a proposal for a community-based exercise program. Through a series of meetings and chance encounters, an engineering firm and a medical supply company partnered with the health region to address the need. A prominent local professional became a public champion for this initiative. The champion was able to secure a non-profit facility as well as financial support from the business community, which in turn facilitated the purchase of state-of-the-art accessible exercise equipment. Health region physiotherapists and an exercise therapist from the medical supply company provided clinical support. The program was piloted with ten participants from January to June, 2014. *Conclusions:* The key elements required to develop a community-based exercise program for persons with neurological impairments may include partnerships with health region, business, non-profit sectors and a public champion, as well as on-site support of professionals trained in exercise therapy for persons with chronic disabling conditions. *Funding Acknowledgement:* Saskatoon Health Region, private sector support and non-profit sector donations during development and implementation of pilot phase. *Keywords:* exercise, rehabilitation, accessibility, community, physiotherapy.

ORIGINAL REPORTS

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COMPARISON BETWEEN THE SENSITIVITY OF STRAIGHT LEG RAISING TEST AND GLUTEAL TRIGGER POINT TO DETECT RADICULAR LOW BACK PAIN; A DIAGNOSTIC ACCURACY STUDY

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Objective: To compare sensitivity of straight leg raising (SLR) test and painful trigger points in the upper outer quadrant of gluteal area (gluteal trigger point; GTrP) in patients with lumbosacral radiculopathy. *Design:* Prospective, double blind, diagnostic study. *Setting:* Pain clinic in the physical medicine and rehabilitation department. *Participants:* Consecutively referred patients with radicular low back pain (LBP) symptoms. *Method:* A physician evaluated patients for the presence or absence of SLR and GTrP. Patients were randomized to determine the sequence of two consecutive evaluations of SLR and GTrP. A second physician, blinded to the SLR and GTrP findings, performed clinical evaluation and ordered MRI imaging. Agreement between clinical findings and MRI was set as reference standard for radicular LBP. *Outcome Measures:* Presence or absence of SLR and GTrP in the side/s concordant with reference standard. *Results:* Included were 168 consecutive patients with radicular LBP – 126 unilateral and 42 bilateral cases. Amongst the 210 sides concordant with reference standard, SLR was positive in 55/210 of the sides; whereas, GTrP was positive in 153/210 sides. The sensitivity of SLR and GTrP were 26% and 72% respectively. Agreement between two signs measured by Kappa was low (0.170). *Conclusion:* To our knowledge, this is the first study comparing SLR with GTrP. The GTrP was almost three times more sensitive than SLR when evaluating consecutively referred patients with lumbosacral radiculopathy. The findings of the present study suggest that GTrP evaluation should be incorporated in the routine physical examination of patients with LBP. *Keywords:* Low back pain, Sensitivity, Gluteal trigger point.

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PHYSICAL MEDICINE & REHABILITATION AWARENESS SURVEY AMONG MEDICAL STUDENTS, RESIDENT PHYSICIANS AND ATTENDING PHYSICIANS AT THE UNIVERSITY OF MANITOBA

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Introduction: It has been reported in the literature that awareness and knowledge of Physical Medicine and Rehabilitation (PM&R) among medical students, residents and physicians is low. Our hypothesis is that the University of Manitoba is no different. *Methods:* There were two cohorts included in the survey study. The first included all medical students, residents and attending staff at the University of Manitoba. These received a questionnaire assessing their base knowledge of PM&R. Based on their answers a short educational module was designed and sent out to the same group. Answers were compared before and after the educational module. The second cohort included third year medical students who attend a half day PM&R teaching session pre-clerkship. They received the same questionnaire before and after the session. *Results:* Both methods demonstrated lack of awareness about the speciality and both educational methods were effective to different degrees in increasing their knowledge. Both groups thought PM&R teaching should be included in the medical school curriculum. *Conclusions:* PM&R awareness is poor amongst physicians and physicians in training. Teaching in this field should be included in medical school and post-graduate medical education curriculum. *Keywords:* Awareness, Knowledge, Undergraduate medical education.

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ULTRASOUND GUIDED PHENOL BLOCK OF THE OBTURATOR NERVE FOR SEVERE ADDUCTOR SPASTICITY: A PILOT STUDY

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Objective: To assess the efficacy of phenol block of the obturator nerve in treating severe adductor spasticity. *Design:* A prospective pilot study. *Setting:* Outpatient rehabilitation clinics. *Participants:* We recruited five subjects with severe adductor spasticity. All subjects

completed the study; all subjects were women and had an average age of 60.4 years; four subjects had bilateral severe adductor spasticity and one had unilateral severe adductor spasticity. *Interventions:* A total of nine phenol blocks of the obturator nerve were performed. Five were performed with ultrasound guidance, followed by localization of the obturator nerve by peripheral nerve stimulator. Four were performed using anatomic landmark and peripheral nerve stimulator for localization. *Outcome Measures:* The primary outcome measure was the Modified Ashworth Scale of the hip adductor at one month. The secondary outcome measures included the Modified Ashworth Scale of the hip adductor at 6 months, distance between the medial femur condyles in hip neutral position, Disability Assessment Scale, Goal Attainment Scale, Spasticity Numeric Rating Scale and Subject and Physician Global impression of changes. *Results:* There was statistically significant decrease in the Modified Ashworth Scale score at one-month compared to baseline (2.43 vs. 4; $p=0.001$). There were no statistically significant differences in the secondary outcomes. *Conclusion:* This study suggests that phenol block of the obturator nerve is effective in treating severe adductor spasticity. We recommend a larger study and longer follow up period to allow further assessment of the efficacy of the phenol obturator nerve block. *Keywords:* Phenol; Spasticity; Obturator nerve; Rehabilitation; Ultrasound.

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PREVALENCE OF DEEP VEIN THROMBOSIS IN PATIENT POST LOWER EXTREMITY AMPUTATION: A PROSPECTIVE STUDY

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Health Sciences Centre

Objective: To determine the prevalence of deep vein thrombosis (DVT) in patients post lower extremity amputation. *Design:* Prospective cohort study. *Setting:* Two tertiary care hospitals in Winnipeg, Manitoba. *Participants:* One hundred and fifty patients were screened post lower extremity amputation performed by vascular surgeons from 2004 to 2009. Fifty-eight were excluded; 20 did not complete the ultrasound test. *Interventions:* Screening for DVT done by ultrasound (U/S) Doppler post surgery. *Results:* Seventy-two patients were included in the study cohort (56 transtibial, 16 transfemoral amputations); 82% were male. Cause of amputation: 96% peripheral vascular disease and diabetic infections; 4% traumatic. In this cohort, 80% were diabetics, 17% were on dialysis, and 30% were smokers. Low molecular weight heparin was the main form of DVT prophylaxis (72% of patients). The U/S was done on average 30 days post amputation. Five patients were found to have DVTs. Four patients had proximal ipsilateral DVTs and one patient had a distal contralateral DVT. All DVT patients were diabetics. Only one DVT was symptomatic. There were no cases of pulmonary embolism or deaths in the study. Proper statistical analysis was not possible due to the small number (5) of DVT. *Conclusion:* The prevalence of DVT in amputee patient who are on DVT prophylaxis up to one month post amputation is 7%. Proximal, ipsilateral DVTs are more common. All DVT patients had diabetes and all but one was asymptomatic. This result may necessitate keeping amputee patient on DVT prophylaxis, even after discharge, until they have good mobility. *Funding Acknowledgment:* War Amps of Canada, Health Sciences Centre, Department of Anaesthesia. *Keywords:* Amputees, Ultrasonography, Doppler, Venous Thrombosis.

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AMPUTATION AND EMPLOYMENT: RATES OF REINTEGRATION BACK TO WORK AS A FUNCTION OF THE REASON FOR AMPUTATION

David Berbrayer

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Objectives: What is the relationship between the reason of amputation and subjects' reintegration back to work, and what are the pertinent factors that facilitate or hinder their reemployment? *Design:* The data was collected in a cross-sectional, retrospective study that used

a questionnaire with a mix of qualitative and quantitative components that measured demographic factors (age, age at amputation, current employment status) and psychosocial factors surrounding the subject (i.e. barriers to employment, perceived reasons for successful/unsuccessful employment post-amputation). Study subjects were divided based on the reason for amputation: In one group subjects had an acute, traumatic reason for amputation while in the other group subjects had a non-acute, chronic cause (such as complications from peripheral arterial disease). The study underwent ethical approval in a tertiary university academic centre. *Results:* The acute, traumatic group appeared to have higher rates of reintegration back to work after their amputation (3 back to work, 1 not) compared to their chronic counterparts (0/2 back to work, 2 not). A very common theme that came up in the acute group's qualitative section was that they see the amputation as an event in their life, and do not let it be a limiting factor in their present. Themes from the chronic group were centred around post-amputation stress, depression, suffering, and co-morbidities. *Conclusions:* This study showed a trend showing traumatic patients are better able to find employment than non-traumatic patients. However, because of the small sample, more research is required prior to reporting significant differences in the rates of reintegration back to work. *Keywords:* Amputation, Rehabilitation, Employment.

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EXPLORING THE BARRIERS TO PHYSICAL ACTIVITY IN ADULTS WITH MYELOMENINGOCELE

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Objectives: To explore barriers to physical activity in adults (>18 years) with spina bifida. *Design:* The study was conducted in a tertiary university centre and passed ethical review. The study design is a descriptive study/barrier assessment. The physical activity scale for individuals with physical disabilities scale (PASIPD) and the Barriers to Physical Activity and Disability Scale (BPADS) were administered to participants. The Physical Activity Scale for Individuals with Physical Disabilities (PASIPD) was used to quantify physical activity levels. The scale includes a total of 13 items which range from leisurely activities to vigorous exercise. Each item is then quantified by multiplying the average hours per week of activity by an intensity value that is specific for each item. This scale has been proven to have adequate construct validity as well as test-retest reliability. The Barriers to Physical Activity and Disability Scale (BPADS) is the second measurement scale used in this study. Through both quantitative (yes/no responses) and qualitative questions (open-ended questions), a variety of personal and environmental barriers to physical activity are elucidated. Demographic details such as name, date, age, gender, assistive devices, and mobility are also part of this questionnaire. *Results:* Participants ($n=8$) mean total PASIPD score was 25.73 ± 15.24 ; mean \pm SD. 8 adult myelomeningocele participants ($M=4$, $F=4$, age 26.1 years ± 5.20 ; mean \pm SD) volunteered to partake in this study. Most participants are currently not in an exercise program or do not have a set physical activity schedule yet would like to start one. There is nothing in the physical environment that is preventing patients from engaging in physical activity. Most have been told by their doctor to exercise but have not been told what to specifically do. The average total score (max=199.5 MET hr/d) for the PASIPD was 25.73 ± 15.24 ; mean \pm SD. The total score was divided among 5 factors (Home Repair/Gardening - 0 ± 0 , Housework - 0.96 ± 1.12 , Vigorous Sport - 11.17 ± 15.02 , Moderate Sport - 1.6 ± 2.03 , Occupation/Transportation - 12.01 ± 10.85). *Conclusions:* Many adults with spina bifida are not engaging in adequate amounts of physical activity for which is considered of health benefit. Increasing emphasis should be placed on physical activity as an intervention for the spina bifida population and individualized based on the individual's own unique barriers. Adult spina bifida patients are not currently in an exercise program or do not have a set physical activity schedule and would like to start an exercise program (7/8). They also feel that an exercise program can help them (7/8). Transportation does not seem to be an issue as

they know where to go and how to get there (7/8) and there is nothing in the physical environment that is preventing them from engaging in physical activity (0/8 reported they are not afraid of leaving their home). *Keywords:* Spina Bifida, Physical Activity, Rehabilitation.

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IDENTIFYING BARRIERS TO MOBILITY AS IT RELATES TO EMPLOYMENT IN ADULTS WITH CEREBRAL PALSY

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Objectives: What are the barriers to mobility as it relates to limiting employment of adults with cerebral palsy. *Design:* The study was approved by the ethical review board of a tertiary academic university teaching centre. This qualitative study involved a 30 minute structured interview with patients randomized by a nursing coordinator attending an outpatient adult rehabilitation clinic at a university teaching centre. Individuals with severe cognitive impairment were excluded. The interview was open-ended and allowed the subjects to undergo self-reflection. Each question was tailored to the type of disability, such as spasticity, athetosis, ataxia and other impairments. Themes and patterns were identified with coded data. *Results:* There were recurrent themes regarding barriers. Accessible transportation was reported to be delayed and there was a lack of accessible parking near the site of employment. At the site of employment, difficulties were identified regarding the ease of entering and exiting the bathroom. Concerns were reported pertaining to the inappropriate width of the elevators when used by multiple employees and the inability of the elevator to accommodate a scooter or a powered/manual wheelchair. There were accessibility issues with respect to the size of the work cubicle and the entrance to the work site which was limited by the type of door handle- push/lever and weight of the door. Push buttons and elevator delays or breakdowns created barriers. Use of telephone or computers were difficult if spasticity or ataxia was not accommodated. During lunch hour there were physical barriers to enter the facility and to warm food in the microwave. *Conclusions:* Availability and maintenance of accessibility devices and services are recurring as barriers to one's mobility when considering employment or volunteer opportunities. Physiatrists have a role in educating employers about employment barriers. Physiatrists have a role in advocating for adults with cerebral palsy by anticipate environmental barriers and become proactive in working with the employers to identify appropriate and ideally low cost solutions. *Keywords:* Cerebral Palsy, Adult, Mobility.

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IMPACT OF VITAMIN D IMPAIRMENT ON FUNCTIONAL OUTCOMES DURING INPATIENT AMPUTEE REHABILITATION

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Background: Recent studies emphasize the important associations of vitamin D (VitD) levels with cardiovascular health, peripheral arterial disease, cognition, and all comorbidities that impact the outcomes of people undergoing prosthetic rehabilitation. This? The associations are particularly concerning in Canada as 32% of individuals under the age of 80 are deficient in VitD (Serum 25 hydroxyvitamin D<50 nmol/L). The objective was to determine whether there was an impact in functional outcome for individuals with amputations who are deficient in VitD. *Design:* Retrospective chart review of consecutive patients admitted to the inpatient Regional Amputee Rehabilitation program from February 2012 to September 2014. Serum VitD levels at the time of admission and L-test scores at the time of discharge were extracted from patient medical records. *Results:* 249 charts reviewed, 219 had VitD levels recorded. Patients were 62.0±14.8 years old, 74% male, with disease-based etiology in

86.8%. Amputation levels: 146 BKA, 36 AKA, 29 bilateral BKA, 8 other. Average VitD level was 57.3±28.7 nmol/L and 42.9% of patients were deficient. Of the 180 patients with both VitD levels and L-test outcomes, patients deficient in VitD had L-test scores of 70.6±10.7 s compared to 74.8±9.7 s for those with sufficient VitD levels ($p=0.57$). No differences were found between male and female patients. *Conclusions:* 42.9% of patients admitted to an inpatient rehabilitation program were found to be VitD deficient. Although Vitamin D mediates many factors important for rehabilitation of amputees, these data indicated that patients with insufficient serum VitD levels performed no worse than their VitD sufficient counterparts. *Keywords:* Vitamin D, Amputation, Rehabilitation.

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PATIENT SATISFACTION WITH A MULTIDISCIPLINARY NEUROMUSCULAR DISEASE CLINIC

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Objective: To determine patient satisfaction at a multidisciplinary clinic for adult neuromuscular disease (NMD) patients by utilizing a validated questionnaire. *Design:* Pre- and post-patient survey study. *Subjects:* Adult neuromuscular disease patients attending the Edmonton Neuromuscular Disease Multidisciplinary Clinic from October 2013 to June 2014. Exclusion criteria included incomplete questionnaires or lack of consent to participate. *Methods:* Patient satisfaction was evaluated using a validated Likert-scale questionnaire measuring six subscales which included general satisfaction with healthcare, access, facilities, appointments, nurses, and doctors. Questionnaires were administered prior to initial attendance and on follow-up visits. STATA 12.0 and Microsoft Excel were used for statistical analysis using paired *t*-tests to compare differences between pre- and post-clinic satisfaction results. *Results:* The response rate was 37.5% (24/64). Among the six subscales, there was significant improvement ($p<0.05$) in general satisfaction with healthcare, facilities, and appointments. There was no significant difference for healthcare access ($p=0.07$), nurses ($p=0.22$), and doctors ($p=0.14$). *Conclusions:* This is the first study to investigate the impact of a NMD multidisciplinary clinic on patient satisfaction. Our results suggest that a multidisciplinary approach can increase patient satisfaction in certain domains of healthcare. However, our results also showed that improvement can be made to healthcare accessibility, patient communication, and time management with nurses and physicians. Specifically, patients felt they were not getting adequate amounts of time to discuss their diagnosis, treatment, and prognosis. This continued pilot study will focus improvements on these specific aspects of care. *Keywords:* Neuromuscular disease, patient satisfaction, multidisciplinary communication, questionnaires.

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IMPACT OF CRITICAL ILLNESS POLYNEUROMYOPATHY IN REHABILITATION: A PROSPECTIVE OBSERVATIONAL PILOT STUDY

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Objective: To determine the prevalence and functional impact of Critical Illness Polyneuropathy (CIPNM) on inpatient rehabilitation. *Design:* Prospective observational study. *Setting:* Inpatient rehabilitation. *Participants:* Participants had ICU admission ≥ 72 hours, were admitted to inpatient rehabilitation from 2013–2014, were ≥ 19 years

old, had no contraindications to electromyography or nerve conduction studies (EMG/NCS), and had no known history of neuropathy, myopathy, neuromuscular junction disorder or diabetes. *Interventions:* EMG/NCS to evaluate for axonal neuropathy and/or myopathy in at least one upper and one lower limb. *Outcome Measures:* Primary outcome measure was prevalence of CIPNM. Secondary outcome measures were Functional Independence Measure (FIM) scores at admission and discharge, FIM gain, FIM efficiency, rehabilitation length of stay and discharge disposition. *Results:* 33 participants were enrolled; 23 (69.7%) had evidence of CIPNM. Average admission FIM score, discharge FIM and FIM gain were 60.0, 97.5 and 30.2 in those with CIPNM versus 74.8, 102.8 and 15.5 in those without. FIM efficiency was 0.37 in both groups. Average rehabilitation length of stay was 117 days versus 63 days and discharge to home was 43% versus 80% in the CIPNM and non-CIPNM groups, respectively. *Conclusion:* Our results suggest that CIPNM is very common in rehabilitation inpatients with a history of ICU admission. CIPNM is associated with lower admission FIM scores. Discharge FIM scores were similar between groups, but those with CIPNM had longer lengths of stay and were less likely to be discharged home. Our results will enable design of appropriately powered future studies to further determine the impact of CIPNM on rehabilitation outcomes. *Funding:* BC Rehab Foundation William Fraser Research Award. *Keywords:* critical illness, polyneuropathy, rehabilitation.

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CAN TECHNOLOGY-ASSISTED TOILETS IMPROVE INDEPENDENCE FOR STROKE REHABILITATION PATIENTS? A PILOT COHORT STUDY

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Objectives: To investigate whether technology-assisted toilets (TATs) improve toileting independence, perineal skin hygiene and quality of life of rehabilitating stroke patients. *Design:* Pilot cohort study. *Setting:* Stroke rehabilitation in- and outpatient units at Élisabeth Bruyère Hospital, Ottawa. *Participants:* Fifteen stroke rehabilitation inpatients, 2 stroke rehabilitation outpatients and 12 health care professionals (HCPs) working in stroke rehabilitation. *Intervention:* Participants used a TAT for a bowel movement on up to three occasions. After each session, participants filled out questionnaires evaluating their experience and were visually inspected for cleanliness by a registered nurse. Participants who did not have a bowel movement during testing sessions tried the cleaning functions and filled out the questionnaires but were not inspected for cleanliness. Participants also rated their regular toileting routine with the Psychosocial Impact of Assistive Devices Scale (PIADS). HCPs used the TAT once and filled out questionnaires evaluating their perceived potential impact on stroke rehabilitation patients. *Outcome Measures:* The PIADS, a valid published instrument, with additional toileting-specific questions was used to evaluate participants' subjective experiences. A cleanliness scale was designed to evaluate skin hygiene after TAT use. *Results:* PIADS scores were higher with the TAT than with the participants' regular toileting routine ($p < 0.03$). HCPs' PIADS scores were high but were lower than participants' scores. TATs cleaned effectively in almost all cases. *Conclusion:* TATs are an improvement over standard toileting in stroke patients and provide adequate toileting hygiene. HCPs believe TATs could be an effective assistive device. Health care decision makers should consider providing TATs to stroke rehabilitation patients. *Funding Acknowledgements:* TOTO USA. *Keywords:* Assistive Devices, Rehabilitation, Stroke, Technology, Toileting.

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CHEMO-DENERVATION WITH ONABOTULINUMTOXINA AS A NEW PARADIGM FOR THE CONDITIONING LESION EFFECT: RESULTS FROM PRECLINICAL STUDIES IN MOUSE MODELS

OF PERIPHERAL NERVE REGENERATION AND AMYOTROPHIC LATERAL SCLEROSIS

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Context/Objective: Peripheral nerve regeneration is improved when the nerve lesion under consideration has been preceded by an earlier nerve crush by 1–2 weeks. This is known as the conditioning lesion effect (CLE). It has also been shown that CLE is protective in a rodent model with amyotrophic lateral sclerosis (ALS). However, in its usual form the CLE lacks clinical feasibility. Transient chemo-denervation with onabotulinumtoxinA may offer an intriguing alternative. *Design:* Pseudo-randomized placebo controlled. *Setting:* Laboratory research. *Participants:* C57BL/6J wild-type mice (Jackson Laboratory, Bar Harbor, USA) and mSOD1g93a ALS model mice (local breeding colony). *Interventions:* For the PNI studies, we injected the triceps surae muscle group of wild-type mice with 0.25U (1 site) of onabotulinumtoxinA or saline and one week later performed tibial nerve crush surgery. For the ALS studies, we injected the triceps surae, quadriceps and forearm flexor muscle groups with a total of 0.75U (3 sites) of onabotulinumtoxinA or saline in 50–60 days old mice (~one month before symptom onset). *Outcome Measures:* An array of behavioral, anatomical and immunohistological assessments were used. *Results:* For PNI, we found that onabotulinumtoxinA pre-conditioning compared to control significantly enhanced tibial nerve reinnervation in terms of myelinated axon counts (366 ± 24 vs 175 ± 40 , $p = 0.004$) and retrogradely labeled motor neuron counts (313 ± 19 vs 205 ± 39 , $p = 0.040$). The ALS model experiments are still ongoing. *Conclusion:* Pre-conditioning with onabotulinumtoxinA replicated the CLE on peripheral nerve regeneration and may be a potential neuroprotection strategy for ALS. *Keywords:* Amyotrophic Lateral Sclerosis, Botulinum Toxins, Type A, Nerve Regeneration.

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ASSOCIATION BETWEEN FEAR OF FALLING AND FUNCTIONAL OUTCOMES AFTER INPATIENT REHABILITATION FOR MAJOR LOWER EXTREMITY AMPUTATION: A RETROSPECTIVE CHART AUDIT

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Context/Objective: People with lower extremity amputations are prone to falling. Fear of falling is concomitant with balance confidence, and both are related to performance in social activities and mobility capability. The objective of this study was to determine how fear of falling and balance confidence affects measurements of functional capacity in people with lower extremity amputations. *Design:* The study is a retrospective chart audit on consecutive admissions to an inpatient amputee rehabilitation program. *Setting:* A rehabilitation academic hospital in London, Ontario. *Participants:* Data from a total of 227 patients (mean age, 64 yr \pm 13.1); 70.9% male) were analyzed from the inpatient rehabilitation discharge assessment (mean length of stay, 29.6 days). Of these patients, 68.7% had below knee amputations ($n = 156$) and 67.8% had fallen prior to admission into the program ($n = 154$). *Interventions:* N/A. *Outcome Measures:* The Activity-specific Balance Confidence (ABC) scale quantified self-efficacy and the distance walked during the 2-Minute Walk Test was the functional measure. *Results:* In multivariate linear regression, ABC scores were associated with performance on 2-Minute Walk Test ($\beta = 0.586$, $p < 0.001$). Specifically, higher balance confidence scores were associated with longer distance walked on the 2-Minute Walk Test. *Conclusion:* Increased fear of falling corresponds with decreased functional performance in ambulation with a prosthesis after lower extremity amputation. The results of the study support the need to address fear of falling throughout the rehabilitation process with the goal of increasing patients' functional performance after discharge. *Keywords:* Amputees, Lower Extremity, Rehabilitation.

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DESIGN AND FABRICATION OF A PRESSURE SENSING DEVICE TO AID WITH FITTING LOWER LIMB PROSTHESES

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Background: Up to 25% of persons with major lower extremity amputations develop wounds related to their prosthesis, which can result in delays in prosthesis fitting, extended hospital stays, or surgical intervention. Therefore, a prototype pressure sensing device was developed to prevent these potential complications. **Objective:** To develop an economical pressure sensing layer prototype at the socket interface that can alert users of high pressure areas so that socket adjustments can be made to prevent ulcer formation. **Methods:** An array of 16 thin and flexible force sensitive resistors coupled with multiplexing circuitry allowed for pressure readings to be taken. The signal transmitted through a low-pass filter to reduce output noise. A microcontroller sampled readings that translated the average of a sequence of voltages into the corresponding pressure value (kPa). The data was passed to a personal computer where it was displayed on the user interface (GUI). **Results:** The sensing layer successfully detected pressure values from able bodied persons. Near real-time plotting was demonstrated with a 250 ms refresh rate for pressures up to 350 kPa with a sensitivity of 1 kPa. High pressure areas were color coded and mapped to location. **Conclusion:** An economical (<\$500) pressure sensing and mapping prototype system was designed and built, and has high potential for preventing pressure ulcers in persons with major lower limb amputations. **Keywords:** lower limb amputation, prosthesis, pressure sensor.

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INTERDISCIPLINARY SPASTICITY MANAGEMENT CLINIC OUTCOMES USING THE GOAL ATTAINMENT SCALE: A RETROSPECTIVE CHART REVIEW

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Objective: To describe the elements and outcomes of an interdisciplinary spasticity management clinic. **Design:** Retrospective chart review. **Setting:** Interdisciplinary Spasticity Management Clinic at a tertiary rehabilitation hospital. **Participants:** 100 adult patients referred for spasticity management and returned for follow-up after initial consultation, between 2010 and 2013. **Interventions:** Treatment strategies include occupational and physical therapies, orthoses, oral medications and focal chemodenervation with botulinum neurotoxin (BoNT) and phenol. **Outcome Measure:** Goal Attainment Scale (GAS). **Results:** The most common etiology of spasticity was stroke (30%). The average age was 48.3 years with 54.5% being female. The most common referral source was a specialist physician (44%). The distribution of GAS outcomes did not vary by diagnosis or gender, but more young (<29) than? elderly (>70) patients achieved their goals ($p=0.01$). The overall GAS T-Score for the clinic was 44.1. T-scores did not vary by diagnosis or the International Classification of Functioning, Disability and Health (ICF) domain. Significant intervention effects were identified for BoNT with improvements in GAS T-scores for treatment targeted to both upper (mean 49.2, 95% confidence interval 45.6–52.7, $p<0.001$) and lower (mean 48.6, 95% confidence interval 46.0–51.2, $p<0.001$) limb muscles compared with no BoNT, across diagnoses and ICF domains. **Conclusion:** We have provided an example of an interdisciplinary approach to spasticity management. The GAS is a

useful patient-centred outcome measure in a heterogenous population with diverse goals. BoNT treatment in the clinic setting was associated with improved goal attainment for both upper and lower limb spasticity relating to multiple ICF domains. **Keywords:** Botulinum toxins, Muscle spasticity, Interdisciplinary health team.

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PREDICTION OF SPASTICITY OUTCOMES FOLLOWING TRAUMATIC SPINAL CORD INJURY UTILIZING RICK HANSEN SPINAL CORD INJURY REGISTRY DATA

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Objective: To quantify and characterize spasticity following traumatic spinal cord injury (tSCI). Predictors of spasticity and its relationship between long-term outcomes including community integration and quality of life will be explored. We hypothesize: 1) spasticity is predicted by the level and completeness of SCI, and 2) more severe spasticity on hospital discharge to the community will correlate with worse long-term outcomes. **Design:** Retrospective cohort registry and chart review. **Setting:** Tertiary acute and rehabilitation hospitals, community. **Participants:** Patients admitted with a tSCI between 2005 and 2013 to Vancouver General Hospital and enrolled in the Rick Hansen Spinal Cord Injury Registry. **Intervention:** None. **Outcome Measures:** ASIA Impairment Scale (AIS), spasticity medications, Penn Spasm Frequency Scale (PSFS), and Community Integration and Quality of Life Questionnaires. **Preliminary Results:** Utilizing the presence of spasticity medications and PSFS on discharge to the community, subjects ($n=90$) were categorized into 1 of 5 spasticity categories: 1) no spasticity (PSFS=0), no medication ($n=35$, 40%); 2) no spasticity, on medications ($n=0$); 3) spasticity (any level, PSFS ≥ 1), no medications ($n=32$, 36%); 4) spasticity (PSFS ≤ 2), on medications ($n=8$, 9%); 5) spasticity (PSFS ≥ 3), on medications ($n=10$, 11%); incomplete data ($n=5$, 6%). **Conclusions:** Future directions include creating a predictive model for spasticity outcomes based on level and severity of tSCI and spasticity category. This will facilitate identification of patients at higher risk for developing severe, problematic spasticity in the sub-acute and chronic phases of tSCI. **Funding:** Dr. PB Mills receives research salary support from the Vancouver Coastal Health Research Institute, TD Grants in Medical Excellence, and VGH and UBC Hospital Foundation. **Keywords:** spinal cord injuries, muscle spasticity, muscle relaxants central, quality of life, community integration.

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NEW INSIGHTS INTO LATERALITY AND ASSOCIATED FACTORS OF ULNAR NEUROPATHY AT THE ELBOW: A RETROSPECTIVE CROSS-SECTIONAL

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Objective: Although ulnar neuropathy at the elbow (UNE) is very common, there is still no firm agreement on its laterality and etiology. The goal of this study is to clarify those issues in a large number of patients with electrophysiologically confirmed UNE. **Design:** Retrospective cross-sectional study. **Study Population:** All patients diagnosed with symptomatic UNE, confirmed by electrodiagnostic studies in a large cohort of patients seen in a tertiary EMG laboratory from 2001 to 2014, through retrospective chart review. **Outcome Measures:** The primary outcome measure was side? the site (left/right) of UNE and its relationship with age, gender, handedness, occupation and comorbidities. **Results:** Of the 2,380 charts reviewed, 880 patients had electrophysiologically confirmed UNE. The mean age was 54.3 \pm 15.9

years and males represented 65.8% (579/880) of patients. Unilateral UNE occurred in the left hand in 60.9% (444/729) of patients. There was no difference in the prevalence of left-sided UNE in right-handed (64.1%) versus left-handed (60.0%) patients [$p=0.546$]. There was also no difference in patient characteristics between left and right-sided UNE ($p>0.05$). However, there was a significant difference between unilateral and bilateral presentations of UNE - the latter were older, more likely to be male, and had a higher likelihood of diabetes, chronic renal failure and stroke ($p<0.05$). *Conclusions:* The study showed that UNE occurred more frequently in the left-hand, regardless of hand dominance. The reason remains unclear, as handedness, gender, occupation and co-morbidities do not appear to be relevant factors. However, there was a significant difference in associated features between unilateral and bilateral UNE, suggesting that patients who present with bilateral UNE may have different predisposing factors.

69 – HONORABLE MENTION

STATUS OF INPATIENT REHABILITATION FOR INDIVIDUALS WITH LOWER LIMB AMPUTATION IN CANADA

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Objective: To determine the: *i*) proportion of individuals who received inpatient rehabilitation in Canada, *ii*) length of inpatient rehabilitation, and *iii*) level of independence at discharge. *Method:* LLA surgical records in Canada starting from April 1 2004 to March 31 2012 were obtained from the Canadian Institute of Health Information (received Sept 2014). For each LLA record obtained, the National Rehabilitation Reporting System (NRS) determined whether the individual received inpatient rehabilitation. For individuals who had inpatient rehabilitation, the NRS provided data on length of rehabilitation, and the Functional Independence Measure (FIM) scores at baseline and discharge. The frequency (%) of individuals who received inpatient rehabilitation as well as the means (SDs) length of their inpatient rehabilitation and their FIM change score at discharge were calculated. *Results:* Only 14.6% of LLA cases in Canada were followed by inpatient rehabilitation. For these individuals, the mean length of stay was 36.2 (24.6) days. The mean (SD) FIM score at baseline was 91.9 (19.4) whereas at discharge it was 106.7 (33.3)/126. *Conclusion:* This is the first study to provide data on the status of inpatient rehabilitation and the independence level at discharge for Canadians with LLA. Understanding the status of inpatient amputee rehabilitation in Canada is essential for managing preventive and rehabilitation services provided to individuals with LLAs. The results of this study indicate that only 14.6% of individuals with LLA received inpatient rehabilitation in Canada. *Funding source:* This study was supported by a grant from the Amputee Coalition of Canada and the University of Alberta-Franklin Fund. BI is supported by Vanier Graduate Scholarship. *Keywords:* Amputation, Canada, Rehabilitation.

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INCIDENCE OF LOWER LIMB AMPUTATION AND AMPUTEES IN CANADA

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Objective: To determine the Canadian provincial: *i*) age-adjusted incidence of LLA, *ii*) rate of inpatient rehabilitation, and *iii*) independence level at discharge. *Methods:* LLA records from Canadian provinces starting from April 1 2004 to March 31 2012 were obtained from the Canadian Institute of Health Information. Data were linked with the data from the National Rehabilitation Reporting System to gather inpatient rehabilitation and Functional Independence Measure (FIM)

data. Age-adjusted rates were calculated. *Results:* There were a total of 59,073 LLAs performed in Canada, involving 43,508 individuals. Mean (SD) age was 65.4 (16.0) years old and 67.4% were males. The number of LLAs increased from 2004 to 2012 for all provinces except for NFL, NB, and Northwest territories. The overall age-adjusted rates were 223.6 for NFL, 215.7 for MB, 172.8 for NS, 168 for SASK, 155.4 for NB, 141.5 for PEI, 139 for AB, 130.6 for ON, 115.9 for BC, 111.8 for QC, and 105 for Northwest territories (rates per 100,000). The main cause of amputation was diabetes (62.5% in 2004; 67.8% in 2011). Only 14.4% received inpatient rehabilitation (highest NS=27.3%; lowest NB=1.2%). The mean (SD) discharge FIM score was 107/126 (14.9) (highest 112.9 (12.3) PEI; lowest NB 67.7 (30.1) in 2011). *Conclusion:* There has been an increase in the number of LLAs performed across provinces. This could be due to the increase in the rate of diabetes. Understanding the status of inpatient rehabilitation is essential for managing prevention and rehabilitation services provided to individuals with LLAs. *Funding source:* Amputee Coalition of Canada and the University of Alberta-Franklin Fund; Vanier Graduate Scholarship.

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ARE THE CANADIAN HYPERTENSION EDUCATION PROGRAM (CHEP) BLOOD PRESSURE TREATMENT TARGETS ACHIEVED DURING ADMISSION FOR STROKE REHABILITATION?

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Context/Objective: Hypertension is a significant risk factor for secondary stroke. The Canadian Hypertension Education Program (CHEP) recommends treating blood pressure targets consistently less than 140/90 mmHg, or less than 130/80 mmHg for diabetics, following the acute phase of stroke. However, concern exists that some individuals may be over treated in acute care, leading to hypotension (i.e., blood pressure less than 90/60 mmHg) and possible adverse effects at rehabilitation admission. *Design:* Retrospective chart review. *Setting:* Tertiary inpatient stroke rehabilitation units in two cities in Western Canada. *Participants:* Post-stroke adults 18 years or older, admitted for inpatient rehabilitation between January 1 and December 31, 2012, with a diagnosis of hypertension. *Outcomes:* The primary outcome of this study is the frequency of participants who achieved the CHEP blood pressure treatment targets at discharge from inpatient stroke rehabilitation. The secondary outcome is the frequency of participants who were hypotensive at admission to inpatient stroke rehabilitation. *Results:* A total of 104 patients (mean age: 67.9±12.4; 46 females) were included. The primary outcome revealed that 80 participants (76.9%) achieved the CHEP blood pressure targets at discharge. The secondary outcome revealed that three participants (2.7%) were hypotensive at admission. *Conclusion:* Admission to a tertiary inpatient stroke rehabilitation unit facilitates achievement of the CHEP blood pressure targets for the treatment of complicated hypertension in post-stroke individuals at discharge. *Keywords:* Stroke, Hypertension, Rehabilitation.

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EXPLORING THE BARRIERS TO PHYSICAL ACTIVITY IN ADULTS WITH SPINA BIFIDA CYSTICA WITH MYELOMENINGOCELE

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Objective: To explore the barriers to physical activity in adults with spina bifida cystica with myelomeningocele. *Design:* Descriptive Study/Barrier Assessment. *Setting:* Outpatient clinic at an academic teaching hospital indicate which one? *Participants:* Adult participants

with spina bifida cystica with myelomeningocele ($n=8$; M=4, F=4, age 26.1 years \pm 5.20; mean \pm SD). *Interventions*: Self-reported questionnaires including the physical activity scale for individuals with physical disabilities scale (PASIPD) and the Barriers to Physical Activity and Disability Scale (BPADS). *Outcome Measures*: Physical activity was quantified by MET hr/d. The determinants of health were also explored, primarily the social environment as well as personal health practices and coping skills. *Results*: Participants ($n=8$) mean total PASIPD score were 25.73 \pm 15.24; most participants were not in an exercise program or did not have a set physical activity schedule yet would like to start one. There were no barriers in the physical environment that was preventing patients from engaging in physical activity. Most have been advised by their doctor to exercise but have not been provided with specific instructions. *Conclusion*: Many adults with spina bifida cystica with myelomeningocele are not engaging in adequate amounts of physical activity for which is considered of health benefit. Increasing emphasis should be placed on physical activity as an intervention for this population and individualized physical activity plans may be implemented based on the individuals' own unique barriers. More research needs to be conducted to obtain statistical power and significance. *Keywords*: Meningomyelocele, Physical Exertion, Exercise.

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RE-HOSPITALIZATION OF ADULTS WITH SPINAL CORD INJURY LIVING IN THE COMMUNITY: A RETROSPECTIVE COHORT ANALYSIS

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Context/Objective: Hospital readmission of people with spinal cord injury (SCI) adversely affects quality of life and increases overall costs of healthcare. Since the rates and reasons necessitating re-hospitalization have not been described in Saskatchewan, our objectives were to describe re-hospitalization rates and identify common reasons for re-hospitalization. *Design*: Retrospective cohort analysis. *Setting*: Tertiary-level care facilities within a Saskatchewan health region representing a catchment area of 500,000 people. *Participants*: Adults with a traumatic SCI included in a health region database admitted to hospital between 2001 and 2013. Within that cohort: a group of adults injured from 2001 to 2010 and their subsequent re-hospitalizations. *Outcome Measures*: Health region administrative data. *Results*: From 2001 to 2010, 502 patients were admitted to hospital for a SCI. Of those, 149 (29.7%) were readmitted and 75.8% were readmitted multiple times in the 13 year period. From 2001–2013, 551 patients with a traumatic SCI required 1,682 hospital readmissions. The mean length of stay was 18.3 days (SD=29.8). The most frequent reasons for re-hospitalization were additional physiotherapy (16.2%), genitourinary system problems (14.2%), and respiratory system problems (13.7%). Among those with multiple re-hospitalizations, most responsible diagnoses were often genitourinary conditions (15.8%) and respiratory conditions (14.7%). *Conclusions*: Re-hospitalization rates for those with traumatic SCI in Saskatchewan are similar to Canadian and international values. Apart from a higher need for physiotherapy services, re-hospitalization for urinary tract infection and pneumonia are common and similar to known common causes for readmission. *Keywords*: Patient readmission, Saskatchewan, Spinal cord injury. *Funding Acknowledgement*: Saskatchewan Health Research Foundation (#2669).

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HONORARY AUTHORSHIP IN POSTGRADUATE MEDICAL RESEARCH PROJECTS

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Objective: To estimate the prevalence of perceived, as defined by the International Committee of Medical Journal Editors (ICMJE), and

unperceived honorary authorship in resident research projects and to identify any predisposing factors. *Design*: Internet-based and in-person survey. *Participants*: Postgraduate physician trainees (family medicine, and medical and surgical specialties) enrolled at the University of Alberta. *Method*: In the first two assessments, trainees were contacted by e-mail with a link to the survey. In the third assessment, surveys were distributed in-person. *Outcome Measures*: The reported prevalence of perceived, ICMJE-defined, and unperceived honorary authorship were the primary outcome measures/Multiple factors were analyzed to determine whether they were associated with the outcome measures. *Results*: The response rate was 27.7% (226/815). The prevalence of perceived, ICMJE-defined, and unperceived honorary authorship were 38.1% (51/134), 57.3% (71/124), and 24.2% (20/124), respectively. Graduating from an international medical school approached significance in association with perceived honorary authorship ($p=0.056$). Unperceived honorary authorship was associated with female respondents 35% of the time (17% in males) ($p=0.02$). *Conclusions*: This is the first study to investigate authorship experiences of postgraduate medical trainees. The results revealed that honorary authorship occurred in a significant proportion of those surveyed. The discrepancy between perceived and ICMJE-defined honorary authorship suggests residents, and in particular female residents are unaware of the internationally accepted criteria for authorship in publications. Our results suggest that postgraduate medical training programs need to take steps to address this serious and possibly widespread ethical issue. *Keywords*: authorship, medical education, ethics.

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IMPACT OF QUALITY AND PATIENT SAFETY ROUNDS IN STROKE REHABILITATION

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Context/Objective: Monthly Quality and Patient Safety Rounds (QPSRs) were introduced on the Stroke Rehabilitation service at Toronto Rehab as a vehicle for improving patient safety and quality of care. Physiatrist-led and entailing interprofessional discussion of recent critical incidents and challenging cases, QPSRs have provided an opportunity for the Stroke team to analyze patient safety issues from a systems perspective, within a just, or “blame-free” culture. The objective of this study was to assess the impact of Stroke QPSRs on patient care, team communication and dynamics, and provider awareness of patient safety issues. *Methods*: Qualitative evaluation was performed through exit surveys after each QPSR, and structured interviews of eight Stroke team members. Exit surveys asked participants what changes to clinical practice they intended to implement as a result of QPSR discussions. Interviews focused on the impact of QPSRs on provider knowledge and practice, team dynamics and patient safety culture. *Results*: QPSR discussions have resulted in numerous concrete changes in clinical practice. QPSRs are highly valued by the team as an opportunity to review patient safety issues in-depth in a blame-free environment, however this has not translated into a more open patient safety culture outside of the rounds. QPSRs have increased staff awareness of patient safety issues and of the systems-based approach to incident analysis, and have secondary benefits of improving team cohesion and communication. *Conclusion*: QPSRs in stroke rehabilitation have changed practice to decrease risk of future critical incidents, while improving provider knowledge of patient safety concepts and team communication. *Keywords*: Stroke, Quality Improvement, Patient Safety.

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CARPAL TUNNEL SYNDROME AFFECTS BOTH YOUNG AND OLD PATIENTS PRESENTING TO SPORT MEDICINE CLINICS

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Objective: To review the demographic details and presentation of patients seen in a sport medicine clinic who were diagnosed with carpal tunnel syndrome. **Methods:** We retrospectively reviewed the charts of the 127 patients seen for electro diagnostic testing at the Fowler Kennedy Sports Medicine Clinic (FKSMC) between 2012 and 2014. **Results:** Of those 127 patients, 145 injuries were recorded; 97 of those injuries were nerve related. 77 (61%) of the patients were male, 50 (39%) were female. The average age was 40.25 (14–77). The most common nerve injury seen was carpal tunnel syndrome (CTS) ($n=26$). Related to the CTS population; 12 were male and 14 were female. Although the average age at diagnosis was 48.27 (range 19-76) there were a number of teenagers also diagnosed. Of these younger patients, rowers appeared more commonly affected, and two patients had CTS as a first presentation of rheumatoid arthritis. Twenty-three (88.5%) of patients with CTS presented with numbness in the finger(s) and/or hand(s), 14 (53.8%) presented with pain, and 9 (34.6%) presented with weakness. After the diagnosis of CTS was made, 23 (88.5%) were given nighttime splints, 15 (57.7%) were referred to physiotherapy, 1 (3.8%) had a carpal tunnel release, 5 (19.2%) were referred for possible carpal tunnel release. **Conclusion:** Similar to the general population, carpal tunnel syndrome is common amongst patients seen at sport medicine clinics. Within the younger population further investigation is warranted to rule out other underlying pathologies. **Keywords:** Nerve, Injury, Sport.

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MECHANISMS AND ELECTRODIAGNOSTIC FINDINGS OF TRAUMATIC AXILLARY NERVE INJURIES IN SPORT MEDICINE PATIENTS

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Objective: To review the demographics, presentation and electro diagnostic findings of sport medicine patients who were diagnosed with axillary nerve injury. **Methods:** We retrospectively reviewed the charts of the 127 patients seen for electro diagnostic testing at the Fowler Kennedy Sports Medicine Clinic (FKSMC) between 2012 and 2014. **Results:** Of those 127 patients, 145 injuries were recorded; 97 of those injuries were nerve related. 77 (61%) of the patients were male, 50 (39%) were female. The average age was 40.25, with a range of 14–77. There were 7 axillary mono neuropathies (5 axonal, 2 neuropraxic) and 2 axillary injuries as part of a brachial plexus injury. The average age was 30 (16–65). All of the patients presented with weakness, 8 (89%) presented with pain, and 7 (78%) presented with numbness. Five (56%) of the axillary nerve injuries were following a shoulder dislocation, 2 (22%) were following surgery, 1 (11%) was caused by a fall, and 1 (11%) occurred after being tackled. Hockey was the most common activity at time of injury. After the diagnosis all were referred to physiotherapy, 3 (33%) were prescribed a neuropathic pain medication, 2 (22%) brachial plexus injuries were referred for surgery opinion, and 1 (11%) was sent for an MRI. **Conclusion:** The majority of axillary nerve injuries seen at a sport medicine clinic were traumatic, axonal injuries that did not require surgery. However presentations as part of a brachial plexus injury were also seen, which promoted referral for surgical opinion. **Keywords:** Nerve, Injury, Sport.

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VERTICAL OVERHEAD MOTION IN THE REHABILITATION OF ELBOW LATERAL COLLATERAL LIGAMENT INJURIES: A BIOMECHANICAL STUDY

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Background: The elbow is the second most commonly dislocated major joint. Dislocation often disrupts the primary varus stabilizer of the elbow, the lateral collateral ligament (LCL). As many activities of daily living cause varus stress, LCL injury causes functional impairment. Following such injuries, therapists often prescribe exercises with the arm overhead as this is thought to enable the triceps and gravity to compress the elbow joint thus improving joint stability. This effect has yet to be proven biomechanically. **Objective:** To quantify the effects of muscle activation, arm and forearm position on elbow stability during simulated rehabilitation exercises following LCL injury. **Methodology:** Seven cadaveric specimens were tested in a custom simulator that permitted elbow motion via motors and actuators attached to tendons. Specimens were examined in three arm positions (vertical overhead, vertical dependent, and varus) and two forearm positions (maximum pronation and supination) in both passive and simulated active elbow flexion and extension. Three injury patterns were studied (intact, partial LCL injury, complete LCL injury). An electromagnetic tracking device measured ulno-humeral kinematics. **Results:** Following complete LCL injury, vertical overhead positioning enhanced elbow stability relative to other arm positions. Simulated active motion improved stability relative to passive motion. Forearm pronation improved stability relative to supination in some but not all arm positions. **Conclusion:** There is a biomechanical basis for overhead exercises following LCL injuries. Initiating earlier range of motion in this “safe position” might decrease elbow stiffness, a common occurrence following elbow injury. Cadaveric studies can be helpful in defining optimal rehabilitation strategies. **Funding Acknowledgement:** Granting Agency: Physician Services Incorporated Foundation Grant Number: R14–31. **Keywords:** elbow; lateral collateral ligament; joint instability; exercise therapy; kinematics.

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STABILITY OVER 1 YEAR OF CERTAIN COGNITIVE MEASURES IN OLDER DRIVERS

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Background: Multiple chronic conditions common to older drivers may affect their cognitive function and driving ability. In previous studies, the stability of cognitive measures widely used to assess older drivers' functional ability has been most often assessed over 2-week intervals. However within a clinical setting, cognitive tests would be typically administered on an annual or semi-annual basis to screen. **Objective:** To identify the long-term stability of certain cognitive measures over the span of one year within the Candrive II sample, and to verify if a learning effect takes place over time. **Methods:** A series of sensory, physical and cognitive measures were administered twice by the same researcher to 693 study participants during 2.5–4 hour clinic appointments one year apart. To determine those of stable health, exclusion criteria were put in place using data from; the Expanded Cumulative Illness Rating Scale, Older American Resources and Services survey, Mini-Mental State Examination (MMSE), and the Time Up and Go (TUG) test. For those participants with stable health, the relative and absolute reliability of the Trail Making Test A and B, Months in Reverse Order, Digits Span (forwards and backwards), and the Montreal Cognitive Assessment (MoCA) were statistically analyzed. **Results:** Across year one and year two assessments, 85 of 663 (13%) participants were determined to be in stable health. Participants' age ranged from 70 to 89, with the majority of the participants being male (64.6%). All cognitive tests were found to have moderate stability (ICC 0.52–0.69). Despite a moderate correlation coefficient, a significant ($p=0.006$) systematic improvement was observed for the trails making A test ($M_{year1}=34.72 (\pm 9.24)$, $M_{year2}=38.28 (\pm 13.9)$). Both SEM% and CV% were very similar for all cognitive measure. MoCA, MVPT and the Months in Reverse Order (Total Score) assessments had measurement variability (SEM% and CV%) under 10%. All types

of the Digit Span assessment, as well as the Timed Months in Reverse had variability values between 10 and 20%, with the remaining Trail Making Tests (A and B) having variability measurements above 20%. **Conclusions:** Our results indicate that in a healthy population, certain cognitive measures remain stable over one year with no learning effect. **Keywords:** Cognition, Older Persons, Driving.

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EVALUATION OF THE GUIDELINES FOR MTBI AND PERSISTENT SYMPTOMS: 1ST EDITION

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Background: The first edition of The Guidelines for Mild Traumatic Brain Injury (mTBI) and Persistent Symptoms was created in late 2008. Dissemination of the guidelines was accomplished via presentations and publication (2012). As of 2012, an updated version of the guidelines was necessary for 2013. **Objectives:** 1) To evaluate the utility and uptake of The Guidelines for mTBI and Persistent Symptoms by sports medicine physicians and military physicians introduced to the guidelines. 2) To receive feedback regarding facilitators and barriers to adaptation of the guidelines. 3) To develop linkages with Ontario sports medicine physicians and the military in order to collaborate on management of sport concussion and non-sport concussion/mTBI. **Methods:** Sports medicine physicians and military physicians were recruited to participate in workshops that were introducing the guidelines in five Ontario cities. Physicians were presented with the guidelines through case based learning. Participant feedback on the guidelines was sought in order to make improvements for the second edition. Physicians were followed-up three months later to inquire about the utility and the use of the guidelines in their practice. **Results:** 76 physicians participated in the workshops. At three months post workshop, 70% of physicians had increased confidence in treating post-concussion patients with persistent symptoms and 50% had incorporated the guidelines into their practice. Many relevant comments were made regarding necessary changes to the guidelines. **Conclusions:** The guidelines had an impact on sport physician practice. Our findings suggest that engaged bidirectional feedback is a newly identified strategy to facilitate guideline implementation. **Keywords:** Mild TBI, Concussion, Guidelines.

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IMPACT OF EARLY TELEPHONE INTERVENTION ON PAEDIATRIC POST-CONCUSSION SYMPTOMS

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Context: Most children recover quickly and fully following concussion, but some experience ongoing symptoms thus limiting participation in school and activities. Research with adults suggests that early telephone counseling reduces ongoing post-concussion symptoms (Bell et al., 2008), however there are no studies investigating this intervention in paediatric populations. **Objectives:** To investigate the effectiveness of early telephone counselling in limiting post-concussion symptoms, and its impact on children and families. **Design:** A pilot, randomized controlled study compared the efficacy of early telephone counselling to usual care (no formalized follow-up). **Setting:** Participating children were discharged home from the local paediatric emergency department. **Participants:** 67 participants aged 5 to 16 years. Groups were equivalent in terms of age, gender and

injury. **Intervention:** An occupational therapist discussed symptom management and return-to-activity with caregivers by telephone at both one week and one month post injury. The control group received usual care. **Outcome Measures:** The Post-Concussion Symptom Inventory and the Family Burden of Injury Interview were administered by a blinded therapist at three months post injury. **Results:** There was no significant difference in post-concussive symptoms ($p=0.67$) and family stress ($p=0.65$) between the groups at three months. Telephone follow up identified eight children with significant symptoms requiring specialized care. **Conclusion:** The pilot study findings suggest that telephone-based interventions may not reduce post-concussion symptoms in children, but can help identify those requiring further care. Additional research is needed to determine if children would be better serviced using another model of care. **Funding Acknowledgement:** BC Children's Hospital Telethon Fund. **Keywords:** Brain Concussion, Early Intervention (Education), Pediatrics, Post-Concussion Syndrome, Telephone. **References:** Bell, KR, Hoffman, JM, Temkin, NR, Powell, JM, Fraser, RT, Esselman, PC, Barber, JK, & Dikmen, S (2008). The effects of telephone counselling on reducing post-traumatic symptoms after mild traumatic brain injury: a randomized trial. *J Neurol Neurosurg Psychiatry* 79, 1275–1281.

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BARRIERS AND ENABLERS FOR A SELF-MANAGEMENT PROGRAM FOR INDIVIDUALS WITH SPINAL CORD INJURY: RESULTS FROM A NATIONAL STAKEHOLDER ADVISORY GROUP

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Context/Objective: Having good proper self-management (SM) skills are critical for those living with a spinal cord injury (SCI) in order to reduce secondary complications and improve general health. The purpose of this research was to determine the most important components of a SM program for SCI and the barriers and enablers to these components from the perspective of a variety of stakeholders. **Design and Participants:** A qualitative descriptive approach was used involving focus groups held at a one-day national stakeholder advisory meeting. Analysis was conducted using inductive thematic analysis and was guided by the Theoretical Domains Framework. Two focus groups were held with a total of 27 stakeholders from across Canada representing the following groups: clinicians, researchers, policy makers, and consumers. **Results:** Some of the most important components of a SM program included increasing knowledge, skill, and confidence among individuals with SCI (i.e., knowledge), using principles of adult learning (i.e., behavioural regulation), and involving peer mentors (i.e., beliefs about capabilities). Key barriers of SM included readiness for self-management (i.e., beliefs about capabilities, motivation and goals), depression, and stigma/embarrassment (i.e., emotion regulation, beliefs about capabilities). Key enablers of SM included evidence-informed content (i.e., knowledge) and the use of on-line tools (i.e., motivation and goals). **Conclusion:** The development of a SM program for individuals with SCI using these results should lead to improved health for persons with SCI and more efficient use of health resources. This program is currently being developed by our team. **Keywords:** spinal cord injury, self-management, qualitative.

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DEVELOPMENT AND INITIAL VALIDATION OF A PAN-CANADIAN SELF-MANAGEMENT PROGRAM FOR SPINAL CORD INJURY

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Context/Objective: There is a need for greater understanding of the self-management (SM) strategies adopted by individuals with spinal cord injury (SCI) in order to develop a SCI-tailored SM program. Thus, the purpose of the current research initiative is to develop, test, and implement a pilot, pan-Canadian SM program for persons with SCI. **Design and Participants:** This research initiative involves seven specific objectives and is informed by the Theoretical Domains Framework. The following steps/methods will be employed: assembly of an advisory committee, an environmental scan, literature reviews, focus groups, end-user consultations and rapid application prototyping development, usability testing, and pilot tests. **Results:** Preliminary findings from the environmental scan, literature reviews, and focus groups will be presented. Key and preliminary lessons from working and engaging with national stakeholders and consumers will also be presented. **Conclusion:** The development of a targeted SM program for individuals with SCI will ultimately lead to improved health for persons with SCI and more efficient use of health resources. The activities outlined above will culminate in the development of a proposal for implementation and evaluation of a national SM program for persons with SCI. It is anticipated that this proposal will involve a randomized controlled trial study design that will be conducted between April 2016 and March 2018. **Keywords:** spinal cord injury, self-management, mixed methods.

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ATTRIBUTIONS AND SELF-EFFICACY FOR PHYSICAL ACTIVITY AMONGST PERSONS POST-STROKE: A CROSS-SECTIONAL DESCRIPTIVE STUDY

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Context/Objective: Physical activity has functional and preventative benefits for persons who have had a stroke. Personal explanations (attributions) for previous behaviour and confidence (self-efficacy) to be active in the future may influence intentions for future behaviour. Our objectives were to examine: 1) physical activity levels of outpatients with stroke who attend a rehabilitation centre; 2) differences in personal explanations for success/failure to be sufficiently active in the past; and 3) differences in confidence to be sufficiently active in the future. **Design:** Cross-sectional descriptive study. **Setting:** Outpatient stroke clinics. **Participants:** 36 persons who had previously had a stroke (14 women; 22 men). Mean age was 63.5 years (SD=12.6). Mean duration since stroke was 2.6 years (SD=5.7). **Outcome Measures:** The IPAQ-short questionnaire which assessed moderate and vigorous physical activity, perceived success/failure to meet Canadian physical activity guidelines, personal explanations via the revised Causal Dimension Scale, and confidence (task and barriers self-efficacy). **Results:** The median weekly duration of moderate physical activity was 40 minutes. 30 (83%) reported no vigorous activity. 23 (64%) reported being unsuccessful in meeting physical activity guidelines. While the successful group tended to report clearly internal, personally controllable, and stable explanations, the unsuccessful group tended to report slightly internal, slightly personally uncontrollable, and stability-neutral explanations. *T*-tests revealed significant differences in mean scores for all three dimensions ($p < 0.05$). Mean self-efficacy scores were also lower amongst the unsuccessful group ($p < 0.001$). **Conclusions:** Our results provide insight into the reasons for why some patients are insufficiently active after stroke, and also provide potential targets for intervention. **Keywords:** Stroke, Exercise, Self-efficacy.

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PATIENTS' PAIN MANAGEMENT EXPERIENCE ON A GENERAL INPATIENT REHABILITATION UNIT

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Context/Objective: According to American Pain Society recommendations, pain management should be patient-centered. Our objective was to explore our patients' pain management experience

within the *Context* of a general rehabilitation unit. **Design:** Cross-sectional descriptive study. **Setting:** Rehabilitation unit. **Participants:** 30 inpatients (21 men, 9 women; median age = 57.5 yrs). The most frequent diagnoses were stroke, spinal cord injury, brain injury, and polytrauma. **Outcome Measures:** Participants completed the modified American Pain Society Outcome Questionnaire (APS-POQ) within the first two weeks of admission. **Results:** Median satisfaction with their overall pain treatment was 8.5 (range 3–10), where 0 is extremely dissatisfied and 10 is extremely satisfied. 18 (60%) indicated that they received information regarding their pain treatment options. 16 (53.3%) used non medicinal methods to relieve their pain (e.g. cold packs, massage etc.); 19 (63.3%) indicated that they were 'never' encouraged by nurses or physicians to utilize non-pharmacological methods. When asked if they were allowed to participate in decisions as much as they wanted to on a 10 point scale, ranging from 0 (not at all) to 10 (very much so), the median response was 8.0; 6 of 29 (20.7%) indicated 'not at all'. **Conclusion:** While this study illustrates high patient satisfaction with their pain management, there was considerable variability in ratings. Areas that could be improved upon include providing additional information on pain treatment options as well as ensuring that patients are included in decision-making. **Keywords:** Pain management, Rehabilitation, Patient-centered care.

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VENOUS THROMBOEMBOLISM PROPHYLAXIS PRESCRIPTION PATTERNS FOR ISCHEMIC STROKE PATIENTS ON A REHABILITATION WARD

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Context/Objective: Evidence suggests low molecular weight heparin (LMWH) is superior to unfractionated heparin (UFH) for VTE prophylaxis in the ischemic stroke population with normal renal function. The objective of this chart review was to determine if UFH was being prescribed to this population despite evidence for the recommended use of LMWH. **Design:** We conducted a retrospective chart review of all the stroke patients admitted to a rehabilitation ward from April 2, 2012 to April 25, 2013. **Setting:** Inpatient rehabilitation ward. **Participants:** 21/105 inpatient medical record charts. **Outcome Measures:** Frequency and percentage were calculated for the non-ambulatory, ischemic stroke patients with normal creatinine levels who received unfractionated heparin for VTE prophylaxis. **Results:** Charts for 105 stroke patients were reviewed. Of these, 43 patients had ischemic strokes and were prescribed VTE prophylaxis. 22 patients received LMWH and 21 patients received UFH. Eight (38%) were prescribed UFH and had serum creatinine levels in the normal range, suggesting that they should have been prescribed LMWH. **Conclusion:** Despite recommendations for the use LMWH for VTE prophylaxis in the ischemic stroke population with normal renal function, we found that UFH continued to be widely prescribed at our site in 2012–2013. However, standardized order forms may have subsequently improved practice patterns. **Keywords:** Rehabilitation, Stroke, Venous thromboembolism.

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CHALLENGES WITH DELIVERING MHEALTH REHABILITATION FOR IMPROVING WALKING IN OLDER ADULTS WITH LOWER LIMB AMPUTATION

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Context/Objective: The number of older adults living with lower limb amputation requiring rehabilitation to improve walking capacity is increasing, while existing rehabilitation service provision is stretched. Commercialized gaming software and mobile health (MHealth) platforms are potential solutions to augment rehabilitation. This presentation is an overview of *Wii.n.Walk*, an in-home MHealth Nintendo Wii Fit™ intervention, and some of the challenges encountered in delivering MHealth rehabilitation interventions. **Design/Intervention:** Secondary analyses of observations from provision of a multi-site, parallel, evaluator-blind randomized controlled trial using gaming and tablet communication hard/software. Participants ($n=12$ to date) are block randomized in triplets to the *Wii.n.Walk* intervention or attention-control (Wii Big Brain cognitive software). A four week supervised (three 40-minute sessions per week) training is followed by four week unsupervised training. **Setting:** One week training at the center and seven weeks at the participants' home. **Participants:** Community-dwelling adults who are >50 years old with unilateral transtibial or transfemoral amputation. **Outcome Measures:** Primary outcome is the Two Minute Walk Test. **Results:** From the initial four triads of individuals enrolled in the trial, two general themes of challenges have emerged: i) "Getting and Staying Connected" (e.g./ Wi-Fi or 4G; Bluetooth headphones and hearing aids; privacy) and ii) "Horizontal Tech Transfer" (e.g./ familiarity, fear, cognition and sensory issues associated with aging; equipment set up issues and expenses). **Conclusion:** MHealth interventions are appealing and potentially promising particularly for providing rehabilitation in remote areas but challenges with integrating technology should be expected and embraced. **Funding source:** This study is funded by the Canadian Institutes of Health Research (CIHR) [MOP-130336], a grant from the Amputee Coalition of Canada, and the University of Alberta-Franklin Fund. BI is a Vanier Canada Graduate Scholar. **Trial Registration:** Clinicaltrial.gov NCT01942798. **Keywords:** Aging; Amputation; Rehabilitation; Telemedicine; Video games.

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REHABILITATION BENEFIT OF DUAL FUNCTION, LOCKABLE, WEIGHT-ACTIVATED FRICTION PROSTHETIC KNEE UNITS: A CASE SERIES

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Context: Patient performance in prosthetic rehabilitation is challenging to correctly predict in every case, especially among individuals with above knee amputations. Funding, models of care, and expected outcomes add pressure to decision making in prosthetic prescription. New developments in affordable, dual-mode knees may provide adaptability during rehabilitation not previously available. **Design:** We report retrospectively on our initial experience of 20 patients (13 male, age 70.1 ± 8.6 years, disease-based etiology in 19) with above knee amputations that were prescribed a dual-function, lockable, weight-activated, stance-brake, constant friction, prosthetic knee unit with their initial prosthesis. **Results:** Rationale for prescribing this knee rather than a single mode knee (i.e., locked vs. safety) included uncertainty in medical potential (in 15 patients), mechanical ability (3), psychological factors (6), cognition (3), or a priori strategic goals of dual modes (3). In 10 cases more than 1 reason was applicable. Rehabilitation implication of the dual function knee is reviewed. At discharge, of 16 definitive outcomes, 6 patients used the locked mode only, 3 unlocked only, and 7 switched modes strategically depending on functional tasks. **Conclusion:** Overall, the results depicted a benefit to the patient in terms of optimizing function in 10 cases by having the option provided by two knee modes. Risks, however, may include a cognitive burden and encouraging unrealistic expectations. **Keywords:** amputation, rehabilitation, artificial limbs.

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A TABLE-ENABLED TELEHEALTH INTERVENTION TO IMPROVE WALKING IN OLDER ADULTS WITH LOWER LIMB AMPUTATION (WII.N.WALK): STUDY PROTOCOL FOR A RANDOMIZED CONTROLLED TRIAL

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Context/Objective: The number of older adults living with lower limb amputation (LLA) requiring rehabilitation to improve walking capacity and mobility is increasing. However, existing rehabilitation practices are failing to meet the high demand. Following pilot studies, *Wii.n.Walk*, an in-home telehealth Nintendo Wii Fit™ intervention, was developed. The study's objective is to determine whether the *Wii.n.Walk* intervention enhances walking capacity in older adults with LLA compared to an attention control group. **Design and Intervention:** The project is a multi-site, parallel, evaluator-blind randomized controlled trial. Participants will be stratified by site and block randomized in triplets to either the *Wii.n.Walk* intervention or an attention control group employing the Wii Big Brain cognitive software. The trial includes both a supervised (three 40-minute sessions per week, for four weeks) and unsupervised phase (four weeks of Wii use at home). **Setting:** Participants' local rehabilitation center and participants' homes in Vancouver, BC and London, ON. **Participants:** Community-dwelling adults over the age of 50 with unilateral transtibial or transfemoral amputation. **Outcome Measures:** The primary outcome measure, the Two Minute Walk Test, measures walking capacity. Outcome measures will be evaluated for all participants at baseline, at the conclusion of the Supervised and Unsupervised Phases, and one year later. **Results:** Study staff have been hired and trained at both sites and recruitment is currently underway. No participants have been enrolled yet. **Conclusion:** *Wii.n.Walk* is a promising in-home telehealth intervention with potential applications for older adults with LLA discharged from rehabilitation or living in remote areas. **Trial Registration:** Clinicaltrial.gov NCT01942798. **Funding:** This study is funded by the Canadian Institutes of Health Research (CIHR) [MOP-130336], a grant from the Amputee Coalition of Canada, and the University of Alberta-Franklin Fund. **Keywords:** Adult; Amputation; Randomized controlled trial; Telemedicine; Walking.

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SHOULDER RETRACTOR STRENGTHENING EXERCISES TO MINIMIZE RHOMBOID ACTIVITY

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Objective: The objective of the study was to investigate the best position for shoulder retractor strengthening exercise to maximize middle trapezius activity and minimize rhomboid major activity. Middle trapezius and rhomboid muscles are both scapular retractors,

but rhomboids also act as downward rotators of the scapula, which can worsen subacromial impingement. *Participants:* 12 healthy subjects (age 30±6 years) with no history of shoulder pain were recruited for this study. *Methods:* Fine wire electromyography was used to examine maximal muscle activation of the middle trapezius and rhomboid major muscle fibers during four different shoulder positions for resisted scapular retraction exercise. The four positions for exercise were shoulder horizontal abduction with elbow extended and, a) shoulder internal rotation, b) shoulder neutral rotation, c) shoulder external rotation, and d) rowing – shoulder neutral rotation and elbow flexed 90 degrees. Ratio of trapezius over rhomboid muscles was compared using Wilcoxon signed rank tests. *Results:* Muscle activation ratio during shoulder retraction exercise performed with shoulder in the rowing position was significantly lower (22%) than shoulder in external rotation position ($p<0.05$). Middle trapezius was less active than rhomboid in the rowing (elbow flexed) compared to shoulder external rotation (elbow extended) position. All four types of exercises produced coactivation of trapezius and rhomboids. *Discussion:* Rowing arm position may not be the best position for shoulder retractor strengthening in patients with impingement syndrome. Preferable position for maximizing middle trapezius activity and minimizing rhomboid activity may be shoulder external rotation with elbow extended. *Keywords:* Superficial Back Muscles, electromyography, strength.

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TIME-BASED EFFECTS OF ONABOTULINUM TOXIN A INJECTIONS

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Background: Onabotulinum toxin A is a commonly used treatment for conditions such as spasticity and dystonia. Onabotulinum's effects can be seen within minutes to hours or days to weeks. The study primarily aims to assess the time-based effects of Onabotulinum in terms of patients' functional goals. In addition, the secondary objectives aim to examine the presence of adverse events following these injections. *Methods:* 31 patients received single-time Onabotulinum injections and stated a functional goal they wished to attain following their treatment. Patients monitored the effects of the injections using a two-week log. The participants graded changes in their progress towards their goal and also noted any adverse effects at the injection site. Descriptive data was analyzed to garner insight into potential opportunities for enhanced care. *Results:* Of the 31 patients, 25 (80.6%) reached their goal at the end of the two-week period. On average, patients reached their goal at 4.9±3.6 days since the time of injection. Goal attainment ranged from 0.5 hours after injection time to 12 days. Seven patients noted adverse events, such as pain, bruising/redness, and bleeding at the injection site. *Conclusions:* Onabotulinum toxin A is a safe and effective method for improving patients' functionality and mobility. The variability in our results can be explained by the wide range of diseases and goals included in the study. In conclusion, setting a goal and reviewing it provides a clinically useful process for both physicians and patients to measure Onabotulinum outcomes, particularly in terms of speed of onset. *Keywords:* Botulinum toxins, Type A, Dystonia, Muscle Spasticity.

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EVALUATING THE IMPACT OF A PHYSICIANS ASSISTANT ON PM&R STROKE OUTPATIENT CLINICS IN CALGARY AB

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Clinical volumes of stroke in Calgary are high. There are between 1,000–1,200 new stroke patients per year admitted to hospital. Despite the fact that many of the newer treatments for acute stroke save lives, most individuals still require some measure of rehabilitation after stroke. Rehabilitation is delivered through a rather complex and

multifaceted approach in Calgary that has evolved over several years. At the center of care for many of these stroke rehabilitation patients is a Stroke Physiatrist – a specialist physician in Physical Medicine and Rehabilitation with significant expertise and experience in stroke rehabilitation. The current clinical coverage for stroke rehabilitation includes four stroke Physiatrists with 1.5 clinical full time equivalents. Until recently, there were significant challenges in outpatient stroke Psychiatry clinics in relation to meeting the clinical demand. The wait times for clinic access had risen to 6 months. Through the Alberta Health Services Physician Assistant Pilot Project, a Stroke Psychiatry Physician Assistant was hired in the end of October 2013. A comprehensive training plan was developed for the Physician Assistant in order to help: 1) Decrease wait times to see a Physiatrist 2) Increase the volume of patients seen in Stroke Psychiatry clinics and 3) Increase patient satisfaction. Our preliminary analysis indicates early signs of successful implementation of a Physician Assistant role within the Stroke Rehabilitation Clinics. *Keywords:* Ambulatory Care Facilities, Physician Assistants, Stroke.

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ENGLISH AS A SECOND LANGUAGE AND PERFORMANCE ON THE MONTREAL COGNITIVE ASSESSMENT (MOCA) AFTER ACQUIRED BRAIN INJURY

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Context/Objective: To determine the effect of English as a Second Language (ESL) on Montreal Cognitive Assessment (MoCA) performance in patients with subacute acquired brain injury. *Design:* Prospective cross-sectional. *Setting:* Tertiary rehabilitation centre in Vancouver, Canada. *Participants:* 51 patients with a recent stroke ($n=30$) or moderate-severe traumatic brain injury ($n=21$) were assessed at an average of 30 days (SD=15) post-injury, upon admission to inpatient interdisciplinary neurorehabilitation or at an outpatient program with comparable therapy intensity. The sample had a mean age of 43 (SD=15), 74% were male, 67% self-identified as Caucasian (vs. 16% Asian-Canadian and 18% other ethnicity), and 78% were native English speakers. All participants self-reported being fluent in English. *Outcome Measures:* English version of the MoCA. Demographic variables were also collected. Such as? *Results:* Native English speakers did not differ from patients with ESL on the total MoCA score (mean 19.9 versus 19.0) or any MoCA subscale score, with the exception of Language (=0.006). Patients with ESL scored approximately one point lower on this subscale (Cohen's d effect size =0.72). Follow-up multivariable regression analyses revealed that ESL status ($B=-0.37$, $p=0.008$) and education attainment ($B=0.29$, $p=0.028$) were independently associated with MoCA-Language scores, but ethnicity was not. *Conclusion:* ESL status only affected the Language subscale of the MoCA, independent of education and ethnicity. Interpreting MoCA performance in patients with subacute acquired brain injury and ESL appears otherwise straightforward. *Funding Acknowledgement:* BC Rehab Foundation William Fraser Award. *Keywords:* Brain Injury; Multilingualism; Stroke; Neuropsychological Tests; Psychometrics.

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PILOTING THE WHEELCHAIR COMPONENTS QUESTIONNAIRE FOR TRIANGULATION PURPOSES

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The Wheelchair Components Questionnaire (WCQ) asks respondents to rate wheelchair components using visual analogue scale (VAS) format with accompanying comments. The WCQit has been used for rating condition of wheelchair components in field studies in low

resource settings¹. Appropriateness of wheelchairs for users is important, as is appropriateness from a clinical standpoint. We pilot the use of the WCQ employing these two additional aspects in a field study of low cost wheelchairs in a low resource setting. We hypothesize that modifying the WCQ to serve this purpose of triangulation provides more complete data for feedback to wheelchair manufacturers and providers. Three versions of the WCQ were employed: 1) The WCQ for appropriateness (WCQa), completed by an experienced seating specialist; 2) the WCQ for user acceptance (WCQu), completed by wheelchair users; and 3) the WCQ for condition, completed by a clinician involved with wheelchair maintenance. The study was conducted in partnership with a host organization at a boarding school for children with disabilities in a low resource setting. The study protocol was approved by LeTourneau University Institutional Review Board and the ethics committee of our partner organization. Users of four types of wheelchairs in place at the study site were recruited as participants in 2014. Data was obtained for all three versions of the WCQ on 39 wheelchairs within the same month. In this paper, utility of triangulation is explored with respect to qualitative feedback in the form of comments. Rispin, K., et al., Preliminary development and validation of the wheelchair parts questionnaire to assess the condition of individual wheelchairs and the design of wheelchairs, RESNA annual conference 2013: Bellevue, WA. **Keywords:** low cost wheelchairs, components, questionnaire.

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PRIMARY CARE CONFIDENCE WITH SPINAL CORD INJURY CARE IN THE COMMUNITY

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Context/Objective: Patients with spinal cord injuries (SCI) have complex care needs that are often managed by primary care providers (PCPs) once they return to the community. PCPs may not routinely receive training about these complex matters and SCI patients have reported dissatisfaction with their care experiences. The primary objective of the study was to determine the confidence of PCPs when caring for SCI patients in the community. The secondary objective was to determine how physiatrists/rehabilitation specialists could best provide support, collaboration, and education to PCPs with regard to preferred management style, follow-up preferences and continuing medical education needs. **Design:** Cross-sectional descriptive study. **Participants:** 24 primary care providers (18 family physicians and 6 nurse practitioners). **Outcome Measures:** Online survey involving multiple choice, yes/no, 10-point confidence scale and open text field items. **Results:** The median overall confidence score was 5.5/10 with highest domain scores in pressure ulcers, pain, and bladder and bowel management. The lowest domain scores were in autonomic dysreflexia, spasticity, sexual counselling, neurologic changes, return to work, and heterotopic ossification. 21 (87.5%) respondents indicated preference for a collaborative co-management care model and 22 (91.7%) PCPs preferred regular follow-up appointments by a rehabilitation specialist. The most preferable method of education delivery identified was practice suggestions and tips in returned consultation reports. **Conclusions:** This information could be used to enhance collaborative care in identified areas of lack of confidence and reduce duplication of services. The findings could also be used for manpower planning, care model design, and directing education. **Funding Acknowledgements:** N/A. **Keywords:** Education, Medical, Continuing; Health Care Quality, Access, Evaluation; Physical Medicine and Rehabilitation; Primary Health Care; Spinal Cord Injuries.

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POST STROKE FATIGUE AND RETURN TO DRIVING

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Objective: To explore the association between fatigue after stroke and the time taken and ability of return to driving in young stroke patients <60 years. **Design:** Prospective cohort study. **Setting:** Tertiary Stroke Rehabilitation Center. **Participants:** 51 consecutive first-ever stroke patients. **Methods:** Stroke patients receiving both inpatient and outpatient rehabilitation were consecutively recruited for this prospective cohort study. Stroke severity, extent of disability, cognitive function and depression were assessed by the Functional Independence Measure (FIM), Modified Rankin Disability Scale (RDS), Montreal Cognitive Assessment (MoCA) and Beck Depression Inventory II. Fatigue Severity Scale (FSS) was used to evaluate post-stroke fatigue on admission and at 3, 6 and 12 months after stroke. **Outcome Measures:** The primary outcome measure was return to driving at three measurement points of 3, 6 and 12 months after stroke, or if driving was resumed sooner than 3 months. **Results:** Patients mean age was 47±10.18. The average FIM score was 92.64±16.78. Prior to stroke, 92.9% of patients were drivers and 7.1% were non-drivers. Of those (who were drivers), 64.1% and 20.5%, respectively, had resumed driving within 3 month and 6 month of baseline whereas 16.7% had not returned to driving after one year following the stroke. Those with fatigue appeared to be slightly less likely to be driving than those without fatigue, but the difference was not significant ($p=0.073$). MoCA ($p=0.0056$) and RDS ($p<0.0001$) were significant. However, MoCA ceased to be significant when included in a model with RDS. Therefore it would appear that disability level was the main determinant in resumption of driving. **Conclusion:** Post-stroke fatigue was not associated with the ability to return to driving. The extent of disability was an independent predictor for longer time taken to resume driving. **Keywords:** post stroke fatigue, return to driving.

REVIEWS

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SEVERE PRESSURE ULCER IN THE SETTING OF SPINAL CORD INJURY AND BIPOLAR DISORDER: A CASE REPORT

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Context: A 39-year-old community-dwelling man with significant medical history of incomplete cervical spinal cord injury (SCI), spasticity, depression, and bipolar I disorder presented with the chief complaint of a need for mobility device evaluation. Only upon screening did the patient divulge that he had developed wounds over his upper lateral thighs. Additional history revealed that he had discontinued his bipolar medication and had spent significant time lying in bed. The patient had been packing the wounds with cotton balls covered with Neosporin and was taking doxycycline that had been prescribed for a prior urinary tract infection. He was waiting to raise this issue at his outpatient SCI clinic appointment in two weeks. **Findings:** Examination revealed a Stage IV 1×1×2 cm wound on the left greater trochanter with exposed bone, active drainage of purulent material, and surrounding erythema. The patient also had a superficial erythematous lesion on the right greater trochanter. The patient was sent to the Emergency Department for wound treatment due to significant risks of osteomyelitis and sepsis. **Conclusion/Clinical Relevance:** For this patient, it appears that the development of pressure ulcers was triggered by non-adherence to bipolar medication leading to a depressive episode and propagated by not seeking medical care. Bipolar disorder and depression should be considered as risk factors for pressure ulcers due to their clinical features of decreased activity level and reduced self-care. This case emphasizes the importance of proactive screening for pressure ulcers, especially in patients with multiple risk factors. **Funding:** none. **Keywords:** spinal cord injuries, bipolar disorder, pressure ulcer.

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IMPACT OF MEDICAL COMORBIDITIES ON STROKE REHABILITATION OUTCOMES – A REVIEW

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Context/Objective: Stroke survivors often are left with impairments, with approximately 315,000 individuals in Canada living with the effects of stroke. Stroke has many known medical risk factors, and often does not present in isolation. Most stroke and medical comorbidities studies have focused on acute stroke, using general functional and mortality outcome measures. This review will examine the current literature regarding medical comorbidities and stroke rehabilitation outcomes. **Methods:** An OvidSP search was performed combining the terms stroke, rehabilitation and comorbidity. Results were limited to English publications. Abstracts were reviewed for relevance to the review question. **Outcomes:** Six publications were appropriate for the current review. One large retrospective study found a significantly lower Functional Independence Measure (FIM) gain in diabetics compared to non-diabetics stroke patients. Additionally, in comparison to non-diabetic, diabetic stroke patients were less likely to be discharged home. One retrospective study found stroke rehabilitation patients with two or more mental health conditions had worse outcomes (hospital readmissions, mortality) at 6 months, but no relationship with FIM gains. One recent study did not find any medical factors (other than age) to be correlated with stroke rehab length of stay. In three small studies, there was a negative correlation found between the comorbidities and length of stay, FIM on admission, but not functional gains. **Conclusion:** There is little evidence demonstrating the effect of comorbidities on stroke rehab outcome. A large cohort study is needed to establish this relationship, as this could be an potentially important consideration in an individual patient's rehabilitation plan in the stroke rehabilitation setting. **Keywords:** stroke, rehabilitation, comorbidity.

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LONG-TERM MANAGEMENT OF UPPER EXTREMITY DYSFUNCTION AFTER STROKE

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Objective: The objective of this study was to: 1) identify the evidence for rehabilitative interventions initiated among chronic stroke survivors (≥ 6 months) addressing upper extremity (UE) function; and, 2) where possible, combine data to perform meta-analyses, to review individual interventions. **Methods:** A literature search of multiple databases (PubMed, CINAHL, SCOPUS, PsycINFO and EMBASE) was conducted to identify articles published in English up to and including December 2014. Studies were included if (1) $\geq 50\%$ of the sample had sustained a stroke, (2) it was a randomized controlled trial, (3) the mean time since stroke was ≥ 6 months and (4) the treatment group received an intervention targeted at the UE. Meta-analyses were performed where sufficient data existed using a fixed or random effects model, as appropriate using Comprehensive Meta-Analysis Software (BioStat Inc. 2015). **Results:** 230 RCTs met inclusion criteria and included 28 different interventions targeting the UE. The four most commonly studied interventions were Constraint-Induced Movement Therapy (CIMT) (35 studies, $n=1,398$), Functional Electrical Stimulation (FES) (36 studies, $n=904$), repetitive Transcranial Magnetic Stimulation (rTMS) (23 studies, $n=440$) and Robotics (30 studies, $n=1,041$) with a pooled sample size of 3783 individuals with a mean age of 55.36 years (range 26–84). **Conclusions:** The literature addressing the management of UE functional limitations in individuals ≥ 6 -months post stroke is rapidly growing. CIMT, FES, rTMS and Robotics are the most studied therapeutic interventions; however, there are many studies involving innovative interventions or combination therapies being applied to this population with promising results. **Keywords:** Stroke, Chronic, Upper Extremity, meta-analysis.

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LONG-TERM MANAGEMENT OF LOWER EXTREMITY DYSFUNCTION AFTER STROKE

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Objective: The objective of this study was to identify the evidence for rehabilitative interventions initiated among chronic stroke survivors (≥ 6 months) addressing lower extremity function. **Methods:** A literature search of multiple databases (PubMed, CINAHL, Cochrane Library, Scopus and EMBASE) was conducted to identify articles published in the English language up to and including December 2014. Studies were included for review if (1) $\geq 50\%$ of the sample had sustained a stroke, (2) the research design was a randomized controlled trial, (3) the mean time since stroke was ≥ 6 months for both the treatment and control group, (4) the treatment group received an intervention targeted at the lower extremity and (5) function was assessed both pre and post-treatment. **Results:** There were 228 RCTs that met inclusion criteria pooled sample size of 4,068 individuals with a mean age of 64.5 ± 8.6 years (range 44.34–82.10 yr). These studies looked at the effects of 27 motor interventions targeted toward the lower extremity with the top three most studied interventions being 1) treadmill training (45 studies; $n=1,618$); 2) aerobic exercise (28 studies, $n=1,328$); and 3) electrical stimulation (22 studies, $n=1,122$). **Conclusions:** Despite the relative lack of clinical focus on rehabilitation in the chronic phase of stroke recovery there are a large number of RCTs studying lower extremity interventions in this population. Treadmill based therapy, electrical stimulation, and aerobic exercise have the most evidence in those who have sustained a stroke > 6 months prior to the intervention. **Keywords:** Review, Stroke, Rehabilitation.

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BOTULINUM NEUROTOXIN (BONT) INJECTION TECHNIQUES FOR THE TREATMENT OF SPASTICITY OF THE LIMBS: A SYSTEMATIC REVIEW

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Objective: To systematically review the literature on BoNT injection techniques used for limb spasticity. **Methods:** MEDLINE, EMBASE, CINAHL, and Cochrane Central Register of Controlled Trials electronic databases were searched for English language, human subjects, and randomized controlled trials from 1990 to April 2014. Studies were assessed for risk of bias using the Physiotherapy Evidence Database scale and were graded according to Sackett's levels of evidence. **Results:** Eight of the 249 studies screened met the selection criteria. Four categories of BoNT injection techniques were identified: 1) Injection site localization; 2) Injection site selection; 3) Injectate volume; 4) Injection volume and site selection. There is level 1 evidence that: ultrasound (US) is more accurate than electrostimulation (ES) when injecting the lateral gastrocnemius; US is equivalent in efficacy to ES in wrist/finger flexors; electromyography has better efficacy than manual needle placement; endplate injections improve outcomes versus multisite quadrant injections; motor point injections are equivalent to multisite injections; high volume injections distant from the endplate are more efficacious than low volumes closer to the endplate. All findings are based on single studies. **Conclusion:** Level 1 evidence exists for differences in accuracy and treatment outcomes using specific BoNT injection techniques. Findings are based on single studies that require independent replication.

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REHABILITATION FOR MILD STROKES: ESTABLISHMENT OF A FAST TRACK PROGRAM

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Objective: To evaluate the effectiveness of a newly established Fast Track Stroke Rehabilitation Program. **Design:** Retrospective cohort study. **Setting:** Tertiary Stroke Rehabilitation Center. **Methods:** Stroke referrals were submitted on-line by the acute care team through an electronic system Rehabilitation Integrated Transition Tracking System (RITTS). The patients were assessed by a stroke rehabilitation physiatrist in a Fast Track clinic with a target of 72 hours following discharge. An interdisciplinary approach was adopted according to the Best Practice Guidelines including weekly team rounds to introduce new patients, to review patient's goals and progress. Patients attended a 10 week program per professional service including any combination of individual and co-treatment sessions. Data were collected retrospectively from MediTech system, RITTS referrals and chart audits. **Outcome Measures:** 1) time between referral and acceptance to the Fast Track clinic; 2) time between acceptance and start of therapies; 3) combined time between referral – acceptance in program – start of therapies; 4) frequency and duration (length of stay and number of visits); and, 5) average AlphaFIM scores. **Results:** 130 consecutive stroke patients were referred to the Fast Track program from July 2013 to December 2014, of which 113 patients completed the program. The mean AlphaFIM score was 97.21±11.65. The average time between referral and acceptance was 6.64 working days, between acceptance and commencement of therapies was 11±10 days. The combined time between referral and acceptance in program and start of therapies was 20±12 days. The percentage of patients who attended each discipline was recorded as recorded as Physiotherapy (PT) 40%, Occupational Therapy (OT) 58%, Speech Language Pathology (SLP) 42%, Social Work (SW) 16%, nursing 100%, and Neuropsychology 14%. The average length of stay with PT was 66.69 days/15 visits, OT 56.28 days/17 visits, SLP 49.55 days/16 visits, SW 3 visits, and neuropsychology 3 visits. Intensity of the therapies with PT, OT and SLP was 2 days per week on average but frequency with SW and neuropsychology varied. **Conclusion:** The newly established Fast Track program in Champlain region provides timely access to stroke rehabilitation services for mild stroke patients following discharge as an effective early supported discharge service. This program helps the hospital to achieve the goals in meeting Quality Based Procedures (QBP) key indicators therefore to improve patient outcomes and remain cost neutral for the health care system. However, challenges remain to fully achieve the benchmarks. **Keywords:** mild stroke, outpatient, rehabilitation.

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THE ACCURACY OF ULTRASOUND GUIDED VERSUS LANDMARK GUIDED INTRA- ARTICULAR HIP JOINT INJECTIONS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Objective: To compare the accuracy of ultrasound (US) guided versus landmark guided intra-articular hip injections. **Materials:** PubMed, Medline, and Cochrane libraries were searched to July 31, 2014. Two independent authors selected studies assessing accuracy of intra-articular hip injections based on predetermined inclusion and exclusion criteria. Selected papers were evaluated and a meta-analysis was performed using random effects models. **Results:** Four US (136 injections) and 5 landmark guided (295 injections) studies were reviewed. The weighted means for US and landmark guided hip injection accuracies

were 100% (95% CI, 98% to 100%) and 72% (95% CI, 56% to 85%), respectively. US guided hip injection accuracy was significantly higher than landmark guided accuracy ($p < 0.0001$). **Conclusion:** This is the first systematic review and meta-analysis of the accuracy of US versus landmark guided hip injections. The meta-analysis revealed US guided hip injections are significantly more accurate than landmark guided. The need for studies examining the efficacy and safety profile of US and landmark guidance for hip joint injections could be superfluous as landmark guidance is not the standard of care. As the use of US expands, it may be more advantageous to compare its accuracy, efficacy, safety, cost-effectiveness and patient satisfaction with fluoroscopic guided injections. **Keywords:** Ultrasonography, Injection, Anatomical Landmark.

MEDICAL STUDENT ESSAY CONTEST

177 – AWARD RECIPIENT

MYOSTATIN IN AGING AND DISEASE: A PROMISING THERAPEUTIC TARGET

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Musculoskeletal diseases are responsible for extensive impairment and economic burden, affecting over 11 million Canadians. Presently, there are no effective and safe pharmacological therapies designed to improve muscle mass and function in the Context of muscle-wasting disease. Myostatin is a recently discovered protein responsible for inhibiting skeletal muscle growth and is implicated in many forms of muscle loss. Myostatin levels are increased in states of disuse, sarcopenia and in disease-associated muscle loss, such as cancer-induced cachexia. These observations highlight the role that myostatin inhibition may have as a therapeutic modality to fight muscle loss. Myostatin is an attractive target for treating muscle disease for several reasons, one being its highly specific effect on skeletal muscle. There are a few methods available for inhibiting myostatin's action and preliminary studies have demonstrated significant improvements in muscle mass and function. While the majority of studies to date have been in murine models of disease, there are presently several human trials underway. The purpose of this paper is to provide an introduction to myostatin, its history, physiology, and significance in disease, and to explore its potential as a therapeutic agent in the treatment of disease and aging induced muscle loss. **Keywords:** Myostatin, Disease, Aging.

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CONCUSSION PREVENTION IN SOCCER: A COMPREHENSIVE LITERATURE REVIEW

Rehana Murani

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Objective: To review a basic approach to concussion in sport, and investigate the current methods of prevention of concussion in the sport of soccer. **Methods:** A literature review of "soccer concussion prevention" was completed to investigate what has been trialed to date. 42 articles met the search criteria, however only 5 articles were relevant to prevention of concussions in soccer. These studies investigated the use of headgear, neck strength, and player education as forms of prevention. **Results:** There is a need for prospective studies highlighting the risks and benefits of headgear for concussion prevention. Headgear in soccer may help prevent impact injuries such as fractures, however, unlikely to decrease concussions, as they are unable to prevent rotational acceleration of the brain. Neck-strengthening programs may or may not lead to increased head stability during impact. Several studies in ice hockey have found no correlation between neck strength and rotational accelerations of the head. Education of the player proved to be the most successful prevention method as it was shown to increase the athlete's reporting of concussions (72% vs. 36% when educated). **Conclusion:** Due to the contact nature of soccer, concussions will likely continue to occur. Based on this literature review, future prevention should begin with player education and the identification of knowledge gaps that may predispose players' to having a concussive injury. Education can be

inexpensive, quick, and easy to implement. In addition, future research on equipment and strengthening techniques specific to the game of soccer are of importance. *Keywords:* Concussion, Prevention, Soccer.

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MEDICAL STUDENT SUMMER CLINICAL EXTERNSHIP IN PM&R: A STUDENT'S EXPERIENCE

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Physical medicine and rehabilitation (PM&R), also known as physiatry, is a medical specialty that is lesser-known to medical students. One reason that medical students have a lack of knowledge about PM&R may be due to its limited exposure during medical school. The dual purposes of this elective report are to increase student exposure to PM&R and to highlight a clinical training opportunity for medical students and medical schools. PM&R is a medical specialty concerned with the diagnosis and treatment of patients with neurological and musculoskeletal conditions, with a focus on restoring function and quality of life. The Medical Student Summer Clinical Externship (MSSCE) is a program offered by the Association of Academic Physiatrists for medical students with a strong desire to work with patients in the field of PM&R. I took part in the MSSCE at the University of Pittsburgh Medical Center in the summer of 2014. Participating in this program and gaining clinical exposure to PM&R was an important and valuable stepping-stone for me, and I would highly recommend the MSSCE to medical students who are interested in the field of PM&R. To increase student exposure to the specialty, PM&R departments can consider becoming a sponsor site for the MSSCE and taking on a medical student during the summer. *Keywords:* Medical Student, Physical Medicine and Rehabilitation, Training.

MEDICAL STUDENT RESEARCH CONTEST

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FEASIBILITY OF OUTCOMES EVALUATION OF A PEDIATRIC SEATING PROGRAM IN A LOW RESOURCE SETTING

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Objective: The aim of this study was to evaluate the feasibility of studying outcomes of a pediatric seating program delivered in northern Haiti. *Design:* A qualitative design using a structured survey approach was implemented, with a two-level consent process. *Methods:* Concurrent with a specialized seating and wheelchair program conducted in Northern Haiti, beneficiaries were introduced to the study concept, and consent received for contact within the year. Of 91 beneficiaries, 86 consented to future contact for study purposes. A survey tool was developed with input from international aid organizations and local rehabilitation providers. Survey was administered during face-to-face or telephone interviews. Outcomes measured included wheelchair use, wheelchair maintenance, wheelchair fit, environmental access, and benefits of wheelchair use. *Results:* 57 beneficiaries were located 6 months post-seating program and consented to the survey. All of the respondents still had the wheelchair, 70% were using it a minimum of 3–5 days per week, 12.3% were not using it at all. The primary reasons for not using the wheelchair were that it was broken, physically uncomfortable, or difficult to transport. The most commonly reported benefits were improved mobility, increased independence, increased participation, and greater interaction with others. *Conclusion:* There is a paucity of literature pertaining to rehabilitation outcomes in low resource settings; information is critical to provide guidance on interventions. This study demonstrates that it is feasible and valuable to conduct outcome studies as part of clinical initiatives in low resource settings. *Keywords:* Wheelchairs, Developing Countries, Outcomes Research.

RESIDENT RESEARCH CONTEST

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INPATIENT STROKE REHABILITATION IN MANITOBA: BED DAYS OCCUPIED BY PATIENTS WITH FUNCTIONAL INDEPENDENCE MEASURE (FIM) SCORE >100

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Context: The Ontario Stroke Network (OSN) Stroke Reference Group (SRG) recommends patients with FIM score more than 80 receive outpatient rehab and FIM >100 remain inpatient only under extenuating circumstances. *Objective:* The objective of this study was to estimate inpatient stroke rehabilitation bed days in Manitoba occupied by patients with Functional Independence Measure (FIM) score >100. *Methods:* Population: Patients discharged from inpatient stroke rehabilitation in Manitoba. *Design:* retrospective. *Outcome Measure:* Length of stay in excess of reaching FIM score ≥ 100 . Data from Canadian Institute of Health Information's National Rehabilitation Reporting System (CIHI-NRS) was used to identify patients with stroke admitted to inpatient stroke rehabilitation in Manitoba from 2008–2013. Number of days spent as inpatient beyond reaching FIM of 100 was calculated in the following formula: If admission FIM <100: Number of excess days = (Discharge FIM score – 100)/ Mean FIM Efficiency If admission FIM ≥ 100 : Number of excess days = length of stay. *Results:* From 2008–2013, 848 patients were discharged from inpatient stroke rehabilitation in Manitoba. Mean LOS was 59 days. 245 patients were discharged with a FIM score <100. 603 patients were discharged with a FIM score ≥ 100 and occupied 15,548 excess inpatient bed days; mean excess of 26 days per patient. *Conclusion:* Mean length of stay for patients admitted to Stroke Rehabilitation in Manitoba is much higher than the national average (59 days vs. 35 days). 71% of the patients are estimated to be staying longer than recommended in inpatient setting. Further data analysis by incorporating factors such as stroke severity, age and geographic location needs to be done. *Keywords:* Stroke Rehabilitation, Length of Stay, Functional Independence Measure.

164 – AWARD RECIPIENT

SCREENING ADHERENCE FOR DEPRESSION POST STROKE: EVALUATION OF OUTPATIENTS, A LONDON EXPERIENCE (SAD PEOPLE)

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Context/Objective: Post stroke depression (PSD) is common and the transition home following discharge may be especially challenging emotionally for stroke survivors. This study aimed to determine to what degree Canadian Best Practice Recommendations for PSD have been adopted within a Southwestern Ontario clinic. *Design:* Practices were evaluated through retrospective chart review before and after the implementation of a protocol requiring completion of the Personal Health Questionnaire 9 (PHQ-9) at the first outpatient visit. Participants included those aged ≥ 18 years and were excluded if their primary diagnosis was not stroke. *Results:* 135 outpatient charts were reviewed. Following protocol implementation, screening rates increased from 0% to 93.8% and the frequency of charting regarding mood increased from 15.7% to 55.4%. Antidepressants were prescribed/recommended for one patient before protocol implementation compared to six patients following implementation; in the post protocol group, these patients had higher mean PHQ-9 scores compared with those where physicians did not prescribe/recommend therapy (12.17 vs. 2.63). The number needed to screen to identify one patient where antidepressants were prescribed/recommended was 1.4. *Conclusion:* This study highlights the frequency of PSD in the outpatient setting as well as a pre protocol lack of screening;

however, protocol implementation can increase screening rates. Routine PHQ-9 completion at the first outpatient visit following stroke was associated with more physician-patient discussion as well as documentation regarding mood. Furthermore, physicians were more likely to prescribe/recommend antidepressants once screening was implemented. This study suggests that the PHQ-9 score was used to guide clinical decision-making in patients not already on an antidepressant. **Keywords:** best practices, depression, stroke.

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THE EFFECT OF TRANSCRANIAL ELECTRICAL STIMULATION ON ORTHOSTATIC HYPOTENSION FOLLOWING TRAUMATIC CERVICAL SPINAL CORD INJURY: A PILOT STUDY

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Objective: To examine the effect of transcranial electrical stimulation (TES) on blood pressure (BP) during orthostatic challenge in individuals with orthostatic hypotension (OH) secondary to cervical spinal cord injury (SCI). We aimed to test the feasibility of methods for future use in a larger study. **Institution:** University of British Columbia, Division of Physical Medicine and Rehabilitation. **Design:** Prospective case series. **Setting:** Tertiary rehabilitation hospital. **Participants:** Four adults (age 18–64 yrs) with sub-acute (59–95 days) traumatic cervical SCI and OH confirmed by sit-up test (postural challenge). **Interventions:** Six sessions of 30 minutes of TES were delivered over 2 weeks. Sit-up tests were performed immediately before the 1st TES session (baseline), during the 1st TES session, immediately after the 6th TES session and at 3 weeks follow up. **Outcome:** The maximum postural change in systolic BP, diastolic BP and heart rate was calculated for all sit-up tests. Results were compared between baseline, during and post-TES to examine whether TES had any immediate, short-term or long-term effects on hemodynamic variables. **Results:** At baseline the postural change in systolic BP across all participants was -24.2 mmHg (SD 4.5) compared to -21.9 mmHg (SD 13) during the first TES session. This difference was not statistically significant ($p=0.70$). Changes in postural outcomes were variable following the 6 TES sessions and at 3 weeks follow up. **Conclusion:** Our methods are feasible as the protocol was completed in 4 subjects and no significant adverse events occurred. Further research is required to determine whether individuals with SCI and OH could benefit from TES. **Keywords:** spinal cord injuries, orthostatic hypotension, Transcranial Direct Current Stimulation.

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COMPARISON OF VASCULAR RESPONSES IN THE MEDIAL COLLATERAL LIGAMENT OF ANTERIOR CRUCIATE LIGAMENT DEFICIENT RABBIT KNEES AND MEDIAL COLLATERAL LIGAMENT TRANSECTED RABBIT KNEES

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Abstract: Anterior cruciate ligament transection (ACL-t) induces chronic joint instability. Increased joint loads are transferred to medial collateral ligament (MCL) causing ligament inflammation, angiogenesis and fibrosis. Similar processes have been shown in healing

MCL transection (MCL-t) injuries. Vasoconstrictive and vasodilatory responses are indirect measures of inflammation. MCL degeneration after ACL-t may be related to intrinsic ligamentous inflammatory responses to injury independent of injury mechanism. We hypothesized that vascular responses in the MCL of rabbit knees directly injured via MCL-t or indirectly injured in the unstable ACL-t knee are similar due to intrinsic injury-inflammatory responses. **Methods:** Vascular responses to phenylephrine (10^{-9} moles) and acetylcholine (10^{-8} moles) in the MCL were compared in control ($n=6$), ACL-t ($n=6$), and MCL-t ($n=5$) rabbit knees using laser speckle perfusion imaging (LSPI). **Results:** Perfusion was increased three-fold above control values in the ACL-t knee, and 1.6 fold in MCL-t knee. 10^{-9} moles of phenylephrine decreased perfusion in MCL's by -42.8±2.9% in control knees, -48.3±6.5% in MCL-t knees, and -18.5±1.8% in ACL-t knees. 10^{-8} moles of acetylcholine increased perfusion by 48.2±4.5% in control knees, 13.7±2.3% in MCL-t knees, and decreased perfusion -3.9±0.1% response in ACL-t knees. **Conclusion:** Vascular responsiveness is largely preserved in the MCL-t injury model and are significantly altered in the ACL-t model. MCL degeneration in the ACL transected knee may relate to chronic inflammation or inflammatory responses that result in abnormal vasoconstrictive and vasodilatory responses. **Keywords:** Anterior cruciate ligament, medial collateral ligament, vascular dysfunction.

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DOES SIZE MATTER? EXAMINING THE EFFECT OF OBESITY ON INPATIENT AMPUTATION REHABILITATION OUTCOMES

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Context/Objective: Lower extremity amputation is prevalent and projected to double by 2050. Obesity is also increasing at rapid rates. The purpose of our study was to investigate whether obesity impacts clinical outcomes of patients at discharge from inpatient amputation rehabilitation. Few studies have directly examined its effect on initial inpatient rehabilitation. **Design:** Retrospective Chart Review. **Setting:** All admissions for amputation rehabilitation at West Park Healthcare Centre between December 2009 and June 2013 were reviewed. **Study population:** Admissions in which rehabilitation was completed for transtibial or transfemoral amputations were included. Excluded patients included truncated admissions, admissions >180 days from amputation, and non-transtibial or non-transfemoral amputations. **Comparison groups:** Outcomes were compared between BMI groups overall, and within amputation levels. **Outcome Measures:** Discharge outcomes were predefined as the 2-minute walk test (2MW), the L-test of functional mobility, and the SIGAM score. **Results:** Of the 289 admissions meeting inclusion criteria, underweight and obese patients took significantly more time to complete the L-test than normal or overweight patients. Underweight patients walked significantly less in two minutes than other patients. No significant difference was found in the SIGAM score. There were no significant differences found in the 2MW, L-test, or SIGAM when patients were grouped by amputation level. **Conclusion:** Obesity seems to impact inpatient amputation rehabilitation on the L-test but not the 2MW or SIGAM. However, the L-test may itself be affected by obesity beyond the amputee population. As such, obesity should not be a deciding factor as to whether a patient is offered rehabilitation. **Keywords:** Amputation, Obesity, Physical Medicine and Rehabilitation.

111 - AWARD RECIPIENT

POTENTIAL IMPLICATIONS OF CONTRALATERAL MOTOR RESPONSE ABSENCE IN BILATERAL SPASTIC CEREBRAL PALSY: AN EXPLORATORY OBSERVATIONAL STUDY

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PhD, Monica A. Gorassini, PhD

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Objective: To explore anatomical differences in the contralateral corticospinal tract (CST) in people with cerebral palsy (CP) with and without contralateral motor responses. **Setting:** Research laboratory and MR Centre. **Participants:** 16 participants with bilateral spastic CP and Gross Motor Functional Classification System (GMFCS) I–IV. **Outcome Measures:** Groups were defined by the presence or absence of motor responses to transcranial magnetic stimulation from the contralateral cortex to the soleus muscle of the more affected leg. Motor function outcomes were GMFCS and Maximum Voluntary Activation (MVA). Diffusion tractography of the CST outcomes were Fractional Anisotropy (FA) which increases with greater white-matter integrity along with Mean Diffusivity (MD) and Perpendicular Diffusivity (PD) which decrease with greater white-matter integrity. Reporting median (range). **Results:** No responses in the more affected leg were obtained by stimulating the contralateral cortex in 4/16 participants. These participants had similar GMFCS, but were less capable of activating their soleus muscle than the 12 participants with contralateral responses: MVA=10uV (7–26uV) vs 34uV (9–85uV) $p=0.029$. Tractography generated contralateral CSTs in all participants except one person without contralateral responses to transcranial magnetic stimulation. FA appears to be lower 0.49 (0.42–0.55) vs 0.59 (0.43–0.62), $p=0.061$ and PD appears to be higher, $0.63 \times 10^{-3} \text{mm}^2/\text{s}$ (0.55–0.80 $\times 10^{-3} \text{mm}^2/\text{s}$) vs $0.52 \times 10^{-3} \text{mm}^2/\text{s}$ (0.45–0.66 $\times 10^{-3} \text{mm}^2/\text{s}$), $p=0.061$, in the 3 participants without contralateral responses compared to participants with contralateral responses. MD was similar between groups. **Conclusion:** People with CP without functional contralateral responses are less able to activate their muscle. This may result from greater damage to the contralateral CST. **Funding Acknowledgement:** CIHR MOP-106549. **Keywords:** (MeSH): Cerebral Palsy, Diffusion Tensor Imaging, Transcranial Magnetic Stimulation.

RESIDENT ESSAY CONTEST

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THE BLIGHT OF HEALTHCARE: SUSTAINABILITY IN MODERN HEALTHCARE PROVISION**Mark Ng**

Physical Medicine and Rehabilitation Manitoba

The concept of harm in modern healthcare provision in Canada requires a global *Context*. Canada's healthcare is one of the least energy efficient in the world and lacks nationwide healthcare waste management regulation. As a result, higher than necessary greenhouse gas emissions and heavy metals are released through waste incineration, landfill degradation, electrical generation and heating of space and water. This contribution to global warming erodes food and water security worldwide through increased incidence of extreme weather events, including storms, droughts and floods. Particularly vulnerable to these events are rural subsistence communities, which are already stricken with poverty and hunger. In combination, these facts underlie part of the basis of the WHO's Preventing Disease through Health Environments document in 2006, which estimates that 24% of disease burden and 23% of all premature deaths are due to environmental factors, such as food and water security and poverty. These insights bring to question whether Canadian healthcare delivery improves the health of Canadians, while simultaneously negatively impacting the well being of others worldwide. It is imperative that effort in healthcare management be towards careful auditing of each institution's environmental impact and implementing measures in waste management and improved energy efficiency. **Keywords:** Sustainability, Healthcare Management, Healthcare Delivery.

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FIVE QUESTIONS ABOUT CRITICAL ILLNESS POLYNEUROMYOPATHY: A CLINICAL REVIEW FOR REHABILITATION MEDICINE**Cameron Cunningham, MD, MSc^{1,2}**

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Over the past 30 years, the neuromuscular complications of critical illness have become increasingly recognized. This group of disorders is termed Critical Illness Polyneuromyopathy (CIPNM). This essay answers 5 questions about the clinical features, pathophysiology, diagnosis, risk factors, and long-term outcome of CIPNM, from a rehabilitation perspective. CIPNM is characterized by the presence of symmetric distal weakness, with or without sensory loss, reduced or absent reflexes and failure to wean from ventilation. Pathophysiology is complex and involves multifactorial processes that lead to multi-organ failure. Electrical, microvascular, inflammatory, metabolic, mitochondrial and gene expression factors have been shown to play a role. Diagnosis of CIPNM necessitates an individual be critically ill, have evidence of limb or respiratory weakness and have electrodiagnostic testing to establish evidence of axonal motor and sensory polyneuropathy and/or a myopathy. Once present, there are no clear treatment options. Aggressive management of sepsis, tight glycemic control and early physical therapy have shown benefit. Presence of CIPNM increases length of ICU stay, prolongs mechanical ventilation time and increases mortality. Long-term prognosis for those with myopathy alone is good, but those with neuropathy often have ongoing functional and electrodiagnostic limitations beyond 1 year of ICU discharge. As survivorship from critical illness improves, the proportion of this population that reaches rehabilitation increases. The precise functional impacts of CIPNM on rehabilitation are not yet clear. **Keywords:** Critical illness, Electromyography, Polyneuropathy.

178 – AWARD RECIPIENT**IMPACT OF PRE-SURGICAL EXERCISE ON PRE- AND POST-BARIATRIC SURGERY OUTCOMES IN PATIENTS WITH OBESITY****Pamela Laya Joseph**

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Context: With a growing obesity epidemic in North America, there is greater demand for Bariatric surgery. "Prehabilitation" programs in other surgical populations improve post-operative function, pain and hospital length of stay. In a bariatric population, the effects of exercise programs before bariatric surgery are unknown. **Objective:** To determine the impact of pre-bariatric surgery exercise on pre- and post-surgical outcomes including exercise, fitness and weight loss in patients with obesity. **Methods:** A search of MEDLINE, EMBASE, CINAHL, and PsychInfo was completed. MeSH terms included obesity, bariatric surgery, exercise, treatment outcomes, fitness, weight loss, anthropometry. **Results:** Of the 235 screened articles, 7 studies were included. Only one observational study involved a structured pre-surgical exercise program, demonstrating improved fitness post-intervention. Three randomized control trials evaluated exercise-counselling programs with conflicting physical activity and weight loss outcomes. The remaining observational studies assessed various outcomes, and two found that pre-operative physical activity was associated with quality of life and post-operative physical activity behaviours. **Conclusions:** Studies that evaluate effects of pre-bariatric surgery exercise programs are limited. Conflicting evidence exists for pre-surgical exercise counselling programs. Future studies require larger sample size, and robust study design to determine effects of pre-surgical exercise in individuals undergoing bariatric surgery. **Keywords:** obesity, bariatric surgery, exercise.

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