



# 2019 ANNUAL REPORT

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**Rehabilitation Research, Innovation & Technology Development**

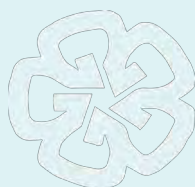
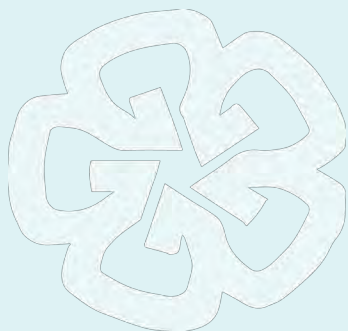
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**Building Abilities for Life™**



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## GRH Mission

Optimize function and improve quality of life of our patients.

## GRH Guiding Principles

- Patients First.
- Accessible Information.
- Our People - Safe, Inclusive, Enabled.
- Innovation-Informed.



# Messages from Senior Administration



**Catherine Hill**  
GRH Senior Operating Officer  
(Interim)



**Dr. Nan Schuurmans**  
GRH Site Medical Director



**Dr. Gary Faulkner**  
Director, Research, Innovation  
& Technology Development

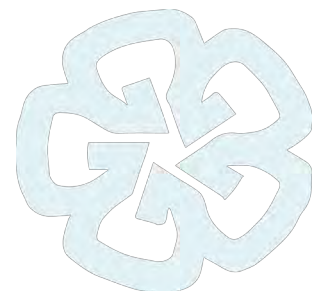
The 2019 Glenrose Rehabilitation Hospital's Research Annual Report highlights a number of innovational projects. Research at the Glenrose remains grounded in a multidisciplinary approach with input from health care professionals, patients and families, partners in academia and industry partners. Award winning researchers, research affiliates and research students provide their talents to support patient care at the Glenrose. Each year, the accomplished teams at the Glenrose push the envelope in terms of reimagining how to best support patients in improving their functional abilities.

This year's report features projects that support decision-making for patient care at the Glenrose, the use of virtual reality (3MDR) as a therapeutic tool for military personnel and veterans with post-traumatic stress disorder, the development of an innovative device that supports patients with swallowing difficulties and the use of specific assessment and screening tools as

predictors of driving ability. Our team consisted of 67 Researchers, 92 Research Affiliates and 15 Research Students. The department lists 118 ongoing research studies with 50 new research studies that started in 2019. Five recipients received GRHF clinical research grants with \$50K in clinical research grant funding being disbursed. 14 Small-Medium Enterprise (SME) partnerships were formed with 6 prototypes having reached the clinical evaluation phase.

We would like to thank the team at the Glenrose Rehabilitation Hospital for their talent, their dedication and their ability to discover new frontiers in rehabilitation. Additionally, we would like to recognize the philanthropic efforts of the Glenrose Hospital Foundation in supporting innovation in our hospital.

We hope you enjoy the 2019 Annual Report.





## Who We Are

The Glenrose Rehabilitation Hospital is the largest free-standing, comprehensive tertiary and quaternary rehabilitation hospital in Canada, serving patients of all ages who require complex rehabilitation to enable them to participate in life to the fullest.

As a leading edge academic teaching hospital, the Glenrose participates in educational training programs for health sciences professionals and offers an array of research and technology development opportunities.

The Glenrose Rehabilitation Hospital is made up of five divisions. The **Adult Rehabilitation Division** is strongly associated with the University of Alberta's Faculty of Medicine & Dentistry, Department of Medicine, Division of Physical Medicine and Rehabilitation. Four inpatient programs are made up of Adult Brain Injury, Adult Stroke, Adult Spinal Cord Injury/General Neurology and the Adult Orthopedic/Musculoskeletal/Burns Program. This division is home to academic physiatrists, researchers and clinical academic colleagues. The Division has one of the longest running and best known Physical Medicine & Rehabilitation residency training programs in Canada. Along with clinical training, the Division of Physical Medicine & Rehabilitation has a record of strong and well-funded research, mainly in the areas of spinal cord injury recovery and treatment as well as neuro-prosthetics, targeted peripheral nerve re-innervation, robotics, artificial intelligence and neuroplasticity. Division members have received many national and international awards recognizing their contributions to rehabilitation science and education.

Our **Pediatric Rehabilitation Division** is also closely linked with the University of Alberta's Faculty of Medicine & Dentistry, Department of Pediatrics. Specialists in developmental-behavioral pediatrics work with colleagues from Glenrose allied health disciplines to provide medical and multi-disciplinary assessment



Glenrose  
Rehabilitation  
Hospital

## Who We Are....

and intervention for children and youth with developmental disabilities and their families. Their emphasis is on cognitive and language disabilities such as intellectual disability, Autism Spectrum Disorder, speech disorders, Fetal Alcohol Spectrum Disorders, developmental language disorders, learning disabilities, and Attention-Deficit/Hyperactivity Disorder (ADHD) and assistive technologies. Also within this division, the Section of Pediatric Rehabilitation Medicine includes a wide range of clinics and programs that provide specialized care to children with impairments and functional limitations resulting from congenital and childhood onset neuro-musculoskeletal disorders. Active research in the areas of Autism, gait disorders in children, the use of AFO's in children with Cerebral Palsy, as well as numerous studies involving the neonatal population, to childhood arthritis and outcomes of children with perinatal stroke have earned national and international accolades for our researchers.

The **Specialized Geriatrics Division** is also aligned with the University of Alberta's Faculty of Medicine & Dentistry, Department of Medicine, and Division of Geriatric Medicine. Members provide inpatient care and clinical services to specialty clinics in osteoporosis, mild cognitive impairment and bowel and bladder problems. The division also has a long-standing residency program as well as an undergraduate special interest group in older people. The Geriatrics department includes a Teaching Unit for the "Care of the Elderly" Family Medicine Program which aligns with other geriatric rehabilitation teams at the Glenrose, accepting geriatric patients and/or frail older adults. The Short-Term Assessment, Rehabilitation & Treatment (START) Psychiatry Day Hospital is one of the most comprehensive programs in Canada, offering a wide range of specialized care in a tertiary rehabilitation hospital. Extensive collaborations between AHS Addictions & Mental Health and Covenant Health bring specialized services to the geriatric population. Active research and teaching is promoted in the areas of dementia, incontinence, falls, frailty, delirium, use of assistive devices to aid independent living, to studies using repetitive transcranial direct stimulation. Members have received many national and international awards in recognition of their contributions in this area.

The **Rehabilitation Research, Innovation & Technology Division** is involved in each of the GRH divisions as discussed above, by facilitating translational work from cutting-edge research and innovative technologies to the bedside. Through the Glenrose Rehabilitation Research Innovation & Technology (GRRIT) Hub, they assist in engaging with external partners in developing technological solutions to the challenges experienced by people living with physical or cognitive disabilities. GRRIT supports the development of innovative products and solutions by providing access to clinical settings, traineeships, specialized equipment, technical advice and clinical evaluations. The GRH Research Division also facilitates research studies for researchers to enable them to carry out their studies across the lifespan from newborn, children, and adolescents to adults and the elderly. Many of our researchers are front-line professional staff, i.e. physical or occupational therapists, prosthetists and nurses who become involved in research to find solutions to recurring issues for their patients. This division is also closely affiliated with researchers from the University of Alberta. Faculties such as Rehabilitation Medicine; Engineering including Biomedical, Computer and Mechanical; Science, Education, Medicine & Dentistry and Public Health. Numerous GRH researchers and research affiliates have been recognized locally, nationally and globally for their advances in treatments and technologies, some of which include the development of myoelectric prostheses, improved continence care in older adults, peripheral nerve regeneration, the restoration of function after nerve injury and the use of Functional Electrical Stimulation (FES) in the promotion of function and mobility following a spinal cord injury.

The **Specialized Rehabilitation Services Division** is made up of services that can be accessed by patients of any age. Some of these services would be the Cochlear Implant Service, I CAN Centre for Assistive Technology, Driver Evaluation & Training Service, Motion Analysis Services, Seating Service and the Vestibular Clinic (Balance). The various research studies carried out in these areas include the use of augmentative and alternative communication systems, evaluation of fitness to drive and the use of Brain Computer Interface (BCI) in access to play for children. Many of the research outcomes are nationally and internationally recognized.



## Our Vision: Building Abilities for Life™

Research and innovation are essential goals of the Glenrose Rehabilitation Hospital's strategic direction. We are constantly evaluating ways in which treatment is being delivered and are continuously looking for approaches that will improve our patient outcomes. While we always keeping abreast of innovative and emerging technologies, we also engage with external partners to develop technological solutions to many of the challenges that are experienced by people living with physical or cognitive disabilities. With the establishment of the Glenrose Research Innovation & Technology (GRRIT) hub, we are able to act as a conduit for collaborations between our partners in academia, industry, entrepreneurs, clinical staff, patients and their families.

Research is an integral part of everyday work being done at the Glenrose. While research activity supports and enhances our commitment to providing the best possible rehabilitation programs to the people of northern and central Alberta, it also enables us to build and maintain our leadership role in physical rehabilitation in Canada.

Glenrose staff have repeatedly proven their exceptional ability in bridging disciplinary limitations and creating multidisciplinary research teams. Collaborations with our many partners within AHS, the University of Alberta, University of Calgary, the Northern Alberta Institute of Technology (NAIT), MacEwan University and industry have produced exciting results.





# Examining the Use of Specialty Mattresses at the Glenrose

An inpatient stay at any hospital can be a challenging time for patients, as those with reduced mobility might be at risk of developing pressure injuries. In this study, we looked at how the type of bed surface that a patient sleeps on at the hospital can impact mobility and quality of life. At the Glenrose, and most hospitals, there are two types of bed surfaces: standard foam surface and specialty air mattress. The specialty air mattresses are composed of air cells that inflate and deflate. The aim is to reduce the pressure applied to the patient's skin and so reduce the risk of pressure injury. However, the air mattresses can make it difficult for the patient to move, and they require an air pump that can create noise.

Over time, an increasing number of specialty air mattresses have been acquired at the Glenrose, meaning that inpatient units may have more specialty air mattresses than patients who need them. To date, there has been no research looking at whether there could be any consequences to placing patients on specialty air mattresses. Our study used a mixed methods research design. We conducted two surveys on the inpatient adult and geriatric units to determine how beds are used. We then held three focus groups with nursing staff, allied health staff and clinical nurse educators. Finally, we recruited 10 patients assessed at low risk of pressure injury through using the Braden Scale. These patients experienced both types of surfaces and spent at least two nights on a standard foam surface and at least two nights on a specialized air mattress. Each patient was interviewed and asked to share their experience of the beds to better understand the impact of each mattress. Also, a study nurse recorded the patients' functional independence and quality of life on each surface using standardized measures.



The results of our study indicated that there are indeed more specialty air mattresses than patients who require them and unless the patient is admitted with a pressure injury, staff find it difficult to determine who should be placed on the specialty mattresses. Sometimes the decision about the type of bed was based on what bed was already present and not based on the risk of pressure injury. Staff indicated that a decision-making framework would be helpful. Patients reported that the air mattresses made sleeping and moving more difficult compared to the standard foam. Most patients found the standard foam more comfortable, but a few patients preferred the soft surface of the air mattress.

This study suggests that there may be negative consequences to placing patients on specialty air mattresses and this decision should be well-considered. We are working to share our findings in a peer-reviewed publication and through presentations to the Glenrose leadership team. Our recommendations include establishing a decision-making process when placing a patient on an inpatient bed surface and carefully considering the ratio of bed surfaces when making future purchases.

Research team:  
Dr. Simon Palfreyman, Assistant Professor,  
Faculty of Nursing, University of Alberta/GRH Research Affiliate;  
Alyson Kwok, GRH Healthcare Improvement Team;  
Alisha Sawich, GRH Spinal Cord Injury Unit  
Jacqueline Futoransky, GRH Patient Care Manager,  
Specialized Geriatrics

# Resilience-Training Fosters Resilient Parents, Children and Communities

Resilient parents tend to raise resilient children and build resilient communities. Resilience - the ability to withstand and bounce back from challenges - is essential to military family life. For those who serve and have served, their families are their key supports. When their families are doing well, so are military members themselves; they are also better able to focus on the mission at hand.

## Resilience-Training for Military Families

With funding from the Glenrose Rehabilitation Hospital Foundation (GRHF) and Kule Institute for Advanced Study (KIAS), and in-kind support from the Edmonton Military Family Resource Centre (MFRC) and the Royal Canadian Chaplain Service (RCChS), a team of researchers and military service providers brought a made-in-Canada resilience program - Reaching IN...Reaching OUT (RIRO)/Bounce Back and Thrive! (BBT) - to the Edmonton Military Family Resource Centre. After a week-long training session of 20 service providers (social workers, military chaplains, educators) and researchers, the program was delivered to military parents with children 8 years of age or younger. The program is designed to teach parents simple, evidence-informed skills to increase their own resilience and enable them to role model resilient behaviours to their young children. Research has shown that even very young children learn resilience skills by watching adults with whom they are in contact. Researchers sought to understand the experiences of Canadian military parents enrolled in the resilience-enhancing training. The perspectives of military service providers and researchers who received the training and delivered the program were also sought. The goal was to determine ways that the RIRO/BBT program might be adjusted to better fit the military context. Future plans include expanding the reach of the program within the Canadian military and beyond, using feedback from this study.

## Resilience Training Outcomes

The findings gleaned from military parents are promising. The program increased participants' awareness of resilience skills and offered them practical ways to implement them in their everyday lives. Participants indicated that they were able to apply skills

in a wide variety of settings and be more intentional about role modeling resilience skills to their children. One parent said: " [It gave us] good insight into our own psyches as parents and how that could affect our parenting". Another commented: "I did enjoy the program. I like considering the thinking habits and where we get stuck as parents." Another emphasized the importance of focusing on parenting strengths: "I found focusing on the strengths was really good...Being aware of what your strengths and your child's strengths are...was really helpful." Once it is more contextualized for military families, participants indicated that the BBT/RIRO program could become a very informative and impactful program for future participants.



## Building Resilient Families

As parents become more aware of their own resilience and use the skills in their daily lives, they are better equipped to role model skills to their children. Parents also become more aware of their non-resilient thoughts and actions and try to reduce them in their parenting. Looking toward the future, the hope is that children from a young age develop healthy resilience skills and habits that can help them build on their strengths and navigate life's challenges. Furthermore, there is the potential for an inter-generational impact where the children, when they themselves become parents, are more

able to role model skills to their future children.

Practicing resilience can also strengthen connections between partners. The translation of the resilience skills from adults to younger family members works to build a cohesive family unit. This is especially important in military families where there are many unique challenges and stressors. Although resiliency alone cannot reverse trauma and conditions such as post-traumatic stress disorder, it has the potential to mitigate the negative impact for both the individual and their family. As such the RIRO/BBT program provides an opportunity for military members and their families to learn and practice resilience skills that can build a strong and long-lasting resilient family unit.

### Uniqueness of the Project

With funding from the GRHF and KIAS, and in-kind support from the Edmonton MFRC and RCChS, a unique multi-disciplinary project was initiated. Researchers from the University of Alberta Faculties of Education, Nursing and Rehabilitation Medicine, along with graduate and undergraduate students, joined persons with lived experience, the Edmonton MFRC and the RCChS. The team's combined expertise resulted in a meaningful, community-based project that provided immediate learning. Research partnerships were also formed that will stimulate future endeavours with potential broad-based impact on families - the often hidden and uncelebrated pillars of those who serve and have served our country.

Dr. Suzette Bremault-Phillips, Associate Professor  
Faculty of Rehabilitation, Department of Occupational Therapy  
& Director, Heroes in Mind Advocacy and Research Consortium (HiMARC),  
University of Alberta/GRH Research Affiliate



## Mobili-T™: Assisting Patients with Swallowing Difficulties

True Angle Medical Technologies Inc. partnered with Glenrose Rehabilitation Hospital clinicians with assistance from the GRRIT Hub, to assess the usability of a new mHealth system with patients. One of the main reasons for the new system's development came from an observation that often times technologies are provided to clinicians and patients without their input, which can be a major barrier to the acceptance of these otherwise great innovations.

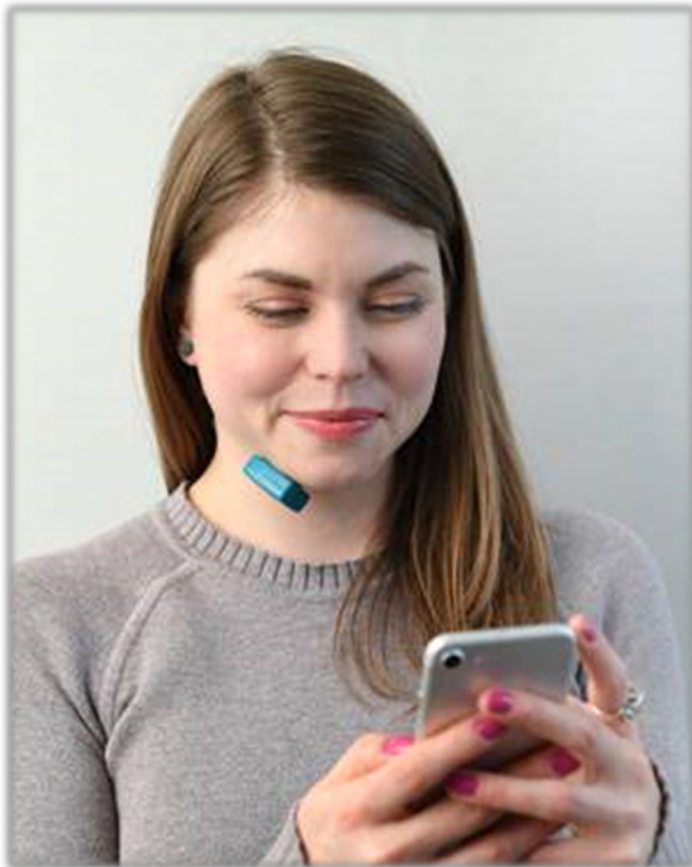
Mobili-T™, the mHealth system currently being evaluated, assists people with swallowing difficulties to complete exercises from the comfort of their own homes. This system was previously tested on patients with head and neck cancer. However, the team wished to know whether persons who may experience mobility, visual, and cognitive impairments in addition to swallowing difficulties (e.g. patients with a history of stroke) could also use Mobili-T™.

Almost everyone has experienced choking on food, but for those suffering from swallowing disorders (or dysphagia) this is a regular and terrifying experience. Dysphagia affects 20% of those over the age of 50, which equates to 250 million people worldwide and 360,000 in Alberta. Those affected by dysphagia are typically patients with a history of stroke, head and neck cancer survivors, Parkinson's disease, and patients who have suffered a traumatic head injury. In North America, half a million people are admitted to the hospital because of difficulties swallowing, which costs the healthcare system more than 17 billion dollars to manage. The Glenrose Rehabilitation Hospital sees a large number of inpatients and outpatients to assess and manage swallowing difficulties.

Mobili-T™ is comprised of a small, wireless device, a smartphone app and a clinician portal. The small device attaches under the chin using skin-safe adhesive and uses surface electromyography (sEMG) sensors to detect how hard and for how long swallowing muscles are contracting. Patients can see this information as biofeedback on their smartphone app.



One of the unique aspects of the



Mobili-T™ system is that we have involved patients and clinicians in the design from the inception of the project. For this reason, it was important to the True Angle team to continue front-line evaluation of the Mobili-T™ with patients.

The purpose of the study conducted in partnership with the GRH was to evaluate the usability of Mobili-T™ with a new specified user subset (i.e., stroke population). Usability testing is defined as “the extent to which the product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified content of use” (Sauro and Lewis, 2012).

We found that the level of independence to complete tasks successfully (i.e., system effectiveness) varied with stroke patients and the clinician or caregiver were required to adjust the level and type of support provided. Most participants required their own as well as clinician resources to complete the tasks efficiently (i.e., system efficiency). Lastly, all participants reported satisfaction with the use of the system.

This usability testing was an important step in understanding modifications and recommendations that our team needed to make for this particular patient group and their clinicians or caregivers. One positive finding from this work was that despite additional resources required by patients with a history of stroke, an mHealth system such as Mobili-T™ can be successfully used with assistance from a caregiver or clinician.

The manuscript from this work is currently in submission.

True Angle is proud of this local, grassroots partnership with the GRH and we would like to thank all

patient participants for their time. We also would like to thank the GRH team for taking time out of their busy days to make this research possible, including Kathy Olasker, Gail Kostiw, Tyler Wetter, Teresa Hardy, Shannon Wagner, Megan Petryk, Kayla Paterson, Donna Sheptycki, Amber Michaud, Christine Gotaas, and Dr. Gary Faulkner.

Remote therapy is even more relevant now, with the advent of strict distancing restrictions and an increased focus from clinicians and professional associations on home-based therapy using mHealth or telehealth.

Dr. Gabriela Constantinescu  
Co-Lead, Head & Neck Surgery Functional Outcomes Laboratory  
Institute for Reconstructive Sciences in Medicine (iRSM)  
Misericordia Community Hospital/ GRH Research Affiliate

# Virtual Reality-Assisted Therapy Helps Military Members and Veterans Overcome PTSD

The realities of modern warfare put military members at risk of developing PTSD and moral injury (MI). This is all the more so when members are exposed to traumatic events and ethical and moral dilemmas in which civilians are targets, threats that they face are ambiguous, and rules of engagement limit them from intervening. Both PTSD and moral injury can result in psychological, emotional, spiritual and interpersonal distress.



[https://www.kelownanow.com/news/news/National\\_News/Troops\\_urged\\_to\\_seek\\_help\\_as\\_use\\_of\\_men](https://www.kelownanow.com/news/news/National_News/Troops_urged_to_seek_help_as_use_of_men)

PTSD rates among Canadian military members and Veterans are 11% and ~16% respectively. Further, up to 58% of Canadian Armed Forces (CAF) military members on tour in Afghanistan were exposed to at least one potentially morally injurious experience. While gold standard treatments for PTSD can reduce symptoms, some military members and Veterans experience treatment-resistant PTSD (TR-PTSD). Currently, evidence-based therapies specifically for TR-PTSD and MI are lacking.

3MDR (Multi-modular Motion-assisted Memory Desensitization and Reconsolidation) is an emerging intervention that has been giving CAF military members and Veterans with combat-related TR-PTSD a renewed sense of hope. The therapy is delivered in the Glenrose Rehabilitation Hospital's immersive Computer Assisted Rehabilitation ENvironment (CAREN) - a room-sized virtual reality system with floor-to-ceiling motion-capture technology screens surrounding a treadmill. During each of six 90-minute 3MDR sessions, a participant continually walks on the treadmill with a clinician standing alongside. Sessions include: (a) a brief *pre-platform warm-up phase* during which self-selected music is played reminiscent of the participant's military deployment(s); (b) a *platform phase* involving a series of seven 4-5-minute active therapy cycles, each of which focuses on 1 of 7 self-selected images. When viewing each image, the participant describes the traumatic

scenario, as well as physical sensations, emotions, and thoughts. A virtual ball displaying a series of numbers (which the participant reads aloud) then briefly moves back and forth horizontally across the screen. The cycle repeats again for the 6 remaining images. Following a mental cool-down, (c) a *post-platform phase* provides an opportunity for debriefing, a safety check and review of a self-care plan. We aim to explore the effectiveness of 3MDR as well as its acceptability and usability by military members, Veterans, and 3MDR clinicians and operators. Findings will inform 3MDR's potential future use with other trauma-affected populations.

## Regaining a Meaningful Life

Promising initial findings from the 11 participants who have completed both 3MDR and 3 and 6-month follow ups continue to inspire. For some participants, the changes they have experienced have been life-altering. Many of the participants comment that their health, wellbeing and family life is far better than it's been in years. With symptoms of moral injury and PTSD significantly reduced (more than a quarter of participants no longer met the criteria for PTSD



Ryan Perry, Jennifer Griffiths, and daughter Sam

immediately following the intervention), participants have been able to find renewed meaning and purpose. They are also better able to function, engage in social activities, and enjoy life. Use of the CAREN and 3MDR was well-accepted by military members and Veterans as well as by five of the 3MDR clinicians and two of the CAREN operators delivering the therapy. To this point, study findings



suggest that 3MDR may be an effective treatment for moral injury and combat-related TR-PTSD.

### Where do we go from here?

If found to be effective and worthy of widespread use, the team would like to further explore ways to make 3MDR and other trauma-focused therapies more portable and accessible to military members, Veterans and other trauma-affected populations wherever they are and whenever they need it. We are currently considering ways to adapt interventions for rural and remote delivery as a means of increasing timely access. This is particularly essential during these unprecedented times of COVID-19-related physical distancing, and in light of the vast, rural Canadian landscape that we enjoy.

### Uniqueness of the Project

Funding from the Glenrose Rehabilitation Hospital Foundation and Royal Canadian Legion Alberta-NWT Command, as well as in-kind support from the

Canadian Armed Forces, Veterans Affairs Canada, Defence Research and Development Canada, Alberta Health Services, the Glenrose Rehabilitation Hospital, and partnerships with the Departments of Psychiatry, Computing Science, and Educational Psychology have provided a unique opportunity for HiMARC to contribute to international efforts aimed at studying 3MDR. The expertise of this broad multi-disciplinary team is making it possible to explore innovative solutions for helping those who serve and have served, as well as their families, to once again live meaningful lives. The research team is grateful for the support received and opportunity to advance this research.

Dr. Suzette Bremault-Phillips, Associate Professor  
Faculty of Rehabilitation, Department of Occupational Therapy &  
Director, Heroes in Mind Advocacy and Research Consortium (HiMARC),  
University of Alberta/RH Research Affiliate

# Exploring the Predictive Ability of the Motor-Free Visual Perception (MVPT) and Trail-Making Test (TMT) for On-Road Driving Performance

Assessment of driving ability following a medical change is rapidly evolving. There are several areas in which evidence is lacking to establish best clinical practice. As the coordinator of the Glenrose Driver Evaluation and Training Program, Ana Holowaychuk has been involved in defining and promoting effective driver screening in the province of Alberta. Yolana Parrott is the occupational therapy professional practice lead and has led several working groups promoting evidence-based practice across disciplines. Ana and Yolana worked together to identify areas in driver assessment which would benefit from further exploration. The Motor-Free Visual Perception Test (MVPT) has been suggested as an assessment tool which is reflective of an individual's ability to drive. However, there are controversies as to whether the MVPT was adequate to serve such purpose. With the support from the Glenrose Clinical Research Grant sponsored by the Glenrose Foundation and co-author, Dr. Ada Leung, Associate Professor, Department of Occupational Therapy and Neuroscience and Mental Health Institute, University of Alberta, Glenrose Occupational Therapists, Ana and Yolana examined the predictive abilities of MVPT, as well as other clinical assessments, on on-road driving performance. It can be difficult as front line clinician's to find the time and resources to engage in research activities, however the experience of completing the project inspired both Ana and Yolana to continue with new research projects. Ana, Yolana and Ada first presented their research findings at the 2019 Canadian Association of Occupational Therapy Conference. Their



paper has recently been published in the [American Journal of Occupational Therapy](#). Congratulations!

Ana Holowaychuk, Occupational Therapist, Glenrose Rehabilitation Hospital  
Yolana Parrott, Occupational Therapist, Glenrose Rehabilitation Hospital  
Dr. Ada Leung, Associate Professor, Faculty of Rehabilitation, Department of Occupational Therapy, University of Alberta/GRH Research Affiliate

# Research Highlights from 2019

## Spinal Cord Injury Treatment Centre and Society (SCITCS): Enhancing the Lives of People with Spinal Cord Injury



The Spinal Cord Injury Treatment Centre and Society (SCITCS) is celebrating over 30 years of creating opportunities for people with a spinal cord injury (SCI) and others. SCITCS is managed by a volunteer board and sustained by a dedicated group of volunteers who are committed to improving the quality of life of people with a SCI. Their motto, Never Say... "Never", remains the driving force behind their organization.

Over the decades, SCITCS has supported newly injured patients with SCI and their families in numerous ways. They host a monthly pizza night on Unit 3B at the Glenrose Rehabilitation Hospital, providing new patients with their best-selling book *Daring To Live*, a SCITCS Never Say... "Never" T-shirt, and a reacher. A SCITCS board member also visits patients with SCI on a weekly basis to provide support and education. These meaningful connections have assisted patients and their families through their rehabilitation journey. Most recently, they hosted a Christmas pizza party that was very well attended by patients and their families, and presented the SCI Program with a new lightweight carbon fiber wheelchair for patients to trial.

Established in April 1987, SCITCS has been promoting and supporting applied research; they were fundamental in bringing state-of-the-art technology such as the ReWalk and Functional Electrical Stimulation (FES) devices to Northern Alberta. FES applies small electrical pulses to paralyzed muscles to restore or improve their function and is commonly used for exercise, but also to assist with breathing, grasping, transferring, standing and walking. SCITCS has provided FES bikes to hospitals and community fitness facilities to allow people with paralysis from neurological injury access to this technology. SCITCS is also a strong proponent of continuing education, and over the years they have sponsored various educational opportunities for patients, families, and clinicians all in the effort to enhance the quality of life for people with SCI.

## Heroes in Mind Advocacy and Research Consortium (HiMARC) Announcement

The Glenrose Rehabilitation Hospital has had a long-standing research collaboration with Canada's military. We have extended that commitment to include veterans and public safety personnel and their families. This is taking the form of our membership in the Heroes in Mind Advocacy and Research Consortium (HiMARC) formed under the leadership of the Faculty of Rehabilitation Medicine at the University of Alberta. This consortium will provide a coordinated approach to funding through grants and donations to advance research, education



and service for the benefit of Canadian military, veterans, first responders and families. HiMARC's

founding members include the Faculty of Rehabilitation Medicine, Alberta Health Services' Glenrose Rehabilitation Hospital, Royal Canadian Legion Alberta - NWT Command, NAIT, Canadian Armed Forces, Veteran Affairs Canada and Covenant Health. The formation of HiMARC was announced on February 13, 2019 at the Glenrose Rehabilitation Hospital.

HiMARC has established several partnerships, initiatives and research projects. One of them, 3MDR, was also announced on February 13th. The Motion-Assisted, Multi-Modal Memory Desensitization and Reconsolidation, or 3MDR research study, the largest of its kind in Canada, will examine people with difficult to treat PTSD (Post Traumatic Stress Disorder) symptoms using Virtual Reality therapy using the Computer-Assisted Rehabilitation Environment (CAREN) System at the Glenrose Rehabilitation Hospital.

## Smart Network Team Outstanding Achievement

Please join us in congratulating Dr. Vivian Mushahwar, Special FES Advisor - GRH and the entire Smart Network team on their success with the latest funding from Economic Development and Trade – the Smart Network has just been awarded \$2.28M over the next 3 years to establish the business arm of the SMART Network that will focus on partnerships with industry and Healthcare, and to commercialize and implement interventions coming out of the SMART Network. It will also





support the local health technology sector, too. This is absolutely fantastic and we would like to congratulate Vivian and everyone on the Smart Network on this outstanding achievement!

### Division of Physical Medicine & Rehabilitation Project

Congratulations to Dr. Ming Chan and his multidisciplinary team for their latest CIHR (Canadian Institute for Health Information) research project grant success! Their team project grant, “Electrical stimulation prior to nerve transection and surgical repair promotes nerve regeneration and functional recovery in a manner exceeding a conditioning lesion”, has just been approved for funding by CIHR. This is highly competitive and is testimony to the team's scientific excellence. We are extremely proud of this achievement.



### Sensation in Missing Limbs—Dr. Jacqueline Hebert

‘We’ve seen some incredibly sophisticated bionic limbs over the years, but one thing they are all missing is feeling. Dr. Jackie Hebert, Physician, Physical Medicine & Rehabilitation Division, Glenrose Rehabilitation Hospital and her team partnered with researchers from the Cleveland Clinic to figure out a way for a person with no hand to sense complex hand movements. That involved surgically rewiring the nerves of six patients and using tiny robots to vibrate the muscles. It resulted in patients using their prosthetic limbs up to 300 times better than before – because they don’t have to watch every move.’



*Reprinted in part from Global News Edmonton Health Matters Su-Ling Goh January 07, 2019*

### Glenrose Staff Published

An article entitled “Functional, Impulse-Based Quantification of Plantar Pressure Patterns in Typical Adult Gait” was published in the January 2019 edition of the [Gait & Posture](#) magazine. Congratulations to Dr. Matthew Prowse, Physician, Beth Watkins, Physiotherapist and Justin Lewicke, Motion Analyst on this accomplishment. Many of the research participants

were Glenrose staff and students who kindly donated their time and foot prints for this project. Their data contributed positively to the body of knowledge and clinical care in this article.

### GRH Research Building Open House

The Glenrose Rehabilitation Research Building is located on the corner of 101 Street and 102 Avenue. The ground floor sits about 2 feet below grade level. In late October 2018, a water main running along 101 Street burst just north of 112 Avenue. A river of water flowed down 101 Street and but for the laudatory efforts of our crew from Facilities Management the water would have flooded the ground floor. As it was, we experienced a few inches of water only. The Research Center was opened in December of 1994 and very little work has been done to the interior since then. The flood event was an opportunity to undertake some minor renovations of the ground floor space to better reflect the changing nature of the work done here now. This included converting a hardware lab into a conference room and painting the walls and repairing the linoleum. Glenrose staff were invited to an open house to view the new and improved Research Center on January 18, 2019.



### Taizhou University Tours the Glenrose

On January 25, 2019, a group from Taizhou University including Guangtin Chen, President; Zhongfei Li, Dean, School of Medicine & Rehabilitation; Hui Jin, Director of Postgraduate Education; Qifang Su, Vice Dean, School of Electronic Information Engineering, and Ying Chen, International Exchange & Cooperation Office visited the GRH. Grace Maier, Director, Specialized Geriatrics – GRH and Doug Hill, Senior Consultant, Rehabilitation Research, Innovation & Technology Development - GRH hosted the tour which included the Courage in Motion Centre, Syncrude Centre for Motion & Balance and Building Trades of Alberta Courage Centre. The group was impressed with the rehab technology that the Glenrose Hospital has to offer and will most likely return for another tour in the future.

## Autism Research Centre Tour

On April 5th Dr. Lonnie Zwaigenbaum hosted a tour of the Autism Research Centre for donors and staff from the Stollery Children's Hospital Foundation (SCHF) and the Women's and Children's Health Research Institute (WCHRI). Dr. Zwaigenbaum showcased the research and its implications for treating children with Autism Spectrum Disorder and discussed what the funding and support provided by the SCHF & WCHRI enables. Presentations from Sarah Raza on the impact of SCHF on her work as a graduate student and from Leanne Bilodeau on what the research means to her family were followed by a discussion about the hopes and plans for the future of Autism research.



## Promotional Video Filmed at the Glenrose

The University of Alberta recently filmed a video in the CIM Center using the CAREN System to develop promotional materials that showcase the Biomedical Engineering Program within the Faculty of Engineering. The video, which includes students that are working on research in the Neuromuscular Control and Biomechanics program, will showcase the research that is currently being conducted in the Faculty of Engineering and the vital role students play in that research. Produced to also highlight the valued partnership with the Glenrose Rehabilitation Hospital and other industrial partners alike, a link to the [video](#) can be viewed here.

## Equitest Training

The Vestibular Rehabilitation Physical Therapy team participated in on-site clinical training on April 29th.



Training was facilitated by Rebecca Latraverse, the Balance and Mobility Clinical Education Specialist for Natus Medical and NeuroCom balance systems. This state of the art equipment provides much more objective norm reference data to guide customized vestibular and balance rehabilitation resulting in better outcomes.

## Bioness Training

On April 30th, Bioness training was provided to eight additional staff from several Glenrose teams. Utilization of this muscle stimulation device which aids in mobility training is steadily increasing, typically averaging 3-4 hours of usage/day. Plans are underway to develop 'train the trainer' materials and processes as a future step. To date, the department has 14 therapy staff trained with 7 more wait-listed as expressing interest in receiving the training in the future.



## Zero G Training

Several training sessions on the Zero G have been held over the last two months for both Physical Therapy and Recreation Therapy staff members. The Glenrose currently has three trainers in Physical Therapy and a total of 21 staff members have either completed the training, are awaiting final testing, are in training or will start training shortly.



## Glenrose Patient's Journey Profiled in Apple Magazine

Apple Magazine's Winter 2019 - Issue 32 features an article on page 44 about a Glenrose patient with a spinal cord injury who's journey with Physical Therapy has been improved using the Exoskeleton (EKS0) - a wearable walking device. Thank you to Karen Benterud and Mel Durocher for highlighting how this exciting technology changes lives. [Read full article here.](#)

## Announcement of Zone Clinical Department Head - Child Health

After an extensive search and selection process, Dr. David Zygun, Edmonton Zone Medical Director announced on May 30th that Dr. Lonnie Zwaigenbaum has accepted the position of Zone Clinical Department Head - Child Health with AHS, effective June 1, 2019. Dr. Zwaigenbaum is currently the Division Director of Developmental Pediatrics and Co-Facility Chief for Child Health at the Glenrose Rehabilitation Hospital. He received his medical training at the University of Toronto,

his residency training at Queens University and holds a MSc in Health Research Methodology from McMaster University. He is a Professor in the Department of Pediatrics at the University of Alberta, a Fellow of the Canadian Academy of Health Sciences and is a Clinician supported by the Stollery Children's Hospital Chair in Autism, who has received the Distinguished Scientist Award of the Stollery Science Lab and national awards from CIHR, Brain Canada, Kids Brain Health Network and Autism Speaks Canada. Dr. Zwaigenbaum has previously served as Associate Division Head (Research) in the Division of Development Pediatrics at the University of Alberta and chairs or has chaired several national committees on Autism Spectrum Disorder and Child Health.

*Reprinted in part from the Announcement email from Dr. David Zygun, Edmonton Zone Medical Director*

### **Video: Innovation & Technology at the GRH**

The Glenrose Rehabilitation Research Innovation & Technology (GRRIT) Hub facilitates as well as develops innovative technologies for use by patients, physicians and caregivers of the Glenrose. These technologies are used to improve function and the quality of life for our clients and their families. Recently shared across various social media platforms, the [Innovation and Technology at the Glenrose Rehabilitation Hospital video](#) showcases a number of these innovative technologies.

### **Career Leadership Award**

Congratulations to Dr. Gary Faulkner, Director, Rehabilitation Research, Innovation & Technology Development, Glenrose Rehabilitation Hospital.

Professor Emeritus, Dr. Gary Faulkner, received the Faculty of Engineering Career Leadership Award for "exceptional career and leadership contributions within the Faculty of Engineering."



'Dr. Faulkner joined the Department of Mechanical Engineering, University of Alberta in 1969 and was an integral member of the Department until his retirement in 2003. He served as Department Chair from 1984 to 1990, taking the department through some tough financial times while steering it through a major overhaul of its undergraduate curriculum. During his tenure in this

department, Dr. Faulkner taught at all levels, and across the curriculum, receiving the department's undergraduate teaching award five times and supervising over twenty-five graduate students.

*"Leadership is all about finding ways to have the members of your team succeed," says Dr. Faulkner. "Leaders need to develop a vision but success will depend on the imagination and ingenuity of the whole team."*

Dr. Faulkner has dedicated himself to service as a professional engineer. He is currently a Director of Engineers Canada, a Fellow of Engineers Canada, a Fellow of the Canadian Society of Mechanical Engineers and an honorary Fellow of Geoscientists Canada. In 2012 he was awarded the Queen's Diamond Jubilee medal, to recognize significant contributions by Canadians that benefit the country and its citizens.'

### **Dr. Peter McCracken Legacy Scholarship**

Congratulations to Anh Pham, the winner of the 2019 Dr. Peter N McCracken Legacy Scholarship. The award was presented to Anh in the Dr. Bill Black Auditorium on May 28th at the 5th Annual Dr. Peter McCracken Memorial Lecture in Geriatric Medicine.

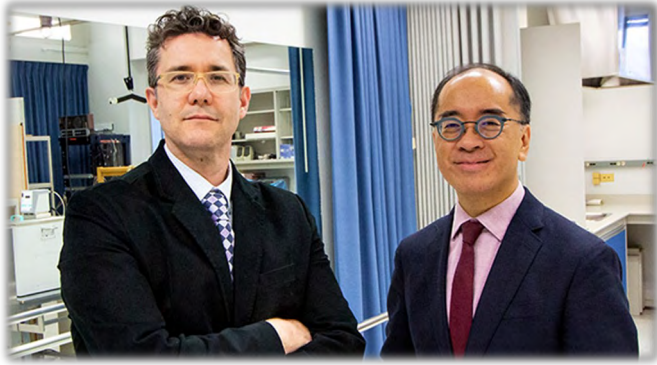
Anh Pham is a PhD Candidate in the School of Public Health at the University of Alberta. She holds a Master of Science in Public Health (Oxford Brookes University) and an MD in Eastern Medicine (University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam).

Anh is interested in supporting community-dwelling older adults by improving quality of primary care. Her doctoral research focuses on using data from primary care electronic medical records to predict dementia development. It is in order to provide appropriate care for people with high risk to avoid or delay dementia onset and to promote healthy aging.

### **Glenrose Physicians Receive Canadian Institutes of Health Research (CIHR) Funding**

Congratulations to Dr. Chester Ho and Dr. Adalberto Loyola Sanchez who have been awarded a Transitions in Care grant by CIHR, for their proposal "Connecting and Coordinating an Enhanced Network for Transitions in Care (CONCENTRIC): A New Model for Spinal Cord Injury





Care in Alberta. This is a provincial collaboration between the University of Alberta, University of Calgary, Alberta Health Services and community partners such as Spinal Cord Injury Alberta. Many staff at the Glenrose are also part of the team. ‘The CONCENTRIC project will explore a model of transitional care that works like a “hub and spoke system.” Edmonton and Calgary will act as the primary “hubs,” providing spinal cord injury specialty services and information to patients on managing their conditions. Health-care providers in communities outside of Edmonton and Calgary will be the “spokes,” providing ongoing care and support for patients in the community.

Currently, Lethbridge and Slave Lake are participating in the pilot project, but the hope is to ultimately expand the number of spokes to cover the entire province. The goal is to build capacity in spoke communities and constant communication between the hubs and spokes so that patients with spinal cord injuries have a more consistent level of care, and fewer complications later in life.’

Apart from the CIHR funding this project is also receiving generously donated funds from the Friends of Glenrose, Alberta Paraplegic Foundation, University of Alberta and University of Calgary.

*Reprinted in part from “UAlberta researchers ready to roll on new model of spinal cord injury care” article by Ryan O’Byrne <https://www.ualberta.ca/medicine/news/2019/july/ualberta-researchers-ready-to-roll-on-newmodel-for-spinal-cord-injury-care>*

### **Makers Making Changes Lunch & Learn**

The GRH Rehabilitation Research, Innovation & Technology Development department hosted a Lunch & Learn featuring Zibusiso Mafaiti, Regional Coordinator of Makers Making Change with the Neil Squire Society. The Neil Squire Society is a Canadian national not-for-profit organization that has been helping patients with disabilities and caregivers throughout Canada gain access to employment, digital literacy, innovation and

assistive technology for over 35 years. Over 85 Glenrose Staff and physicians attended this session to learn what the [Neil Squire Society / Makers Making Change](#) can do to help those with disabilities remove barriers to increase independence. Makers Making Change’s goal is to connect volunteers to people with disabilities who need assistive technology or devices at low or reasonable cost.

### **Glenrose Observership Program Hosted Two Hong Kong Therapists**

In July, the Glenrose Rehabilitation Hospital was



privileged to welcome two therapists from the [Hong Kong Sanatorium and Hospital \(HKSH\)](#) (for a three week observation of our Spinal Cord Injury

program. HKSH is one of 12 private hospitals in Hong Kong. It was originally established in 1922 as a 28 bed maternity hospital. Today HKSH is a 500 bed facility with more than 30 specialty centres. The hospital established a spinal cord injury (SCI) program 5 years ago. Chow Hoi Kwan (Kenny) is one of 30 Physical Therapists and Leung Wai Pong (James) is the only Occupational Therapist from the Department of Physical Medicine and Rehabilitation (est 2013). The department also has Speech Therapy and podiatry services. Kenny and James spent time with various members of our team observing practices, exploring technology and meeting with a range of Glenrose specialty programs including GAIT Laboratory, I CAN Centre for Assistive Technology, CAREN and members of Glenrose Research, Innovation and Technology Development team to understand how our therapist and clinicians work together to support innovation. Kenny had an opportunity to visit with the Royal Alexandra Hospital Neuro unit and talk to them about acute SCI care and referral/transition to GRH.

Kenny and James presented to the team on their last day (Thursday July 25, 2019) on the HKSH SCI program as well as an overview of the city and private and public healthcare system in Hong Kong. Both expressed their gratitude for the opportunity and appreciation for how welcoming, open and supportive our Glenrose patients were.

### **Mayor Don Iveson Tours The Glenrose**

On August 30th, Dr. Gary Faulkner, Director, Rehabilitation Research, Innovation, and Technology Development, and the Glenrose Rehabilitation Research, Innovation and Technology (GRRIT) team hosted a tour of the Glenrose for Edmonton Mayor Don Iveson. The tour focused on innovations that strive to meet the Glenrose vision of “*Building Abilities for Life*”. Mayor Iveson saw how the Glenrose team is collaborating with academic and industrial partners to improve the quality of life for people living with disabilities. Glenrose staff and representatives from Senior Leadership, the Friends of the Glenrose, the Glenrose Foundation and industry partners demonstrated technologies such as the Glenrose Grocery Game, FEPS (Flexion, Extension, Pronation and Supination) device and the significant role of students. Tour stops included CAREN system in the Courage in Motion Centre, Prosthetics, Orthotics and Seating and the Dr. Bill Black Auditorium which won the 2019 Mayor’s Award in the Accessible Home and Buildings category.



available to them,” says Dr. Gary Faulkner, Director of Research, Innovation and Technology at the GRH. “The only way we can do that is by providing resources to assist these companies in moving their products to the market and our patients. If they are successful, our patients will benefit.”

Reprinted in part from AHS Insite Article “Glenrose Innovators Get a Federal Boost” by Vanessa Gomes: <https://insite.albertahealthservices.ca/Page23718.aspx>

### Glenrose Innovators Get A Federal Boost

‘The Glenrose Foundation announced on August 29th that it will be receiving an investment of more than \$1.8 million from the Government of Canada to expand the Glenrose Rehabilitation Research Innovation and Technology (GRRIT) Hub.

This funding provided through Western Economic Diversification, will support the development of new health care technologies and products in Western Canada, bring them to market more quickly and create high-quality job and training opportunities.

In addition, the GRRIT Hub will be expanding its services to Calgary in collaboration with the Foothills Medical Centre, Tom Baker Cancer Centre and the Ward of the 21st Century initiative.

Established in 2015 with the aim of advancing health innovation in Western Canada, the GRRIT Hub fosters interactions between Alberta Health Services clinicians and physicians, patient and families, small and medium-sized businesses, post-secondary institutions, donors and funding groups. Through these partnerships, new technologies are developed, trialed to assess their effectiveness and integrated into clinical practice to help patients with their rehabilitation. “In order for us to help our patients, we need to have these innovative products

### Glenrose Grocery Grab - Download the App Today!

The Occupational Therapists at the Glenrose have been instrumental in developing a cognitive video game for older adults focusing on the skills of memory, attention and problem solving. This has been a long process from idea to creation; however, we now have a polished game that provides an informal assessment of cognitive skills and a fun and engaging treatment tool. Available for play on the large touch screen in the Building Trades of Alberta Courage Centre and our adjustable touch tables, it can now also be downloaded free of charge from the APP store for Android or Apple tablets. Please play and share! Players of all skills and age levels have found it to be fun, interesting and challenging.



We are in the process of completing a research project with the game and older adult population at the Glenrose. Preliminary results are suggesting some support for cognitive skill development. This game was also presented at Games for Health Europe to review the

preliminary research, to develop international partnerships and knowledge sharing and most importantly to highlight the importance of front-line staff being involved with game development for rehabilitation purposes.

### Protix Tours the Glenrose

On Friday, October 25th, Patty Wickson, Executive Director Innovation, Evidence, Evaluation & Impact at AHS introduced Dr. John Ralston and his company Protix to the Glenrose. Dr. Ralston, through his company, has developed a sensor/software system mounted on an individual's mastoid to record variations in posture that occur after specific activities or traumatic events. He presented an overview of the technology with potential clinical applications to Dr. Chester Ho and senior administration. This was followed by a tour of the Glenrose and a discussion of potential collaborative research and innovation projects.

### An Immersive Virtual Reality Experience To Take The Pain Away

Rehabilitation procedures for burn injuries often come with extreme pain. With the rise of Virtual Reality (VR) technologies, leading rehabilitation centres across North America and Europe are using VR to reduce the amount of pain experienced by the patients during their treatment sessions. To an Albertan recovering from severe burn wounds inflicted by an exploding propane tank, no place was more soothing than a polar landscape or a tropical rainforest. *"It keeps your mind off the therapy and distracts your thoughts causing you to feel less pain during the therapy"* says Ralph, one of our burn patients on unit 4A.

Improving the quality of our patients' experience has always been a priority for us here at the Glenrose. Our



research, innovation and technology group has worked with our burn treatment group to make use of VR technology to improve the quality of burn treatment sessions. We are hoping to see this technology used more frequently as a distraction means during painful clinical procedure such as burn rehabilitation and injections.

### Building a Sustainable Research Platform at the Glenrose

The Glenrose is a nationally recognized center for physical rehabilitation; however, for the GRH to become an internationally recognized centre of care, innovation and rehabilitation research, a leader in tertiary and quaternary rehabilitation, we require active engagement in clinical research and innovation. For this to occur, it is proposed that a sustainable research platform be created to allow the Glenrose to attract and retain the highest caliber clinical staff and physicians to work in and with our facility.

The vision for this platform is to provide internationally recognized clinical leadership through outcomes-based research in rehabilitation. The platform would assist researchers actively engaged in developing new treatments, devices and products as well as those gathering evidence that guides changes to positively impact clinical practice and improve health outcomes for GRH clients.

GRH Research & Innovation has held an inaugural meeting with various levels of GRH staff and management including physician researchers. Currently interviews are being held with GRH medical researchers as well as various GRH leaders to gather feedback. The plan is to create a draft proposal including topics such as focus, vision, infrastructure, resourcing etc) by the end of November. Further consultation will take place with key stakeholders, including leadership, managers, physicians, staff, patient/family advisors, University of Alberta research affiliates, funders and vendors, etc) regarding their thoughts on the proposal.

### Greater Edmonton Health Advisory Council Tours the Glenrose with a Focus on Technology & Innovation

The Greater Edmonton Health Advisory Council (HAC) toured the Glenrose Rehabilitation Hospital on Tuesday, November 12th. The tour was led by Dr. Gary Faulkner, Director of Rehabilitation Research, Innovation &



Technology Development and Quentin Ranson, Acting Manager Occupational Therapy & Psychology Services.



The focus of this tour was on technology and innovative approaches to rehabilitation, including the Dynamic Shoulder Brace Technology. The group visited the I CAN Centre for Assistive Learning, the Courage In Motion (CIM) Centre with the CAREN System, Prosthetic Orthotics and Seating, and the Building Trades of Alberta Courage Centre (BTACC). The Greater Edmonton Health Advisory Council is comprised of community volunteer members who connect with people in their communities to gather feedback about local health service delivery and bring that feedback forward to Alberta Health Services. In turn, AHS shares operational information with the Council so members can bring that information back to the community as needed. Council members come with a unique background and perspective and are keen to expand awareness of the HAC in the communities they serve and learn more about the health facilities and programs available in those communities. One of the ways the Council achieves this goal is by meeting five to six times per year at various locations in the Greater Edmonton Zone and tour the facilities available to residents.

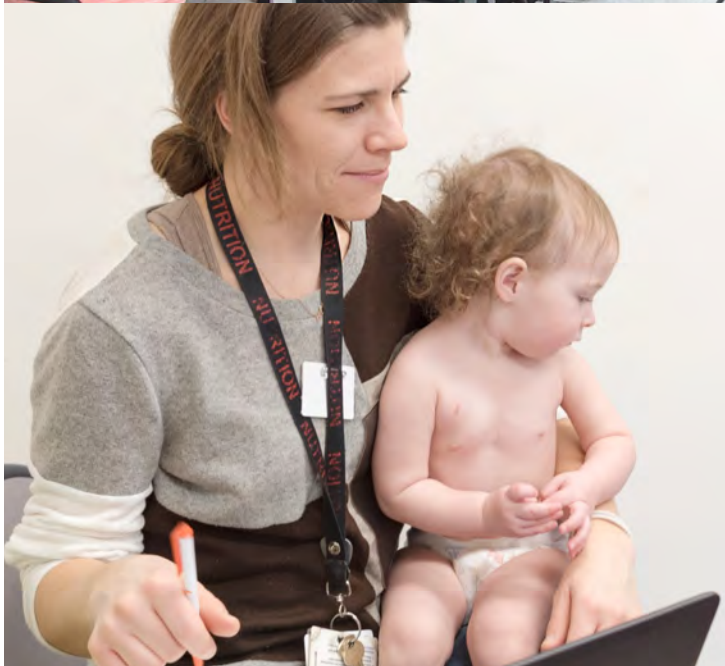
## Device Designed & Developed by Glenrose Engineering Team Now in Use

The wheelchair trainer device originally designed and developed by the Glenrose Rehabilitation Research, Innovation & Technology (GRRIT) engineering team is currently being utilized at the Syncrude Centre for Motion and Balance. This device was developed to provide an adjustable and stationary wheeling environment for wheelchair users in which you can control the resistance on the wheels and analyze the shoulder mechanics. The device is designed to be portable to provide access for different units based on their needs. For a wheelchair user wheeling consumes a major portion of their daily life and incorrect wheeling mechanics can result in secondary health complications such as muscle fatigue over the course of many years. Preventing such complications and improving the quality of patients' lives was the drive behind this development.



## Focusing on Patient Abilities

As a tertiary and quaternary level rehabilitation facility, the Glenrose Rehabilitation Hospital offers specialized rehabilitation and therapeutic services from highly skilled professionals across a range of disciplines. Our complex rehabilitation interventions are supported by academic teaching, innovative technology and ground-breaking research. Our main focus is on restoring function and improving the well-being and independence of all of our patients.



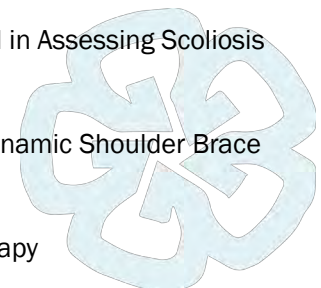


## 2019 Research Students



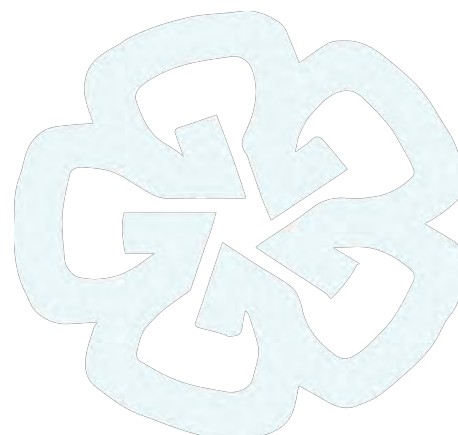
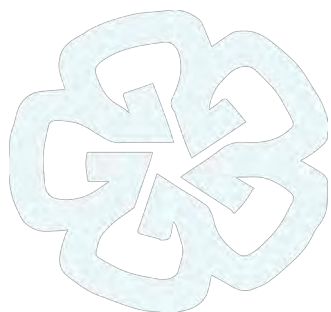
The Glenrose Research, Innovation and Technology Development department continues to offer students who have exceptional academic records an opportunity to participate in research. Students are accepted from high school (Careers, WISEST or HYRS Programs between grades 11 and 12) to Undergraduate, Masters, PhD programs and Post-Doctoral candidates. The majority of students have technical backgrounds in engineering, while others are in pre-medicine or kinesiology practicum placements. Many of our students are enrolled at the University of Alberta, however, students from other Canadian universities and international programs such as the International Association for the Exchange of Students for Technical Experience (IASTE) and the University of Alberta Research Experience (UARE) Program are accepted. Experience gained at the Glenrose helps form career plans for students. Several students have gone on to become entrepreneurs, have enrolled in medicine or rehabilitation medicine programs, pursued graduate studies, academic careers or have gained employment in traditional engineering roles.

- ◆ Aiden Kooyman, Mechanical/Biomedical Engineering, University of Alberta  
Karma; Design, Manufacture and Prototype of Medical Devices and Accessories
- ◆ Allan Huang, Mechanical Engineering, University of Alberta  
Bowhead; Design, Build and Testing Refinements for an Innovative Off-Road Electric Motorized Trike
- ◆ Andrew Archibald, Mechanical/Biomedical Engineering, University of Alberta  
Glenrose Rehabilitation Hospital; Designing Technology for Rehabilitation Therapy
- ◆ Brendan Coutts, Computer Engineering, University of Alberta  
University of Alberta, Dr. Edmond Lou; Dynamic Pressure Cushion for Patients with Spinal Cord Injuries
- ◆ Carmen Leung, Mechanical/Biomedical Engineering, University of Alberta  
University of Alberta, Edmond Lou; Adapting Ultrasound Techniques to be used in Assessing Scoliosis
- ◆ Dave Dhruvi, Mechanical Engineering, University of Alberta  
University of Alberta, Ming Chan; Design and Develop Refinements to Novel Dynamic Shoulder Brace
- ◆ Elizabeth Chao, Mechanical Engineering, University of Alberta  
Glenrose Rehabilitation Hospital; Designing Technology for Rehabilitation Therapy



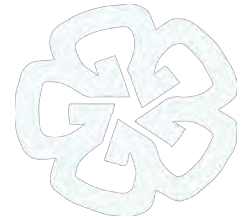


- ◆ Gabriel Risbud-Vincent, Mechanical/Biomedical Engineering, University of Alberta  
Glenrose Rehabilitation Hospital; Designing Technology for Rehabilitation Therapy
- ◆ Harshil Pisavadia, Mechanical Engineering, University of Alberta  
University of Alberta, Lindsey Westover; Hardware and Software Upgrade of the Advanced System for Implant Stability Testing
- ◆ Lisa Long, Mechanical Engineering, University of Alberta  
Bowhead; Design, Build and Testing Refinements for an Innovative Off-Road Electric Motorized Trike
- ◆ Matthew Brydges, Mechanical Engineering, University of Alberta  
Karma; Design, Manufacture and Prototype of Medical Devices and Accessories
- ◆ Tatiana Place, Mechanical/Biomedical Engineering, University of Alberta  
Bowhead; Design, Build and Testing Refinements for an Innovative Off-Road Electric Motorized Trike
- ◆ Tod Vandenberg, Mechanical/Biomedical Engineering  
Karma; Design, Manufacture and Prototype of Medical Devices and Accessories
- ◆ Yomna Mohamed, Engineering Physics (Nanoengineering)  
Glenrose Rehabilitation Hospital; Designing Technology for Rehabilitation Therapy
- ◆ Yousef Algoahy, Civil Engineering, University of Alberta  
University of Alberta, Dr. Lindsey Westover; Hardware and Software Upgrade of the Advanced System for Implant Stability Testing



# 2019 Clinical Research Grant Recipients

The Glenrose Foundation raises funds that fuel innovative research and education, as well as acquire advanced equipment and technology. The Foundation works with the hospital to determine what would have the greatest impact on patients and their recovery, both physically and emotionally, and then finds ways to make it happen. This year the GRH Foundation sponsored five remarkable studies, as follows:

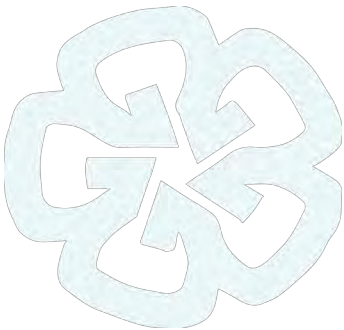


**Principal Investigator:** **Glyn Murgatroyd,**  
Occupational Therapist, GRH

**Co-Applicants:** Dr. Ming Chang, Professor, Faculty of Medicine & Dentistry, Department of Medicine, University of Alberta;  
GRH Research Affiliate

**Study Title:** A Control Trial to Evaluate Performance of the Glenrose Dynamic Shoulder Brace in Patients with Axillary Nerve Injuries

**Overview:** This study will evaluate the functional impact of the dynamic shoulder brace to aid in refining the design and validating the orthosis through a comprehensive range of functional outcome measures, which will lead to eventual commercialization.



**Principal Investigator:** **Dr. Lonnie Zwaigenbaum,**  
Faculty of Medicine & Dentistry,  
Department of Pediatrics, University of Alberta;  
Director, Autism Research Centre, Glenrose Rehabilitation Hospital

**Co-Applicants:** Catherine Hill, SOO, GRH; Krista Brower, Edmonton Oliver PCN

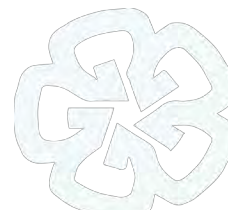
**Study Title:** Evaluation of the Adult Autism Video Learning Module

**Overview:** This study will evaluate the short-term impact of the Adult Autism Video Learning Modules for increasing the ability for primary care physicians to provide healthcare to adults with autism and their families, and those transitioning from child to adult services.

## 2019 Clinical Research Grant Recipients – continued



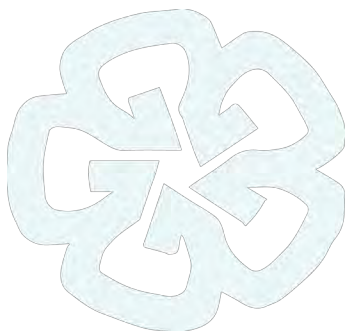
**Principal Investigator:** Ana Holowaychuk,  
Occupational Therapist, Driver Evaluation & Training Service,  
Glenrose Rehabilitation Hospital



**Co-Applicant:** Dr. Ada Leung, Associate Professor, Faculty of Rehabilitation Medicine, Department of Occupational Therapy, University of Alberta; GRH Research Affiliate

**Study Title:** Evaluation of Fitness to Drive: A Comparison Study of Performance on Cognitive/Perceptual Assessment Tools and On-Road Evaluation

**Overview:** As return to driving following medical change is a growing area of focus in Canadian healthcare, this study will evaluate and determine if the current set of assessment tools to assess reasoning and awareness is of benefit in the Glenrose Driver Training & Evaluation Service, Camrose and Tofield Driver Assessment Programs.



**Principal Investigator:** Dr. Lesley Pritchard-Wiart,  
Assistant Professor, Faculty of Rehabilitation Medicine,  
Department of Physical Therapy, University of Alberta;  
GRH Research Affiliate

**Study Title:** Evaluation of the Immediate Effects of Ankle Foot Orthoses on Gross Motor Function, Physical Activity & Participation of Young Children with Cerebral Palsy: A Mixed Methods Study

**Overview:** This study will examine the effects of ankle-foot orthoses (AFOs) on physical activity levels and participation of young children with cerebral palsy in their homes, schools and communities. Valuable information can then be shared with Glenrose clinicians about the benefits and challenges of early AFO use.



## 2019 Clinical Research Grant Recipients – continued

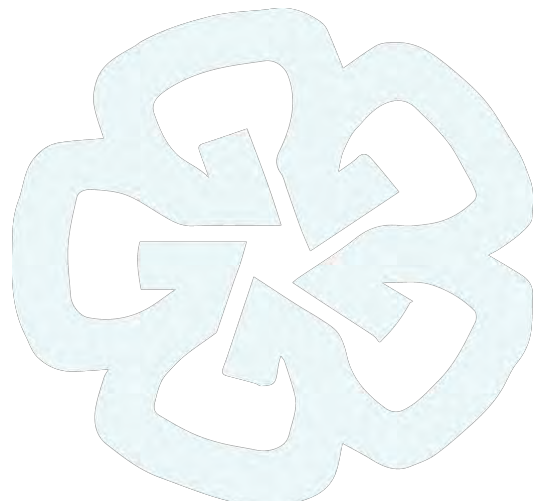
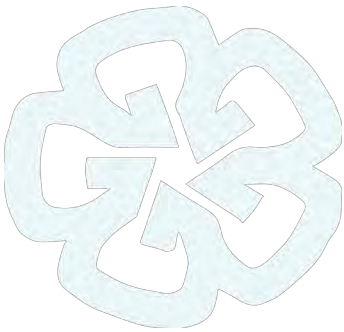


**Principal Investigator:** [Dr. Kim Adams](#),  
Associate Professor, Faculty of Rehabilitation Medicine, University of Alberta;  
GRH Research Affiliate

**Co-Applicants:** Corinne Tuck, Occupational Therapist, GRH; Dr. John Andersen, Site Lead, Pediatrics, GRH

**Study Title:** Access to Play for Children with Complex Physical Needs Through a Brain Computer Interface (BCI)

**Overview:** The study will look at building partnerships with patients (adults and children), families/caregivers, GRH clinicians, engineers and research partners to develop and implement BCI systems for patients with severe motor and communication impairments.



# 2019 Quick Facts

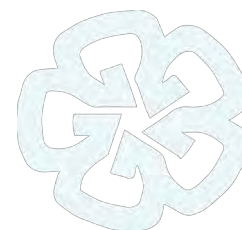


## RESEARCH FOCUS

- Understanding Child Developmental Health
- Improving Function for People with Chronic Conditions
- Advancing Function Through Assistive Technology
- Anticipating the Needs of an Aging Population

## RESEARCHERS

- **67** Researchers
- **92** Research Affiliates
- **15** Research Students

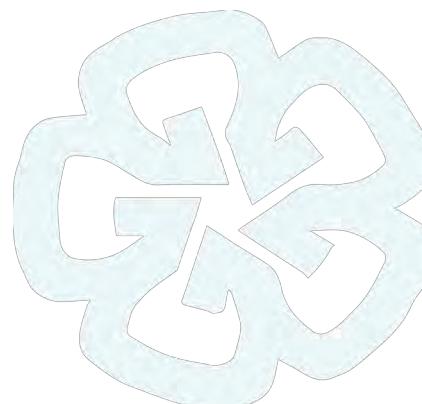


## RESEARCH STUDIES & GRANTS

- **118** Ongoing Research Studies
- **50** New Research Studies Opened in 2019
- **5** Clinical Research Grant Recipients Awarded
- **\$50K** Clinical Research Grant Funding Disbursed

## RESEARCH OUTCOMES

- **14** Small-Medium Enterprise (SME) Partnerships
- **6** Prototypes Reached Clinical Evaluations



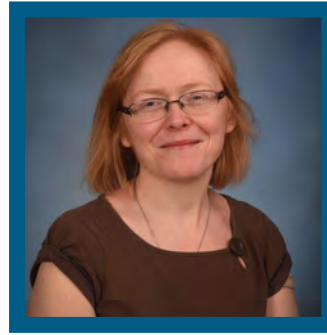
## Research Affiliates Appointed in 2019



**Anthony Singhal, PhD**  
Associate Professor, Faculty of Science—Psychology Science, University of Alberta



**Carmen Rasmussen, PhD**  
Associate Professor, Faculty of Medicine & Dentistry, Department of Pediatrics, University of Alberta



**Frances Carr, PhD**  
Assistant Clinical Professor, Faculty of Medicine & Dentistry, Division of Geriatric Medicine, University of Alberta



**Gabriela Constantinescu, PhD**  
Chief Product Officer, True Angle Medical Technologies, Faculty of Rehabilitation Medicine, University of Alberta



**Heather MacLeod**  
Team Leader/Senior Geriatric Assessor, Bruyere Continuing Care, Ottawa, Ontario



**Jacqueline Hebert, MD, FRCPC**  
Professor, Faculty of Medicine & Dentistry, Division of Physical Medicine & Rehabilitation, University of Alberta



**Krista Brower**  
Director, Evaluation & Quality Improvement  
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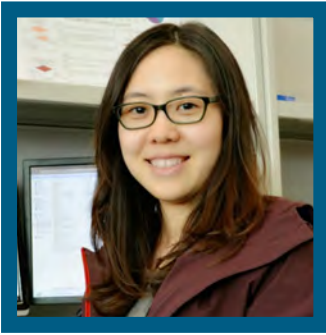
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## Research Affiliates Appointed in 2019 (continued)



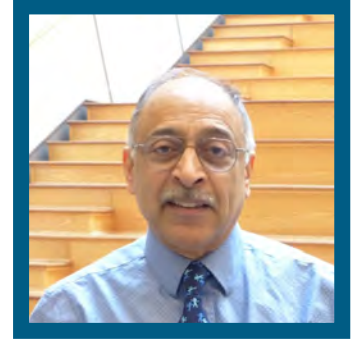
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