ACTION AT GRH



Office of Research and Innovation Grand River Hospital

BRINGING TOGETHER INNOVATION AND EXCEPTIONAL CARE

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Miniature dialyzer created by QIDNI Labs

FALL/WINTER 2020



The Office of Research and Innovation (ORI) at Grand River Hospital brings clinicians and research and industry partners together to explore new ways of improving patient care.

We coordinate all research and innovation activities at Grand River Hospital, one of the largest and busiest community hospital's in Ontario, with nearly 600 beds, approximately 3500 staff, and 600 physicians, dentists, midwives and nurse practitioners. ORI supports and participates in multidisciplinary clinician-based applied research in each of GRH's 15 clinical programs and service areas. Through partnerships with institutions across the Waterloo-Wellington region, such as the University of Waterloo and McMaster University Michael G. DeGroote School of Medicine, ORI provides researchers and clinicians with the opportunity to work together on groundbreaking studies that advance exceptional care at GRH.



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ORI-GRH



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MEET THE STAFF



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Research for better mental health care for families in our community

With the rate of hospitalization among youth experiencing mental illness increasing, Grand River Hospital (GRH) has entered a partnership with the University of Waterloo to better understand the impact that mental health treatment has on the long-term quality of life for patients and their

for patients and their families.

"Recent data shows that the number of Canadian youth who access mental health care in emergency departments is growing, while hospitalizations have increased by 37% in the Recent data shows that the number of Canadian youth who access mental health care in emergency departments is growing, while hospitalizations have increased by 37% in the last ten years

last ten years," says principal investigator Dr. Mark Ferro, Assistant Professor at the University of Waterloo and Canada Research Chair in Youth Mental Health. "However, we don't know very much about the factors that contribute to return visits to the hospital, or the quality of life of these youth after they leave the hospital."

To address this gap, Dr. Ferro and his research

team from Waterloo and McMaster universities have partnered with Dr. John Vanderkooy, a Child and Adolescent Psychiatrist at GRH. Grand River Hospital provides mental health care to youth under the age of 17 through outpatient services and in a 13-bed

inpatient unit.

Through his work, Dr. Vanderkooy and the inpatient clinic staff work to identify youth who



"Working with Grand River Hospital is extremely valuable. With their participation in this study we are able to work with a large number of participants which makes our findings more applicable, and helpful to youth and their families."

> Dr. Mark Ferro, Assistant Professor, University of Waterloo Canada Research Chair in Youth Mental Health

are interested and able to participate in the study. Participants and their parents are interviewed at their first inpatient stay at Grand River or McMaster Children's hospitals. Participants then continue to provide information to the research team for a year following their care through follow-up interviews with research staff and through the use of a smartphone app.

Designed by one of Dr. Ferro's co-investigators, the app enables participants to share their thoughts and feelings with the research team.

The app provides youth, and their parents, opportunities to share their experiences, and their level of satisfaction with the care services they are receiving

"The app provides youth

and their parents, opportunities to share their experiences, and their level of satisfaction with the care services they are receiving," says Dr. Ferro. "With this approach we are able to collect real-time data that otherwise would not be possible."

The study also investigates readmissions to hospital within the context of the data and information collected. By comparing this information to the feedback participants submit through the app, researchers hope to identify trends that may indicate why and when youth need to come back to the hospital for care.

Dr. Mark Ferro, University of Waterloo (standing) meets with Dr. John Vanderkooy, Child and Adolescent Psychiatrist at Grand River Hospital. Although provincial records show demographic trends for hospital visits, this study incorporates the use of direct patient/family feedback and experiences that will help better illustrate the relationships between readmissions, quality of life, and overall well-being.

"We hope that this study will help us to enable

improved care, better understand those patients for whom readmission may be beneficial, and ensure best the possible outcomes for youth" says Dr. Ferro. "Working with Grand River

Hospital is extremely valuable. With their participation in this study we are able to work with a large number of participants which makes our findings more applicable, and helpful to youth and their families."



RENAL DIALYSIS UNIT

Examining the economic impact of advanced kidney disease

Grand River Hospital (GRH) and the Wilfrid Laurier University Lazaridis MBA Program have collaborated to prepare a study examining the financial impact of management of End Stage Renal Disease (ESRD) on the individual patients, caregivers and the hospital.

By working in partnership with Lazaridis MBA student consulting group, the hospital is able to gain access to diverse talents, enthusiasm, and with cutting-edge skills. In exchange for their hard work, Lazaridis MBA students benefit by gaining real-world experience that they can bring into the workforce.

"Our partnership with the Grand River Hospital not only allows our students to apply their training to real problems, but to do so through projects that will make a difference in the lives of people in our community and beyond," said Shawn Komar, assistant professor of organizational behaviour and human resources in the Lazaridis School at Laurier and coordinator of this project. "We're proud of our students and their ability to tackle the complex and meaningful issues that characterize the business of healthcare."

From 2008 to 2017, there was a 46% increase of new ESRD patients under the age of 65. The cost for care to the health care system for the more than 2.2 million people with ESRD (0.06% of Canada's population) is estimated to be \$2.5 billion. What is not included in this cost estimate is the cost to patients and their families.

Hospitals are impacted by ESRD through medical supplies, employee salaries and other costs and these are relatively easily quantified. The financial impact on patients can be much more difficult to analyze. Out-of-pocket costs can include medications, emergency services, transportation, physiotherapy, food supplements, lost income and other expenses. Currently, little is known about the financial burden that ESRD patients experience as a result of the disease.

Different types of ESRD treatment options, ranging from early detection to transplants, will have longterm financial impacts on the patients, and continuously influence hospital expenditures and government subsidies. For example:

- Patients that opt for home-hemodialysis or peritoneal dialysis can ease their financial burden with lower transportation costs, more efficient treatment times, and greater scheduling flexibility.
- It is estimated that roughly 20% of kidney transplant recipients are able to return to work, reducing disability insurance payments and the financial strain on the patient, while also improving the quality of life for the patient.
- Early detection of Chronic Kidney Disease (CKD) among high-risk patients can also have a significant impact in reducing the number of cases that progress to ESRD, reducing the burden of costly and invasive treatments for patients.

Following the completion of a review of the literature the MBA consulting group designed an intake survey on the cost impacts to patients and their families. A subsequent study will see the collection of primary data through the distribution of the 80-question survey to patients and caregivers within the GRH regional renal program located at GRH's KW campus, satellite locations and those who are either on home hemo-dialysis or peritoneal dialysis.

The survey will collect patient data relating to age, sex, marital status, distance from treatment locations, employment status, debt financing, insurance coverage, transplant eligibility and other factors. The outcome of this study will provide, for the first time, a quantification of the comprehensive cost of care for CKD and ESRD patients at GRH.



Spotlight on renal res

Local innovator works with Grand River Hospital to trial a grour

As a student in system design engineering at the University of Waterloo, Dr. Morteza Ahmadi knew very little about kidneys and renal disease. His focus was on working with silicon nanofilters, much the same as those used for computer components. It was only after starting his Masters in Biomedicine and having the opportunity to further observe how silicon nanofilters work, that he learned they operate similarly to the filtration system used during renal dialysis treatment.

Greatly interested in learning more about this treatment modality for patients with renal disease, Morteza could not believe the impact that dialysis treatment has on patients. The life of patients requiring renal dialysis involves travelling to their nearest dialysis unit multiple times per week for multiple hours on each visit, to be connected to a dialysis machine for treatment. The impact on patients' time, finances, and guality of life is significant. While some patients qualify to undergo renal dialysis at home, operating these machines requires significant resources both material and human with the direct involvement of nurses and renal technicians. The maintenance and upkeep of the dialysis equipment is expensive. In North America, a year of conventional dialysis may cost the healthcare system upwards of \$80,000 for each patient. Patients also endure more hardships due to complications and lifestyle restrictions.

Knowing the fundamental technology of renal dialysis has remained relatively unchanged since its invention in the 1940s, Morteza used his knowledge of silicon nanofilters to start thinking about the possibility of creating a miniature dialyzer (the part of the dialysis machine where the blood is filtered) that would allow patients to receive dialysis while continuing to be mobile. He credits his deep understanding of renal disease from having had the privilege to attend a Nephrology fellowship with the KRESCENT (Kidney Research Scientist Core Education and National Training Program) Foundation; the only engineer to be trained alongside some of the country's top nephrologists and kidney scientists. KRESCENT is a multi-partner collaboration, founded by the Kidney Foundation of Canada, the Canadian Society of Nephrology, and the Canadian Institutes of Health Research.

This is how QIDNI Labs was born. Based here in Kitchener-Waterloo, currently working out of the Velocity hub of the University of Waterloo, is



"The people at Grand River Hospital are amazing. Not only have they been very supportive, but they bring a tremendous amount of expertise."

Dr. Morteza Ahmadi, QIDNI Labs

earch and innovation

dbreaking discovery for patients undergoing dialysis treatment

where this groundbreaking innovative technology is being developed.

Using silicon nanofilters, Morteza and his research team have developed a portable device that offers blood filtration that is on par with traditional polymer dialyzers. These filters have been developed to offer a specific pore size which allows albumen to be blocked from the bloodstream,

while allowing other essential proteins to pass through. These thin membranes also require less surface area than a regular blood dialyzer, which allows for a significantly smaller form factor. Because silicon nanotechnology is a mature field, the industry is

This has the potential to create a massive change in the way we deliver renal care. This discovery will be of great benefit to renal patients in our community and beyond

more comfortable with the use of this material in the miniaturization of medical devices such as blood dialyzers. "Studies have shown that longer dialyzer treatment times can potentially be associated with prolonged survival. This renal replacement therapy device could reduce many of the costs associated with traditional dialysis equipment and services, creating an opportunity for patients to have access to dialysis at any time," said Morteza.

QIDNI's commitment to keeping this technology work local will continue with a partnership with Grand River Hospital's Regional Renal Program and Office of Research and Innovation. His excitement about working with Grand River Hospital is evident. "The people at Grand River Hospital are amazing. Not only have they been very supportive, but they bring a tremendous amount of expertise."

Grand River Hospital Regional Renal Program is one of 26 regional renal programs in Ontario and is the single provider of acute and chronic kidney disease services within Waterloo Wellington. The GRH regional renal program provides the full continuum

> of renal services including acute hemodialysis, independent dialysis (home hemodialysis and peritoneal dialysis), pre-transplant preparation and ongoing chronic kidney disease (CKD) services within Waterloo Wellington. During the past

15 years, the demand for renal dialysis has grown from serving 300 patients to more than 500 patients per year.

GRH Regional Renal Program and QIDNI Labs will embark on a series of clinical research studies that will rigorously examine the technology created by QIDNI for safety and efficacy. Kim Hendrick, Director of the Regional Renal Program is enthusiastic about this initiative. "It is a fantastic opportunity for Grand River Hospital to participate in the development of such innovative technology. This has the potential to create a massive change in the way we deliver renal care. This discovery will be of great benefit to future renal patients in our community and beyond."

Personalized Medicine

MyTEMP Clinical Trial

Grand River Hospital's (GRH) renal program is a regional centre with chronic kidney disease (CKD) services for those living in Waterloo Region and Wellington County. People with failed kidneys need an artificial kidney machine (called dialysis) to remove toxins and extra fluid from their blood. The renal clinic at GRH supports the management of medical care for patients who require dialysis.

Most patients receive dialysis treatments three times a week, for a treatment that is four hours in duration. During this treatment, about half of patients may experience a drop in blood pressure, which can cause dizziness and muscle cramping. Patients who experience repeated drops in blood pressure may risk injury to the heart and brain.

New research, being led by Dr. Amit Garg at the Lawson Health Research Institute, shows that cooling the temperature of the dialysis fluid (called dialysate) can reduce heart and brain injury. Typically, all patients' dialysate temperature is set at 36.5°C to match their body temperature.

The MyTEMP study will compare patient outcomes of those that receive dialysate at

body temperature (standard of care) to those that received dialysate at a temperature 0.5°C below body temperature (the intervention). GRH has been participating as an intervention site since 2017. GRH nephrologist, Dr. Laura Gregor is leading the study locally. As part of the research, GRH renal patients who receive their dialysis incenter will have a nurse set the temperature of the dialysate to 0.5°C below their body temperature measured just before starting the dialysis treatment. This simple, safe and low-cost intervention, that is occurring as a large provincial study with over 7500 dialysis patients in Ontario, will provide new evidence to the benefits of patient care, survival, and well-being bv personalizing dialysis treatment.

Over 500 patients annually receive dialysis at Grand River Hospital, delivering nearly 60,000 hemodialysis treatments each year



Partnering Together in Research

The Office of Research & Innovation at Grand River Hospital and the McMaster University Michael G. DeGroote School of Medicine - Waterloo Regional Campus have partnered together to support joint McMaster and GRH-led research/innovation initiatives that involve McMaster medical students and residents.

Through this collaborative initiative, McMaster medical students and residents will work alongside Grand River Hospital staff and physicians to conduct research and innovation projects focused on improving patient outcomes, caregiver experiences, and/or health care delivery processes.

"This partnership between McMaster and GRH will help support the outstanding work by our joint faculty, staff, and learners, and catalyze new programs of research that will impact the community. It's an important step toward realizing our potential together," said Dr. Andrew Costa, Assistant Professor, Schlegel Chair in Clinical Epidemiology & Aging and Research Director at Michael G. DeGroote School of Medicine, Waterloo Regional Campus.

Dr. Rebecca Kruisselbrink, an active clinician at GRH who is also the Regional Education Lead for McMaster Internal Medicine Program and the Chief of Academic Affairs at GRH, is excited to see this partnership come to fruition. She sees the opportunity to increase the feasibility of student and resident collaboration on clinician-driven research projects. "This partnership initiative highlights GRH's commitment to medical education by providing an excellent clinical learning environment."

This partnership between McMaster and GRH will help support the outstanding work by our joint faculty, staff, and learners, and catalyze new programs of research that will impact the community

Changing the way we assess pancreatic cancer

GRH aims to provide evidence-based guidelines for Whipple specimen reporting

Pancreatic cancer is highly aggressive and often associated with a poor prognosis. Currently, the most effective treatment method is a surgery known as the Whipple procedure paired with chemotherapy. Unfortunately, there is a lack of universal guidelines for pathology physicians to use in the assessment and reporting of the specimen removed by the Whipple procedure. It is currently believed that this lack of universal guideline may be leading to the under-reporting of microscopically positive resection margins, meaning it is difficult to say with ultimate certainty if the full tumor has been removed as a result of the surgery.

Lead investigator, Dr. Vlad Maksymov, a pathologist in the department of Laboratory Medicine at Grand River Hospital (GRH), and collaborator Kailyn Clarke, a University of Guelph graduate student in the department of Population Medicine, have set out to provide evidence-based reporting guidelines for the Whipple specimen by determining the clinical significance of the margins found on the retroperitoneal surface of the pancreas.

"We are currently in the process of collecting data on margin status, and disease-free and overall survival in pancreatic cancer patients. Additionally, we are also collecting data on a large number of other parameters that influence prognosis in the interest of generating a detailed pancreatic cancer database – perhaps the first of its kind in Canada – to be used in future studies," says Clarke. "As a Masters student, we are rarely afforded the opportunity to work on such an impactful project. I am immensely grateful to have this experience and am eager to see how this project will affect the way we practice medicine."



"The ability for University of Guelph Master's students to partner with clinicians in a research capacity provides additional learning opportunities that cannot be achieved in the classroom setting. Experiential learning collaborations allow students to gain hands-on experience, which expands their skill set and improves their opportunity for employment after graduation. We appreciate GRH partnering with us to provide this excellent learning environment," said Dr. Cathy Bauman, DVM, MPH, PhD, Assistant Professor, Ontario Veterinary College, University of Guelph.



Empowering Canadian innovators to lead the global MedTech industry

The CAN Health network is a partnership of leading Canadian medical and technology institutions. Acting together, these institutions are taking a nationwide approach to introduce technology into the health care system.

Trillium Health Partners, located in Mississauga, Ontario, is leading the creation of the CAN Health Network in southern Ontario, of which Grand River Hospital (GRH) will participate as an Edge – a space where the most promising Canadian health-tech companies will have access to real health care environments. Here, their products will receive the support they need for widespread adoption, helping companies scale first nationally, then internationally. Across Ontario, GRH is joined by Sunnybrook Health Sciences Center, Sinai Health System, SE Health, Bruyère Research Institute, Prism Eye Institute, University Health Network, SickKids, and Unity Health Toronto as a participating Edge.

The CAN Health Network will allow promising companies to work directly with health care organizations to understand their needs and commercialize health technologies to meet those needs and scale up their companies. Through this, small and medium-sized enterprises and leading start-ups will be able to work with early adopter institutions to collaboratively research, develop and refine Canadian medical technologies to make them market-ready.

GRH looks forward to sharing more about the CAN Health Network and launch of the GRH Edge in the coming months.



Redefining tools for clinical practice

Usability and Usefulness of the "Occupational Therapy Return to Driving Screen" for the Mild Stroke and Transient Ischemic Attack Patient in Acute Care

The Canadian Stroke Congress was held in Ottawa on October 3-5, 2019. As an annual event, the congress is a catalyst for the sharing of current evidence-based practices, profiling innovative research and highlighting Canadian achievements and contributions to the stroke diagnosis, care and recovery process. Grand River Hospital researchers and occupational therapists, April Vander Veen and Sarah Renner, attended the conference to present their research poster "Usability and usefulness of the occupational therapy return to driving screen" for mild stroke and transient ischemic attack patients in acute care.

In 2018, Ontario occupational therapists (OTs) were granted authority by provincial regulation to report potentially unsafe drivers to the Ministry of Transportation in Ontario. In anticipation of this expanded role, the researchers developed the "Occupational Therapy Return to Driving Screen," a toolkit used to assess driving safety for patients diagnosed with transient ischemic attack (TIA) and mild stroke in acute care. This toolkit utilizes evidence-based assessments, recommendations from Canadian Stroke Best Practice Guidelines and driver standards. The goal of the research is to assess the usefulness and usability of the toolkit to assist with decision-making regarding a patients' ability to safely return to driving.

As part of the research, surveys were distributed to patients who were diagnosed with a TIA or mild stroke who completed a driving screen assessment with an OT. Physicians and OTs who reviewed the screen results were also surveyed. Survey questions focused on the usefulness and usability of the toolkit in assisting clinical decision-making regarding functional fitness to drive.

Of the survey responses thus far, 100% of the OTs and physicians agree that the toolkit increased confidence in making decisions regarding driving and provided useful tools to engage patients in the discussion regarding their ability to return to driving. Patient feedback is still being collected, but thus far, positive experience responses are being indicated.



GRH Occupational Therapists Sarah Renner (left) and April Vander Veen (right) at the Canadian Stroke Congress, October 2019.

As a next step in the research, the results of this study will be used to refine the toolkit and the study will be expanded to additional hospital sites to increase the sample size. In addition, patients who participated in the initial survey may be contacted 1-2 years after their hospital stay to evaluate the function of the driver screening tool as a means to predict a patients' future driving status.

Our Partners



In 2015, The University of Waterloo (UW) and Grand River Hospital (GRH) launched a partnership to enable academics and clinicians to collaborate on research that will benefit patient care and enrich university research. The two organizations have a shared research agenda that supports patient care while developing new evidence to improve health outcomes.

Since 2010, GRH and UW have collaborated on over 30 research studies and clinical trials.

To learn more about our partnership with the University of Waterloo visit:

http://uwaterloo.ca/research/university-waterlo-grand-river-hospital-research

The Office of Research and Innovation is also proud to partner with the following organizations to advance exceptional research and innovation at Grand River Hospital

















Tri-Hospital Research Ethics Board (THREB)









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grhosp.on.ca/research

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