



Department of Medicine
Annual Report 2018-2020

FEATURE STORIES





A PASSION FOR CARE

Excellence in care

research
care
learning

Dr. Alistair Ingram: applying past lessons to stop the spread of COVID-19

When the COVID-19 pandemic began in March 2020, Dr. Alistair Ingram made contingency plans about how to replace doctors he expected could contract the virus.

“There was a great deal of anxiety and concern when the pandemic first broke out. Nobody was vaccinated. People were working directly with COVID patients,” said Dr. Ingram, the Chief of Medicine at St. Joseph’s Healthcare.

“When the pandemic first started, we made very exhaustive plans for how we would cover the large number of physicians we expected to get sick and be absent. But that never happened.”

In fact, throughout the pandemic, Dr. Ingram says that while some St. Joseph’s staff contracted COVID-19 in the community, almost no staff contracted the virus at work. The hospital also experienced fewer outbreaks compared to other hospitals.

“The number of outbreaks that we’ve had compared to other hospitals is not chance. We’re doing something different,” he said.

Dr. Ingram credits a few factors for St. Joe’s success with containing COVID-19. The first, he says, can be traced back to the hospital’s experiences with C. difficile outbreaks in 2010 and 2011 – an experience Dr. Ingram calls “a road to Damascus experience” that fostered a robust Infection Prevention and Control (IPAC) department.

“We have had a strong IPAC department since then, and a strong culture that

IPAC continues to push in terms of care when it comes to infection control,” he said.

“IPAC was able to move very quickly with COVID, on the back of what was a very strong culture, to really drill down about how we use PPE, how we could never take our minds off it. And I think they bear a large amount of credit for our success.”

He also credits the 5,000 staff, residents, and students at the hospital for following protocols, using PPE properly, and paying attention to the tiny details that can either prevent or spread infection. Sticking to regular routines as much as possible was also crucial, he said.

“As soon as one of your main medical wards has a patient with COVID, and then that spreads to another patient with COVID – you’re done. That ward is now closed for 2 weeks, and now you’ve got to find 50 beds somewhere else. The subsequent chaos that’s created, I think, provides more opportunity for COVID to spread elsewhere,” he said.

“The more you can continue to operate as you usually operate, with extraordinarily careful attention to PPE use and hand-washing et cetera, the more you are likely to be successful as time goes by – because the less you’re going to create chaos and problems. And I

believe that’s been a huge part of our success.”

Now that everyone has had an opportunity to be vaccinated, things have become somewhat calmer at the hospital, he said. In fact, the experience has served as a reminder about the joys and opportunities that come along with practicing medicine.

“The pandemic has served to help some of us regroup and refocus ourselves on our reasons we’re in medicine, which, after long years in practice, can kind of fade away from you a bit,” he said.

“It really has led a lot of us to realize how fortunate we are to be in this profession, how much we enjoy taking care of patients, and how much we continue to enjoy learning about new things – even something as tragic as COVID – there’s always something of interest you can find in it.” ■



Dr. Tim O'Shea

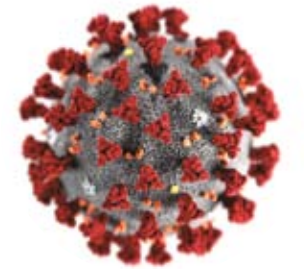


A PASSION FOR CARE

Excellence in care

research
care
learning

Dr. Tim O'Shea and Dr. Leslie Martin: Providing care, outreach, and advocacy for some of Hamilton's most vulnerable residents



Tim O'Shea believes that even the most excellent medical care isn't enough to treat some of Hamilton's sickest, most marginalized patients.

For Dr. O'Shea – associate professor, an infectious diseases and internal medicine specialist, and a physician with the Hamilton Shelter Health Network and The Hamilton Social Medicine Response Team (HAMSMaRT) – patients dealing with homelessness, substance abuse, and mental illness need not only medical care, but social supports.

"If looking after a patient's health means looking after whatever infections they may have, or whatever medication needs they may have, and then ignoring that they have no place to sleep -- that seems very weak," he said.

It was this philosophy that compelled Dr. O'Shea to begin HAMSMaRT along with Co-founder Dr. Christian Kraeker. A coalition of physicians, peer support workers and community organizers, HAMSMaRT was borne out of a desire to connect with homeless individuals in the community, and to provide excellence in clinical care to those who are often excluded from the traditional medical system.

"It started from an experience of seeing patients in the hospital coming in over and over again with similar issues," he said. "There was a bit of a sense

that when they walked out the hospital doors, who knows what happened at that point - and then they would come back again. It was just sort of a recognition that we were not really engaging in the community side of things at all."

Dr. O'Shea says that part of what makes HAMSMaRT unique is an explicit recognition that much of what makes and keeps their patients sick is the result of political or policy decisions. Actively working to address those issues is part of the HAMSMaRT mandate. As a result, Dr. O'Shea has become a vocal advocate and an active ally for Hamilton's homeless population.

Since Covid-19 hit in 2020, much of his work focused on Covid-19 in the shelter system and mitigating the risk for both staff and shelter patrons. He has also become a central voice in the debate surrounding homeless encampments in the community.

"With HAMSMaRT, we've always had the belief that health care is political," he said. "We're trying to acknowledge the fact that ignoring the political side of things really is doing our patients a disservice."

Dr. O'Shea points to one particular patient to demonstrate the devastating effects homelessness has on health – and the limitations of medical care that doesn't address the root cause of the issue.

"This patient was very unwell, living on the streets, in a very precarious setting. We had the expertise from a medical perspective to deal with the medical problems, but the best that we did was keep that person alive for a year. We didn't really make much impact on their health," he said.

As soon as that patient became housed, within three months, their health improved dramatically.

"Just to see the impact of that – the difference between somebody being homeless and hustling all day long to survive, versus being housed in a place where they feel safe and comfortable – the impacts on health were so huge," he said.

"And I think that's just a little bit humbling from a medical perspective. We feel like, 'Come to us and we're going to help you' – but not if we don't address these other issues."

Dr. Leslie Martin began her work with the homeless population after being mentored by Dr. O'Shea. Dr. Martin, a general internist with the department of medicine, first began her work with inpatients with substance use disorders after noticing that there were no official protocols for individuals who were suffering from withdrawal symptoms while in hospital.

"We would be seeing patients in hospital who would be going through severe withdrawal, and we didn't really have ways to help them locally," she said. "It just wasn't within anybody's realm of expertise."

As the opioid crisis intensified, in February of 2018, Dr. Martin became co-chair of the Inpatient Addictions Medicine Service. This service, co-chaired by Dr. Robin Lennox, a family physician, is seeking to transform the health care experience for people who use drugs by: providing compassionate wraparound care; integrating harm reduction and evidence-based approaches; building

capacity and understanding amongst healthcare teams; working to eliminate stigma; and empowering people who use drugs. In the past three years, this service has seen over 600 patients.

Dr. Martin points out that the first challenge of treating patients who use drugs is often getting them to stay in hospital, as the environment is often a very challenging place for this population. Often, they've had previous traumatic experiences accessing the healthcare system. It's also an institutional setting, which can trigger memories of negative experiences. There can also be power dynamics in terms of administering medication, as patients in this population are used to controlling their own intake.

However, the main challenge for many patients who have opioid use disorder is withdrawal. There is a very high rate of people with substance abuse problems leaving the hospital against medical advice, in large part due to trying to mitigate withdrawal symptoms. If those symptoms are managed in hospital, that can become a gateway to providing more fulsome and meaningful care.

"If we can prevent the withdrawal and ensure that people are not going through severe withdrawal, hopefully we can keep them in the hospital longer, as a first step to treat the medical reason for their presentation. And the next

step from there is, how do we work on getting those wraparound services," she said.

Dr. Martin says there is still work to do when it comes to attitudes towards people who use drugs in an inpatient setting. For example, she points out that healthcare providers are very familiar with housing concerns in aging patients, adding that there is a "well-oiled machine" within the hospital system to ensure that aging patients are supported and well-housed once they leave hospital. The same is not true for homeless patients.

"We would never discharge an older person to the street, or to an underserved home, but we do that with homeless patients all the time," she said. "I think that has been a real shift in trying to understand how can we wrap services around this patient population."

While Dr. Martin says she sees many places where care can improve, she knows that the Inpatient Addictions Medicine Service has made a positive impact on patients' lives.

"Overwhelmingly, the feedback we get is that our presence has made a difference," she said. "So that inspires us to try to continue to make change." ■



Dr. Leslie Martin



A PASSION FOR KNOWLEDGE

Excellence in teaching

research
care
learning

Dr. Jill Rudkowski: Adapting the Clerkship program during Covid-19

On March 16, 2020, during the earliest stages of the Covid-19 pandemic, the DeGroot School of Medicine at McMaster made the difficult decision to pull its undergraduate medical students out of the clinical learning environment.

“The system was in crisis and nobody knew what they were dealing with. We didn’t have a good understanding of safety. That was a decision across the country – all students in all provinces were pulled out of the clinical environment at the same time,” said Dr. Jill Rudkowski, the Chair of Clerkship and Concept Integration and Review for the DeGroot School of Medicine at McMaster.

“We had to consider the safety of the students, the safety of the patients, the safety of the faculty, and the capacity of the system to host learners.”

It was up to Dr. Rudkowski and her Clerkship team to figure out a way to continue to train medical students while not having access

to learning in the clinical environment. In response, in the span of just two weeks, she led the creation of an 11-week curriculum to replace some of the learning they would have experienced had it not been for Covid-19.

“I’ve never faced a bigger challenge,” she said. “It was very intense.”

While the class of 2020 was only a few weeks away from graduation, they were able to complete their remaining clerkship rotations relatively smoothly. However, Dr. Rudkowski points out that it quickly became apparent that the class of 2021 was not going to get back into the clinical environment before

July. Dr. Rudkowski was faced with the challenge of helping students at all three McMaster Medicine campuses – Hamilton, Waterloo and Niagara— stay on track towards graduation in May 2021 in order to begin their postgraduate residency training on time.

The curriculum Dr. Rudkowski created, called the Virtual Longitudinal Clerkship, provided a mix of learning opportunities reflecting some of the learning students would have done during their clinical rotations. This included live virtual teaching sessions with Faculty across many McMaster Departments (Family Medicine, Pediatrics, Surgery, Anesthesia, Obstetrics and Gynecology, and Psychiatry).

Photo taken pre-COVID





Photos taken pre-COVID

“We had faculty from across the Departments at McMaster who hosted those live teaching sessions and created the content very last minute. It was really incredible to see such strong collaboration,” Dr. Rudkowski said.

Dr. Rudkowski also curated online resources for students to use for self-study, and every student was introduced to the skills needed for virtual patient care through online sessions with faculty and standardized patients. Dr. Rudkowski points out that these skills became crucial, as students would need to have the skills to properly assess patients’ health virtually when they returned to in-person learning – something that few learners or physicians had any experience with prior to the pandemic.

The Class of 2021 was ultimately able to return to the clinical environment full-time in July. However, that created

a ripple effect for the Class of 2022, which would usually have started pre-clerkship electives over the summer. As a result, Dr. Rudkowski worked with the undergraduate medical team to develop a new “Transition to Clerkship” 12-week curriculum for the class of 2022 so that they would be on track for Clerkship in January 2022. This was a hybrid course comprised of virtual small and large group sessions, the virtual patient care course, in-person skills training, and clinical electives.

“I think it was the best success we could have had with the challenges that we faced,” she said. “It was just an unbelievable year of having to just completely rethink how we delivered content for clerkship and pivot on a dime. I have never been more grateful for the collaboration and dedication of the people I work with.”



Dr. Rudkowski was also able to rely on the support of and ingenuity of colleagues across Canada as the Chair of the Clerkship Network of the Association of the Faculties of Medicine of Canada.

“It’s been really neat to be able to collaborate and liaise with colleagues across the country who are charged with running Clerkship at all 17 medical schools, especially with the pandemic,” she said. “We’ve been able to create a really solid network of communication, idea-sharing, and support so that nobody feels like they’re in it alone.” ■

A PASSION FOR KNOWLEDGE

Excellence in teaching

research
care
learning

Dr. Lori Whitehead and Dr. Azim Gangji: Innovation in Education

If you ask Dr. Lori Whitehead about the most valuable skills students can acquire, she won't point to a specific lesson or hands-on experience.

Instead, Dr. Whitehead – the director of the Internal Medicine Residency Program – says some of the most valuable things students can learn at McMaster are innovation, creativity, and flexibility.

“We teach them about the importance of creative thinking. We try to do that at McMaster with our learners, but it threads through the entire university,” Whitehead said.

Dr. Whitehead's work as director of the Internal Medicine Residency Program focuses on seeing 118 postgraduate students through the intensive, three-year stretch after medical school that allows students to hone their skills and zero in on a specialty.

Under Dr. Whitehead's tenure, one of the most exciting innovations to come to McMaster's residency program has been a new model of learning called reflective practice. This method, which stems from new teaching guidelines from the Royal College of Physicians, encourages residents to set goals, focus on their progress, and – along with the help and mentorship of academic advisors – seek advice and encouragement if they run into roadblocks along the way.

Dr. Whitehead says the move to the reflective practice model “has been a

bit of a culture change for residents.”

“I believe that what we've done is sort of inspired our residents to look at how reflective practice is a technique for lifelong learning and self-assessment,” she said. “Lifelong learning very important to a physician. If you don't keep up with your learning and the trends in medicine you're not going to provide best practices.”

This type of self-reflection can also be useful to residents when it comes to meeting the intense demands of balancing learning with their clinical schedules. Residents can spend 10 to 12 hours a day seeing patients, but are still required to complete their academic and research work – a schedule that can become grueling and overwhelming, Dr. Whitehead points out.

“Residents need to recognize when they're directly working with patients they need to take advantage of every opportunity to learn on the job,” she said. “They should reflect on, “Even though I was busy and I ran around all day doing a hundred things, I kind of learned these different things.” I think they need to keep their eye on that ball.”

Ultimately, self-knowledge – including understanding how to balance work with personal time and to seek support

when they're feeling overwhelmed – makes residents into better doctors, Whitehead says. Each student brings their own ideas and passions to their experiences as a resident.

“If someone is passionate about a certain subject matter or a project, they will probably get more traction from that -- even if initially the idea sounds like it may not be as high a priority as something else,” she said. “But if a learner or a physician has passion and sees the need for something, and it does have merit, it's my job to inspire that resident to follow their dreams and to follow their passion – because that's going to make them happy, give them a lot of satisfaction, and teach them about the importance of creative thinking.”

Just as Dr. Whitehead has ushered in new teaching models and philosophies as the director of the Internal Medicine Residency Program, Dr. Azim Gangji, the director of the Nephrology and Transplant Fellowship Program and the Vice President of Education at St. Joseph's Healthcare Hamilton, has introduced various innovative programs for internal medicine residents.

One of Dr. Gangji's biggest innovations in teaching was introducing a case-based learning curriculum for internal medicine residents along with



Photo taken pre-COVID



Dr. Ted Xenodemetropolous, the first one of its kind in the country. This means that instead of learning in a lecture-based format, McMaster residents break into smaller groups and learn by reviewing specific scenarios that mirror real-world examples.

Dr. Gangji says that this model not only develops medical expertise, but also allows residents to build skills as collaborators, communicators, leaders, health advocates, scholars, and professionals (roles that are laid out by the Royal College of Physicians as part of the CanMEDS framework). This hands-on learning and collaboration has led to residents gaining a more well-rounded, contextualized understanding of the material, Dr. Gangji says.

“As opposed to the traditional lecture-based style, which is more passive learning, case-based learning is more active learning and the residents participate and are encouraged to problem solve and address not only the medical aspects of the case but to address the patient’s overall issues,” he said.

“We always practice as a team, and the idea was to recognize that when you’re working in a team, you’re learning as a team as well – as opposed to lecture-based model, where information is just fed to you and you’re not necessarily taking it in.”

Since its inception, Dr. Gangji’s case-based learning curriculum continues to involve, including incorporating standardized patients.

But Dr. Gangji says his true legacy of innovation in education lies with the

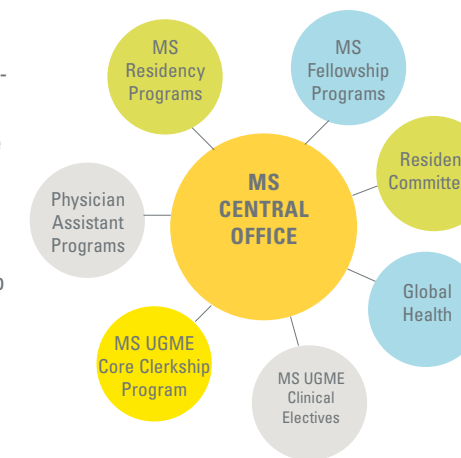
incorporation of a Medical Specialties Central Office structure, which brought the 18 individual medical specialty residency programs and 51 fellowships under one umbrella in the Department of Medicine.

Dr. Gangji identified the need for a centralized hub to manage a range of programs through his leadership roles, which at one point ranged from overseeing undergraduate clerkships through to fellowship programs. He noticed that some programs were “have” programs, while others were “have nots” lacking human resources and basic financial supports.

“It really kind of harmonized these programs, enhanced efficiencies, and made sure the programs were well-resourced,” he said. “The idea is to bring about unity and innovation.”

Throughout his work enhancing, modifying, and transforming education systems, it’s the concept of collaboration and partnership that drives Dr. Gangji.

“My theme always is to work together as a team, and to develop more harmony and build structure to enhance efficiencies,” he said. “The legacy of building unity is really important to me.” ■



Creating a centralized office structure allowed funding to be provided fairly between divisional residency programs, allowed for consistency in administrative staff, promoted collaboration between programs and furthered residency education by instituting a combined medical specialties academic half day as well as social and wellness committees.

Photo taken pre-COVID

A PASSION FOR OTHERS

Global Connections

research
care
learning

Dr. Ally Prebtani and Dr. Zahira Khalid: Building healthcare capacity in the developing world

As McMaster faculty, both Dr. Ally Prebtani and Dr. Zahira Khalid focus their work here in Hamilton – but the scope of their care extends far beyond Canada’s borders.

Both Dr. Prebtani and Dr. Khalid volunteer their time to train and collaborate with healthcare providers in developing countries – Dr. Prebtani as the founder and director of the Internal Medicine Residency International Health Program, which focuses on Uganda, and Dr. Khalid as program director of the first internal medicine residency program at Georgetown Public Hospital in Guyana.

Dr. Prebtani, who was born in Uganda and immigrated to Canada as a young child, says his interest in global health stems from a tradition of volunteerism that was instilled in him from an early age.

“In my community, there’s a very strong sense of volunteerism – a lot of the things we do is based on voluntary service without expecting anything monetary in return,” he said. “We try to instill it in our children, and it was also encouraged and nurtured by my parents.”

Dr. Prebtani’s work as founding director of the Internal Medicine Residency International Health Program focuses on building capacity in Uganda, where there can be a lack of infrastructure, physical resources, and human resources.

Dr. Prebtani points out that one of the biggest challenges for developing countries like Uganda is that there is a lack of

advanced formal training programs. As a result, a key pillar of the program has been to take McMaster residents and faculty to Uganda to teach, research, and collaborate.

In turn, residents from Uganda are also invited to learn, train, and socialize here in Hamilton – a process that strengthens both the professional and social bonds between the two countries.

“A lot of the Ugandan leadership and the residents have said, “We’re not your colleagues anymore - we’re your friends,”” said Dr. Prebtani.

The primary goal of the program is to empower and train local health care providers in order to foster self-sustaining growth in the Ugandan health care system.

“It’s not a one-off, or medical tourism. We really want to build capacity and make this program sustainable – which has shown itself to be the case,” said Dr. Prebtani. “It’s been almost two decades that we’ve been doing this, and you see lots of quality improvement and lots of feedback from our counterparts in Uganda.”

The drive for sustainability and longevity has also inspired Dr. Khalid’s work in Guyana. Dr. Khalid has spent ten years working in the field of global health and has volunteered as a physician



Dr. Zahira Khalid

and clinical educator in Uganda, Peru, Cambodia and Namibia.

But during her first visit to Guyana, she felt drawn to the idea of creating a lasting program that would have major impacts on the level and quality of care.

“Once I went there, I just knew there was a lot that could be done, and a lot that could be sustainable, which was quite in contrast to where I had worked in previous places,” she said. “Things just didn’t seem to be sustainable. You went there, you’d work on something, and then it would be back to stage one. You could never leave something behind.”

“Here, I saw an opportunity to do something, keep it sustainable, and hand it back to the people who could run it locally.”

She took over leadership of the program in 2015 after the previous director unexpectedly had to return to the U.S. Prior to the Covid-19 pandemic,

Dr. Prebtani at foot of bed left.
Group photo taken pre-COVID

Dr. Khalid traveling to Guyana for two week intervals every six weeks to deliver curriculum, oversee exams, help with recruitment, coach, and mentor the residents – duties which continued virtually once pandemic travel limitations were put in place.

In her role as program director, Dr. Khalid has overseen the education of the first-ever locally trained Guyanese physicians and the establishment of a new department of medicine. Prior to the creation of this program, Dr. Khalid points out that there were three or four internists in the entire country – all of whom were trained outside of Guyana and worked in the private sector and didn’t provide any teaching or mentorship.

Now, there have been 16 Guyanese graduates of the internal medicine residency program, all of whom are now working in the public sector, and 20 residents currently enrolled in the program. This has a huge impact on the availability and accessibility of care for the Guyanese population.

“Before, they would have to go outside the country to get specialized care,” said Dr. Khalid. “One of the residents said that it kind of changed the history of how internal medicine is provided.”

Dr. Khalid has just finished her role as program director, and has now handed over the leadership of the program to a former graduate. She continues to act as a mentor and assistant program director and helps to oversee programming – including helping to manage the response to Covid-19.

“I’m very proud of how they have come together to provide care for the patients – the person who provided most of the Covid testing and Covid care is recent graduate,” she said. “I think they’ve done an amazing job controlling the pandemic and educating the public.” ■





A PASSION FOR RESEARCH

Groundbreaking research

research
care
learning

Dr. Elena Verdu: Unlocking the mysteries of our gut bacteria

Dr. Elena Verdu's fascination with gut bacteria has led her around the world.

Initially trained in Internal Medicine at the University of Buenos Aires, Dr. Verdu travelled to Switzerland in 1991 to receive further training in gastroenterology and clinical research at the University of Lausanne.

The move from her native Argentina to Switzerland helped inspire Dr. Verdu to pursue the line of research that she continues today.

"I came from a medical background, and suddenly I was exposed to this fundamental interaction between gut microbes, dietary antigens, and how they impact the host at the basic level," she said.

"At that time, the exciting discovery in gastroenterology was that there was a bacterium that was found to cause peptic ulcer disease. You have to imagine the times – the question in the wind really was, "What else could bacteria cause in gastroenterology?," she said.

Dr. Verdu was drawn to McMaster in 1996 due to its Intestinal Diseases Research Program, and what she calls the "cross pollination" of scientists and clinicians – a rarity at that time.

"This program was looking at gastrointestinal disease from so many different angles. This was the beginning of the maturation for me as a scientist in gastrointestinal diseases," she said.

Today, Dr. Verdu's research largely focuses on two diseases – celiac disease and inflammatory bowel disease (IBD). Recently, her research has uncovered that there is a link between celiac disease and IBD involving how our gut bacteria reacts to the foods we eat.

Dr. Verdu explains that certain amino acids, like tryptophan, are metabolized by our gut bacteria – and when that happens, they release certain substances called metabolites that will protect our intestinal lining. Dr. Verdu's research has shown that patients with celiac disease can't easily process tryptophan, but adding good gut bacteria that can process tryptophan can ultimately help treat patients with celiac disease. The major discovery of

this program of research showed that this same pathway is also seen in IBD.

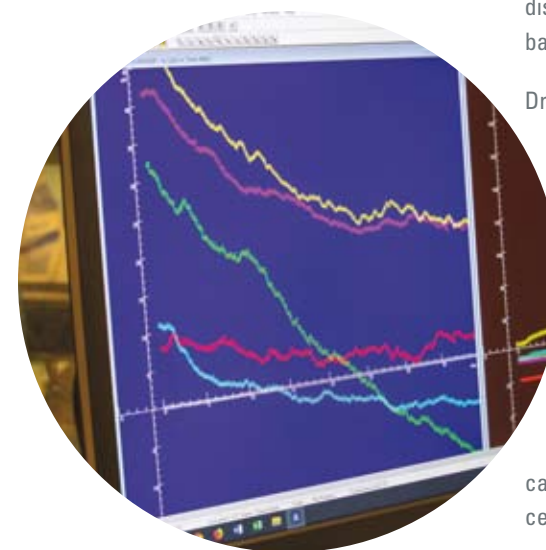
This particular research project could have major implications for the way we treat these diseases – both of which are becoming more common among Canadians.

"What interests me is whether there is a common pathway between these two diseases – and could bacteria be the link between the two of them?," she said. "If we understand the root causes of these diseases, and why this increase is happening, we can then intervene preventively – or we can devise therapies that are going to be more efficacious."

Dr. Verdu's research is continuing to focus on investigating the root causes of chronic intestinal inflammation, and looking at how nutrition can factor into this.

Her biggest piece of advice about maintaining healthy gut bacteria? Do your own cooking, eat a variety of foods, and avoid foods that come in a box.

"In general, if I have to give one piece of advice, I would say do what my grandmother or great grandmother said, which is to eat a little bit of everything," she said. "Eat a variety of food that can stimulate richness and variety in your gut microbiota." ■





A PASSION FOR RESEARCH

Groundbreaking research

research
care
learning

Dr. Matthew Lanktree: Predicting kidney disease before it starts

Dr. Matthew Lanktree says he feels a bit like a modern-day fortune teller.

Dr. Lanktree, a clinician scientist in nephrology genetics and the Medical director of the McMaster Kidney Genetics Clinic, focuses his research on understanding the genetic causes of advanced kidney disease. He's able to use imaging and biomarkers to predict which of his patients are likely to experience mild forms of the disease, and which patients are more likely to progress to kidney failure – even before they're symptomatic.

"They'll say, 'I have no symptoms – what are you talking about?' But from looking at the amount of protein in their urine, and their kidney function estimate, and things like their blood pressure and their imaging, and putting that all together, I can say, 'This is something we need to work on together.' And it's really difficult to hear, because they can be completely asymptomatic at that point," he said.

Predicting the progression of kidney disease in various patients allows Dr. Lanktree to target treatments and therapies to each specific patient, based on the expected course of the disease.

"We can try to reassure people that are going to have mild courses, and

inform people who are going to have aggressive courses, to do both the conservative therapies that are good for everybody, but then also pick out the people that are candidates for treatments that may be associated with a higher therapeutic burden," he said.

Dr. Lanktree's research is a game-changer for both patients and the healthcare system. Kidney disease is common – one in 10 Canadians will experience the disease – and debilitating, as patients are often asymptomatic until the disease becomes very advanced.

Kidney disease is also extremely expensive to treat, as dialysis for kidney transplantation costs Canadians \$310 million each year. Preventing the progression of the disease for as long as possible – until a patient can retire or until their children have left the house, for example – can have major implications on patients' lives, as well as the healthcare system.

"Even delaying the onset of kidney failure by a few years can have enormous impact," Dr. Lanktree said.

Dr. Lanktree's research also focuses on why some patients are more likely to develop more serious forms of the disease, based on their genetics – a field of research that Dr. Lanktree says is "exploding."



"Why do some people have mild kidney disease, while other people progress to kidney failure? Using sequencing and whole genome analyses, I'm trying to identify the people that are at higher risk of going into kidney failure based on their genetic makeup," he said.

"We're just starting to appreciate that genetic mutations cause about 10 per cent of adult onset kidney failure. Even five years ago, people would not have thought it was that high." ■



A PASSION FOR RESEARCH

Groundbreaking research

research
care
learning

Dr. Salim Yusuf: Using big-picture thinking to improve global health

When Dr. Salim Yusuf was attending Oxford University as a Rhodes scholar, he received a piece of advice that changed his life: get the big picture right and every detail right.

While a student at Oxford, Dr. Yusuf was part of a team of cardiologists and epidemiologists that developed the idea of conducting large simple studies to detect or exclude whether treatments reduced death, or other major complications, by involving tens of thousands of patients around the world.

“We developed the concept and the approaches of doing very large studies internationally. Until then, it was very uncommon to do studies internationally. Most studies until that time included just a few hundred patients, and occasionally a few thousand,” he said.

“We recognized that we may not have discovered the true benefits of several treatments because the studies done to evaluate them were too small. So we proposed that we needed much larger studies, and in order to make them feasible, they had to be much simpler than the studies usually conducted.”

This led to the development of large simple trials: a concept that has transformed the management and outcomes of patients with cardiovascular diseases, and that has defined Dr. Yusuf’s long and distinguished career – including his current position

as director of the Population Health Research Institute (PHRI), recognized as one of the top clinical research groups in the world.

Dr. Yusuf and the 350-strong team at PHRI have been performing massive studies with long-term follow up in several conditions, encompassing 1,500,000 participants in 102 countries on 6 continents. Most of the studies at PHRI take an average of five to ten years, while some can continue for as long as 15 to 20 years.

PHRI’s recent landmark research projects include:

- The discovery by Shamir Mehta that the likelihood of death and permanent heart damage in heart attack patients can be reduced by opening all the narrowings in their coronary arteries, rather than just the blocked artery that caused the heart attack.
- The discovery by Richard Whitlock that removing the left atrial appendage during cardiac surgery in patients with atrial fibrillation reduced the risk of stroke substantially.
- A translational research program headed by Guillaume Paré that relies on PHRI’s database of over 4 million units of blood and urine to identify new blood biomarkers. This program has identified new biomarkers and genetic markers to improve the prediction of coronary artery disease, stroke, heart failure, kidney diseases and diabetes.

- A study on global nutrition, encompassing about 160,000 participants in 21 countries, showing that eating too many refined carbohydrates is associated with higher mortality and cardiovascular problems, while a moderate amount of fats, including saturated fats, is actually good for you.

These studies are only a sliver of the ground-breaking research currently underway at PHRI, including a major 20-year study on identifying the causes of dementia. The goal for every project, Dr. Yusuf says, is to definitively solve an important problem.

“At PHRI we often ask of a particular study, “Will this win us the gold medal at the high school meet, or at the Olympics?” he said.

What Dr. Yusuf takes the most pride in is PHRI’s team itself, and its culture of sharing, mentoring, and excellence.

“What I’m most proud of is the team we’ve developed, the contributions we’ve made in terms of improving human health, but most importantly, making global collaborations, global friends, and developing a new generation of researchers in different parts of the world, that will make an impact well into the future,” he said.

“You cannot realize big dreams and major projects by one individual alone – it requires a team that has a culture of reaching for the stars and working extraordinarily hard.” ■



A PASSION FOR RESEARCH

Groundbreaking research

research
care
learning

Dr. Teresa Chan: Supporting doctors as learners

Dr. Teresa Chan has always been interested in helping others learn.

Even as a high school student, Dr. Chan acted as a mentor and a peer tutor for her classmates, including teaching her fellow students how to follow Robert's Rules of Order during model United Nations. It was this fascination with learning and with education systems that led her to pursue a teaching degree, before attending medical school at Western University.

Today, Dr. Chan blends her passion for teaching and her love of medicine as an emergency physician, an educator, and an education scientist.

Much of Dr. Chan's research has focused on training doctors to handle the busy and stressful environment of the emergency room. One of her recent research projects focused on how physicians teach and learn in multi-patient environments, and the creation of cognitive modelling on how to prioritize patients.

"I really try to understand how people are taught and learn the process of handling the busy department – and what is the thinking model that's really underpinning that," she said.

"In a clinic room – maybe you're bouncing between two and three different rooms, but you're doing one thing at a time," she said. "In emergency medicine – you're not really only doing one thing

at time. There's a whole bunch of different things going on at once. We probably also have the highest acuity, and therefore the highest amount of turnover."

This program of research led to the development of Dr. Chan's most well-known projects, a board game about emergency department flow called GridlockED.

The game requires players to direct patients to the appropriate area of the hospital – the resuscitation zone, step-down zone, intermediate zone, minor zone and waiting room – and earn points for completing tasks. The three goals of the game are to achieve 500 points, "survive" an eight-hour shift, and keep patients safe.

The board game allows doctors to learn how to manage the emergency department in a low-stakes, low-risk environment before being put in charge of the entire unit on their own.

"How do people go from seeing one patient at a time as a med student to handling a whole department of 16 patients at the same time? That skill set wasn't clearly articulated," she said.

Dr. Chan's other programs of research have focused on how doctors can use social media to enhance their learning, including how doctors can use apps like Slack to form tight research teams that aren't dependent on location. Her



next project will likely focus on how "to bring out the best in people," she says, and what it means to be "excellent" in health care.

Each of her research projects have acknowledged that while healthcare providers are incredibly driven and talented, "We're not perfect, and we need to be supported in our development," she said.

"To be a more inclusive teacher, you really have to understand that some of these skills are not obvious to everyone. It is to some people – the easy learner who just gets everything – but to be honest, those people don't really challenge me in learning. They're a privilege to teach, but you don't have to do very much," she said. "For me as an educator, the thing that drives me are the people that struggle. Helping those students succeed makes being an education researcher and teacher fulfilling." ■