nova scotia health authority
Research Services

Research Focus

gastroenterology

It's a small division with a big mandate. Researchers in the Division of Digestive Care & Endoscopy are leading and taking part in a wide range of local, national and international studies to improve outcomes for patients with inflammatory bowel disease (IBD), fatty liver disease and colon cancer. This research is imperative, given that Nova Scotia has among the highest rates of these diseases not just in Canada, but in the world.

"These three diseases place an enormous burden on individuals, families, the health care system, and society as a whole in Nova Scotia," says the division's director of research, Dr. Jennifer Jones, NSHA staff gastroenterologist and associate professor at Dalhousie Medical School. "Over the past few years, we've been building capacity for investigator-initiated research that will provide evidence to guide us in tackling the challenges we face in treating and delivering health care for these chronic gastrointestinal diseases."

Building Research Capacity Addresses Growing Burden of Disease

In addition to recruiting Dr. Jones back to Nova Scotia from Saskatchewan—with a specific mandate to grow this type of research—the Division of Digestive Care & Endoscopy has hired a full-time research associate and research assistant, secured local and national funding, and started building a comprehensive research database with help from NSHA's Research Methods Unit.

"After building a solid research infrastructure, we're expanding our research efforts, attracting more learners, and developing new collaborations," says Dr. Jones.

Research in the division runs the gamut from national longitudinal population studies, to local health services and quality assurance studies, to international clinical trials. In fact, the division has a global reputation for its success in recruiting participants to clinical trials.

Local funding from the NSHA Research Fund and QEII Foundation Translating Research into Care (TRIC) grant programs has enabled researchers in the division to launch proof-of-principle studies that have allowed them to secure catalyst funding and multi-year grants from the Canadian Institutes of Health Research (CIHR) and other funding agencies.

"A lot of our patients are dealing with chronic digestive disorders that significantly impair quality of life and, in some cases, cause premature death," notes Dr. Jones. "The work we're doing to establish cost-effective, evidence-based, patient-centred health care delivery models will help our patients dramatically. It can also be applied to other chronic diseases, so we're creating a template our colleagues in other divisions could adapt to meet their patients' needs."

Research associate Courtney Heisler with director of research for the division, Dr. Jennifer Jones

Inflammatory Bowel Disease

IMAGINE a World with no IBD

Digestive issues are among the most common of all health complaints, with two in three Canadians experiencing gastrointestinal symptoms to at least some degree. Approximately 20 per cent of patients seen in primary health care have a chronic gastrointestinal disorder, such as acid reflux, Irritable Bowel Syndrome (IBS), or constipation, leading to very high referral rates to gastrointestinal specialists.

On the severe end of the spectrum is Inflammatory Bowel Disease (IBD), an umbrella term that encompasses Crohn's disease and ulcerative colitis. Together, these two immune-mediated chronic diseases of the gastrointestinal tract affect an average of 1 in 140 Canadians and, as recent data reveals, an astonishing 1 in 83 Nova Scotians.

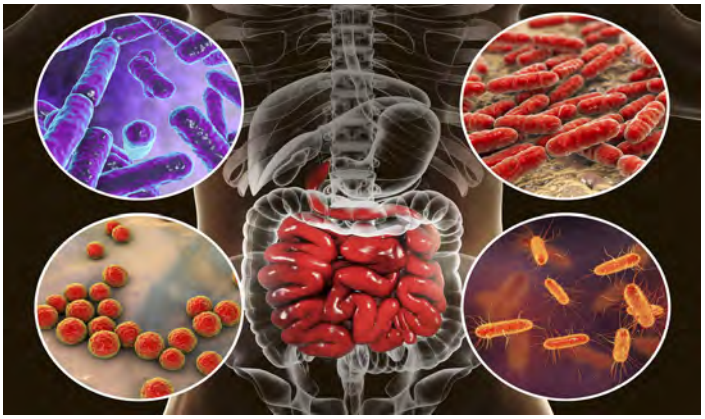
"We don't yet know exactly what causes IBD... or how to predict how long a patient's remission will last"

"We don't yet know exactly what causes IBD, what triggers flare-ups, or how to predict how long a patient's remission will last," says Dr. Jennifer Jones. "These are important questions we need to answer to help patients keep their disease under control."

If IBD is not well-managed with medication, diet and stress management techniques, patients may experience excruciating pain as well as an increase in loose, frequent, urgent bowel movements. Some patients develop complications such as strictures, fistulas, perforations, obstructions or abscesses in the bowel that require surgery.

The Canada-wide study, IMAGINE (Inflammation, Microbiome & Alimentation: Gastro-Intestinal & Neuropsychiatric Effects), is gathering data from some

Contents



Data about patients' lifestyles, along with biological samples, will reveal more about intestinal microbiology, which informs individualized care and better treatment.

8,000 patients to uncover those all-important answers. Dr. Jones is co-leading the Nova Scotia arm with Dr. Anthony Otley, a pediatric gastroenterologist at the IWK Health Centre. The Canadian Institutes of Health Research's Strategy for Patient-Oriented Research (CIHR SPOR) is funding the five-year, 17-centre study to the tune of $24 million.

"We will enroll about 500 patients here at NSHA—most with IBD and some with IBS as well," says research assistant, Slava Khovratovich. "Participants will fill out detailed annual surveys about their diet, medication use, symptoms, stress in their lives and so on, and we will collect blood, urine and stool samples from them, for four years."

This wealth of anonymized patient data will be linked to provincial health databases and analyzed to reveal how patients' genetics, diet, treatment regimen, emotions, intestinal microbiology and other factors influence the frequency of flare-ups and severity of symptoms. It will also explore how flare-ups and symptoms affect patients' mental health, social and occupational functioning, and other key aspects of their lives.

"This is one of the largest, most comprehensive cohort studies of IBD and IBS ever conducted in the world," notes Dr. Jones. "We will learn so much that will guide us in providing more effective, individualized care, treatment, advice and support to our patients."

Mitigating the Risk of Malnutrition & Hospitalization

Dietitian Lindsay Boisvenue (bottom) teaches newly diagnosed patients about basic nutrition and how it can apply to IBD.

People with IBD face a triple threat when it comes to nutrition. Because the lining of their digestive tract is inflamed and not functioning properly, they may not absorb nutrients from their food properly. They may also limit their intake of food, due to lack of appetite and fear of the pain that often comes with eating. And, they may lose a lot of the food they have eaten to vomiting and diarrhea.

"Patients can become severely malnourished and dehydrated to the point they need to be hospitalized," says Lindsay Boisvenue, a registered dietitian working with patients in the Nova Scotia Collaborative Inflammatory Bowel Diseases program. "They also face a high risk of developing eating disorders, anxiety and depression."

There is currently no validated tool for screening IBD patients for nutrition risk, but Ms. Boisvenue aims to change this.

"We're working on a simple screening questionnaire clinicians can use to quickly identify when patients are tipping into malnutrition risk," she says. "If we can flag these patients early, we can work with them more intensively to correct their diets and supplement as necessary to restore their body mass and nutrient status."

With Dr. Jennifer Jones, Ms. Boisvenue has applied for funding to conduct a study to validate the screening tool. If proven effective, the tool would become part of standard practice in Nova Scotia and, Boisvenue hopes, Canada-wide.

At the same time, Ms. Boisvenue has embarked on a collaboration with colleagues in Saskatchewan and British Columbia to test the effect of the Mediterranean diet on disease activity, gut microbiome composition and immune responses of patients with ulcerative colitis.

"I will be recruiting patients in our clinics to take part in the study and providing them with information about how to follow the Mediterranean diet," says Ms. Boisvenue, noting that this is a diet rich in vegetables, fish and olive oil. "We'll collect blood and stool samples for analysis and monitor their symptoms to gain a sense of the impact of the diet over time."

Ms. Boisvenue constantly scans the literature for the latest evidence about the impact of specific foods, nutrients and special diets on IBD. She has completed a review of micronutrient status in IBD that she and Dr. Jones aim to

"Patients [with IBD] can become severely malnourished & dehydrated"

publish, and recently developed "Nutrition 101: IBD," a group education class for newly diagnosed patients. This reviews the basics of nutrition in IBD and such topics as probiotics, omega-3 fatty acids, fibre, and special diets like FODMAPs, IBD-AID and the Specific Carbohydrate Diet (SCD).

Ensuring Access to High Quality, Patient-Centred Care

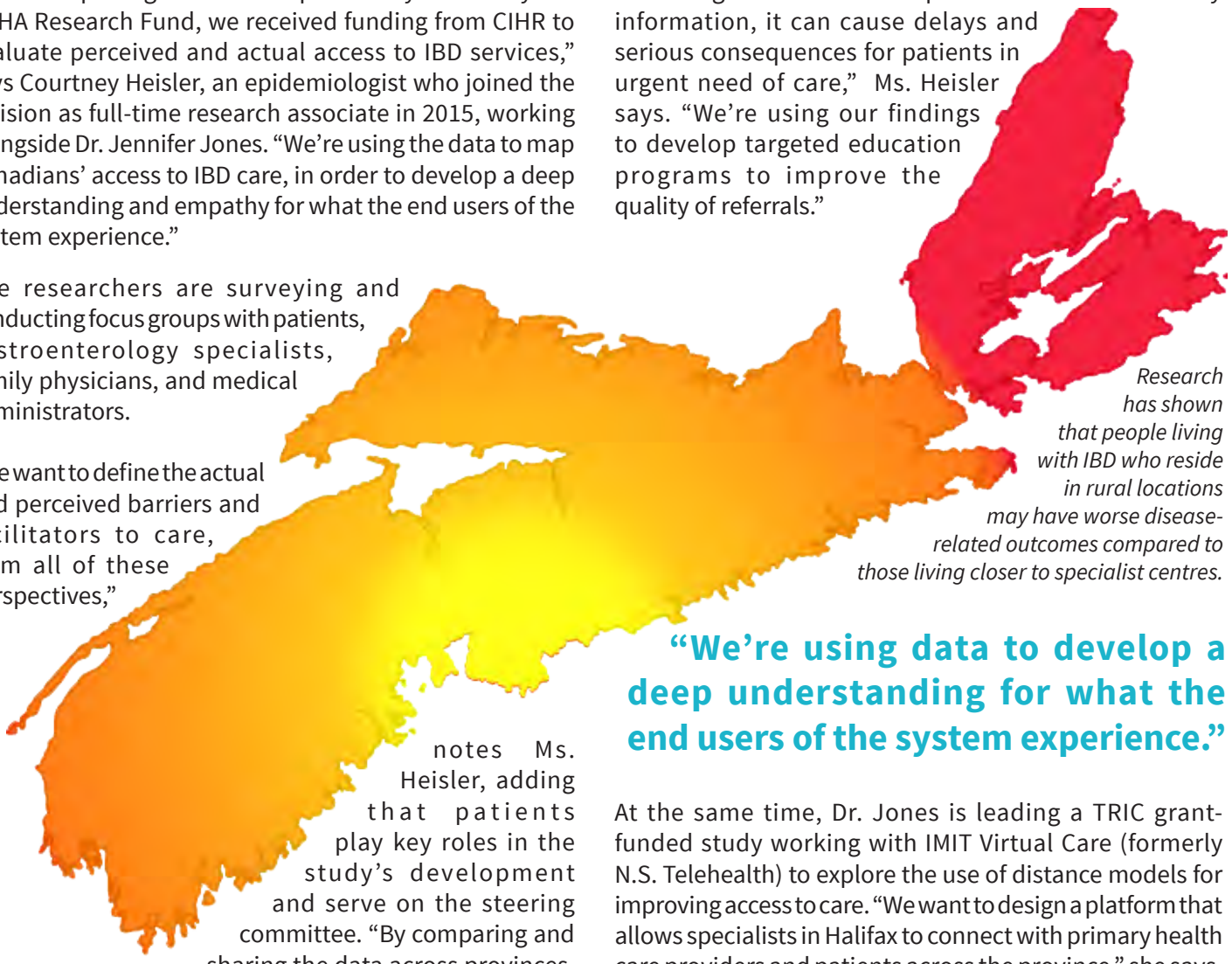
Researchers at NSHA are working hard to systematically identify and remove barriers that prevent people with IBD from gaining access to timely, high-quality care—not just in Nova Scotia, but all across Canada.

"After completing a successful pilot study funded by the NSHA Research Fund, we received funding from CIHR to evaluate perceived and actual access to IBD services," says Courtney Heisler, an epidemiologist who joined the division as full-time research associate in 2015, working alongside Dr. Jennifer Jones. "We're using the data to map Canadians' access to IBD care, in order to develop a deep understanding and empathy for what the end users of the system experience."

The researchers are surveying and conducting focus groups with patients, gastroenterology specialists, family physicians, and medical administrators.

"We want to define the actual and perceived barriers and facilitators to care, from all of these perspectives," notes Ms. Heisler, adding that patients play key roles in the study's development and serve on the steering committee. "By comparing and sharing the data across provinces, we'll be able to identify the most impactful health system infrastructure and process challenges at a high level so that we can develop and evaluate province-specific health care delivery innovations."

A related study examined quality of referrals to the Nova Scotia Collaborative IBD program. "If the referral is not legible or does not provide all the necessary information, it can cause delays and serious consequences for patients in urgent need of care," Ms. Heisler says. "We're using our findings to develop targeted education programs to improve the quality of referrals."



Research has shown that people living with IBD who reside in rural locations may have worse disease-related outcomes compared to those living closer to specialist centres.

"We're using data to develop a deep understanding for what the end users of the system experience."

At the same time, Dr. Jones is leading a TRIC grant-funded study working with IMIT Virtual Care (formerly N.S. Telehealth) to explore the use of distance models for improving access to care. "We want to design a platform that allows specialists in Halifax to connect with primary health care providers and patients across the province," she says. "This will expedite diagnosis while deepening providers' understanding of symptoms and the pathways to care."

Putting Better Care in Patients' Hands

Dr. Jennifer Jones has teamed up with developers in the Faculty of Computer Science at Dalhousie University to create a mobile app to help patients monitor and manage physical, psychological and social aspects of their IBD. "The app uses artificial intelligence to assess and provide feedback to patients based on their input," says Dr. Jones. "This includes information and advice as well as interventions based on cognitive-behavioral therapy." The app also feeds information back to the IBD program, flagging people who are in significant distress, so program staff can reach out to help them.

New Medication & a New Lease on Life

Tim Muise has struggled with the symptoms of Crohn's disease for more than 20 years and tried many medications to ease the pain. He eventually found a medication that helped, but its effectiveness did not last. When NSHA nurse practitioner Barb Currie suggested a clinical trial, he jumped in.

"I'd never been in a trial before, and it seemed like a good way to give back," says Muise, who started the double-blinded randomized controlled trial of a new subcutaneous biologic in April 2017. "At first I didn't do well… I must have been randomized to the placebo… so they put me on the study drug. I also cut way back on sugar, dairy products and bread. Between the diet and the drug, I feel much better."

"At first I didn't do well…Between the diet and the study drug, I feel much better."

Since starting the medication, the lining of Muise's large intestine has begun to heal. "This is the first time in all these years they've found healing when they do the endoscopes," he says, noting that Dr. Dana Farina is his gastroenterologist.

It's reassuring to be on a trial. "The study team is really on top of my situation," says Muise. "In addition to ongoing care from my NP, Barb, the study coordinator, Phyllis Durning, is following my bloodwork and other results closely to make sure I'm on track."

Patient Tim Muise (right) sits as research coordinator Phyllis Durning takes his vital signs. Tim has been feeling better since starting a medication being studied at the QEII Health Sciences Centre.

Raising the Bar on Treatment & Outcomes Through Clinical Trials

New drugs are helping IBD patients achieve sustained relief from disruptive and painful symptoms. Clinical trials are the key to making these new medications available.

"Currently, we're participating in twelve clinical trials," says research coordinator Phyllis Durning. "These are international, multi-centre studies involving 200 to 400 centres."

Some of the new treatments are gut-specific biologics designed to reduce inflammation in the intestinal tract. The goal is to alleviate symptoms without compromising overall immunity.

Other new treatments are easier for patients to take.

"We're currently conducting trials of subcutaneous and oral medications that patients can administer themselves," notes research coordinator Shari Smith. "To be able to take a pill or do an injection at home, instead of coming to hospital for an IV, is a great benefit for patients."

Sometimes patients have good initial results with a medication, but its effectiveness wanes over time. Other patients have not responded to any of the treatments they've tried and desperately need a new option.

"Any new drug trial presents an opportunity to benefit patients," remarks Durning. "If we can achieve mucosal healing in the bowel, we can help patients feel better and improve their quality of life."

Managing the Epidemic of Fatty Liver Disease

Fatty liver disease has reached epidemic proportions in Nova Scotia. "I see 20 or more new patients with advanced inflammatory fatty liver disease every week," says Dr. Magnus McLeod, an internist who specializes in liver disease. "Two nurse practitioners see five to ten less severe new patients a week."

Rising rates of fatty liver disease mirror the epidemic of obesity and diabetes worldwide.

"It's estimated that 25 per cent of adults around the globe have fatty liver disease," notes Dr. McLeod. "In Nova Scotia, an estimated 35 to 40 per cent of the adult population is affected."

As many as 25 per cent of patients with fatty liver disease have the inflammatory subtype known as NASH—non-alcoholic steatohepatitis—which can lead to scarring in the liver. Left untreated, this can progress to cirrhosis and liver failure, with transplant the only route to survival.

Dr. McLeod and Dr. Kevork Peltekian, hepatologist and head of the Division of Digestive Care & Endoscopy, are leading NSHA's involvement in several international clinical trials of potential therapies. These include trials of new medications designed specifically for NASH, as well as studies to see if drugs used to treat diabetes could also help prevent the progression of fatty liver disease.

"There are so many factors involved, from insulin resistance, to bile acid regulation, to the gut microbiome… a cocktail of agents may be required," says Dr. McLeod, adding, "Every patient is different… ultimately we're looking at personalized medicine."

If fatty liver disease is diagnosed early enough—before it progresses to the inflammatory stage that accelerates scarring and leads to cirrhosis—it can be halted and even reversed with weight loss and lifestyle changes. The challenge is twofold: most patients are unable to lose the weight and keep if off, and it is difficult to accurately pinpoint the stage of disease and monitor its response to treatment. "Liver biopsy is the current gold standard, because blood tests of liver enzymes give high rates of false positives and false negatives," Dr. McLeod explains. "We have a fibroscan that uses ultrasound and other vibration waves to measure liver elasticity, but we're collaborating with Radiology to develop far more precise measures."

35

to 40% of the adult population of NS is affected by fatty liver disease.

This is higher than the global estimate of 25%.

Dr. Peltekian and Dr. McLeod send patients to radiologist Dr. Sharon Clarke, who has an Atlantic Innovation Fund award with BIOTIC to create MRI algorithms that reveal detailed information about the amounts and kinds of fat in the liver and the risk of serious progressive disease.

"These tools will dramatically improve our ability to reduce the toll of fatty liver disease," says Dr. McLeod, who is also developing a program to help motivated patients lose weight.

Improving Polyp Detection to Prevent Cancer and Save Lives

Although colon cancer is not in the spotlight like breast and prostate cancer, it is the second-most common cancer in Nova Scotia in both women and men. And, rates are higher in Atlantic Canada than the rest of the country.

"The key to reducing the risk of colon cancer is to find and completely remove all polyps, which are clumps of precancerous cells," says Dr. Donald MacIntosh, NSHA gastroenterologist and head of the Nova Scotia Colon Cancer Screening Program. "If you don't find the polyps, or if any part of a polyp is left behind in a colonoscopy, the patient is at risk of developing cancer. That's why we are rigourously collecting and analyzing data about how well our specialists are performing colonoscopies in the province."

Results of these quality assurance studies—conducted in part by gastroenterology resident Dr. Matt Miles—are used to identify where clinicians need further training to perfect their skills.

Nova Scotia launched province-wide colon cancer screening in 2009, collecting stool samples from citizens aged 50 to 74. If any traces of blood are found in the sample, the person is called in for a colonoscopy.

"There are a lot of questions to be asked and answered and we can lead the country in this."

"About 10 per cent of people screened will require a scope and polyps will be found and removed in about 60 per cent," notes Dr. MacIntosh. "About one per cent of people with a positive test will have bowel cancer."

When cancer is found, the cure rate is 85 to 95 per cent if it's removed before it has spread. Once metastasized, cure rates for colon cancer plummet to 10 or 15 per cent.

"The quality of the procedure is of paramount importance," says Dr. MacIntosh. "That includes how patients are advised to prepare for their colonoscopy."

There is currently no national standard for bowel preparation for colonoscopy. NSHA gastroenterologist Dr. Ian Epstein is leading the Nova Scotia arm of the national B-Clean study, comparing different regimens to see which lead to the highest polyp-detection rates.

Dr. Ian Epstein and Dr. Donald MacIntosh hold an endoscope, the main tool used in a colonscopy, the procedure used to detect and remove polyps (clumps of pre-cancerous cells).

"We really need to be able to advise our patients as to how much fluid to consume, whether or not to fast, and what laxative formula they should use," remarks Dr. Epstein. "We enrolled 300 patients in this study and will work with our colleagues across Canada to translate our findings into clinical practice guidelines."

Nova Scotia is poised to expand its research in the realm of colon cancer screening, detection, and early intervention. "We're building a comprehensive database," notes Dr. MacIntosh. "There are a lot of questions to be asked and answered and we can lead the country in this."

Role of Learners in Research

Learners Make Research Happen

A big part of building capacity for research is attracting learners to complete projects. As the Division of Endoscopy & Digestive Care steadily builds its base of full-time research staff and funding for investigator-initiated research, more learners are showing up to get involved.

"Residents play a big role in the division's research efforts"

says Dr. Ian Epstein, director of gastroenterology resident research and internal medicine postgraduate education. "Most residents conduct at least one project in each of their five years, which adds up to a significant contribution."

Over the past several years, residents have published and presented findings on topics including: the use of probiotics in colitis; the cost-effectiveness of fecal calprotectin as a marker for IBD; effects of blood thinners on gastrointestinal bleeding; what markers found in endoscopies are most predictive of malignancies; a variety of issues around hepatitis C, chronic liver disease and organ transplant, and many more.

"We are also supervising a growing number of medical students from Dalhousie," remarks Dr. Jenn Jones. "And now we are getting ready to make the next big step, to recruit graduate students to do their thesis projects with us. This will allow us to embark on more complex epidemiological research."

As she notes, learners often bring fresh ideas, energy, and dedicated time to conduct the many detailed tasks that research requires.

Spotlight on Resident Research

Senior gastroenterology resident Dr. Matthew Miles has been involved in a myriad of research projects during his residency training. Most recently, he surveyed IBD care providers from coast to coast, to help Dr. Jennifer Jones and Courtney Heisler chart the landscape of IBD care in Canada.

"We wanted to learn what kinds of services and resources are available, in what clinics, with what kind of staff mixes," explains Dr. Miles. "This information will help us improve care both nationally and locally, by locating gaps that need to be filled and identifying successful approaches we could adopt here."

Dr. Miles has also played a key role in research to measure and improve the quality of colonoscopies performed in Nova Scotia, and taken part in studies involving the treatment of recurrent hepatitis C in liver transplant recipients and drug-induced liver dysfunction.

Senior gastroenterology resident Dr. Matthew Miles

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