



# Research & Innovation

## ANNUAL REPORT 2019

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# The Power of Partnerships

A message from Dr. Gail Tomblin Murphy, Vice President, Research & Innovation

It's been less than a year since I stepped into the role of VP of Research and Innovation at the Nova Scotia Health Authority, yet, in that short time I have been inspired by such a strong sense of shared vision, cooperation and partnership. I hope you will also be inspired as you read through this report, which highlights just some of the vital research and innovation partnerships that are leading the way to better health care and outcomes for Nova Scotians.

Research and innovation are fundamental to everything we do at NSHA—and partnership is fundamental to research and innovation. Working closely with our partners and stakeholders, and listening to and understanding their goals, challenges and concerns, helps us clarify our shared priorities and align our research and innovation efforts to meet health care needs, together. Whether it's liaising with senior decision-makers in government, connecting with industry partners, collaborating with research networks across Canada and around the world, or meeting with patients and communities across our province, partnership permeates our activities at every level.

In this report, you'll read about the researchers working to empower Nova Scotians to be more physically active, prevent cognitive declines that can occur in older people after surgery, monitor patients' well-being from a distance, advance diagnostic imaging in emergency settings, make radiation safer, and improve the diagnosis and treatment of serious mental illness and Lyme disease.

Even though we face many challenges in our province when it comes to health—with our aging population and high rates of chronic disease—we are blessed with a truly extraordinary attitude in our culture that embraces cooperation over competition and the sharing of information over the guarding of it. As a result, we enjoy incredibly productive partnerships with Dalhousie University, Cape Breton University, Mount Saint Vincent University, St. Francis Xavier University, Cape Breton University, Nova Scotia Community College, Acadia University and other universities, the IWK Health Centre, the Government of Nova Scotia, QEII Foundation and the other 41 health care foundations in the province, a wide range of non-governmental organizations, and the private sector. Our flagship TRIC health care improvement program continues to be fundamental to our



**Dr. Gail Tomblin Murphy** is an internationally recognized expert in needs-based approaches to health systems and workforce planning, evaluation and research. In addition to her own research and her leadership role at the Nova Scotia Health Authority, she is director of the World Health Organization/Pan American Health Organization Collaborating Centre on Health Workforce Planning and Research.

health system in Nova Scotia. As you'll see in this report, the investment and impact continue to grow. Partnerships allow us to make the most of our resources while making the greatest impact on clinical practice, health service delivery and health system design.

Our many partners are providing crucial input to new strategic directions for research at NSHA. These will be unveiled in the months to come, along with the action plan and evaluation framework we will need to move forward, focus our efforts, build capacity and support and measure our success. One thing I know for certain is that, whatever success we achieve, it is entirely due to the power of partnerships.

Yours sincerely,

Gail Tomblin Murphy



# Proactive Health Care

## Prescribing exercise to improve Nova Scotians' health

Health care providers in Nova Scotia may now prescribe daily exercise as part of health care, thanks to Exercise is Medicine Nova Scotia (EIM-NS), part of an international initiative to make exercise a go-to intervention for people with chronic disease.

*“As much as 80 per cent of all disease in primary care is chronic, and preventable factors contribute to most chronic disease,” says project lead Dr. Jonathon Fowles, an NSHA-affiliated scientist and kinesiology professor at Acadia University in Wolfville, N.S. “While many factors contribute to disease, physical activity is hugely important in prevention and management and, with help, is something patients can do to take charge of their own health... 30 minutes of moderate exercise a day reduces premature mortality by 30 to 40 per cent, while 75 minutes reduces it by 70 to 80 per cent.” The result is added years of independent living for active Nova Scotians and savings of at least \$25 million a year for the province.*

*“Thirty minutes of moderate exercise a day reduces premature mortality by 30 to 40 per cent.”*

### Addressing cancer patients' and survivors' special needs

Research shows exercise reduces cancer recurrence risk and improves function, well-being and survival. But cancer patients and survivors face such challenges as pain, muscle wasting and fatigue that make exercise difficult. NSHA-affiliated scientist Dr. Melanie Keats and Cancer Care Nova Scotia have launched ACCESS\* (Activating Cancer Communities through an Exercise Strategy for Survivors) to test the outcomes of an exercise program tailored to cancer patients' needs.

A peek at the prescription pad N.S. health care providers are using

EIM-NS is a research and knowledge translation partnership involving NSHA and several universities, health professional associations and provincial disease care programs, endorsed by the Chief Medical Officer of Health. Its first step surveyed more than 600 health professionals in the province.

*“Many health care providers reported moderate confidence in counselling patients on physical activity and low confidence in prescribing exercise programs,” says Dr. Fowles. “More than 80 per cent wanted more education.”*

The EIM-NS partnership set out to teach providers how to appropriately counsel patients about physical activity and safely and effectively prescribe exercise, through a series of workshops, grand rounds, webinars and publications.

*“Exercise is Medicine Nova Scotia is changing practice,” notes Dr. Fowles. “Providers’ attitudes and behaviours about prescribing exercise are changing and we have mobilized networks linking providers to fitness programs, professionals and facilities across Nova Scotia, to help patients follow through to become more active.”*

*“We’ll be comparing participants to a control group to see if the program reduces visits to the doctor’s office or emergency room, use of medications, or hospital stays,” says Dr. Keats. “If we can show that people are feeling and doing better, we will have a case for launching similar exercise programs for cancer patients and survivors across Nova Scotia.”*

*\*ACCESS is funded by CIHR, NSHA, the QEII Foundation, the Canadian Centre for Applied Research in Cancer Control and the Quebec Breast Cancer Foundation.*





# Proactive Health Care

## Protecting aging brains from anesthesia risk



Dr. Michael Schmidt (centre) in the operating room with former student Yaeesh Sardiwalla (left) and research coordinator Vera Lloyd (right)

Researchers at NSHA and Dalhousie University have teamed up to take a big-data approach to solving a common problem known as post-operative cognitive decline (POCD). This is a sudden drop in cognitive function that can occur especially in older patients after surgery and general anesthesia, particularly if they already have any issues with cognition.

Project co-lead Dr. Michael Schmidt—an anesthesiologist at NSHA and professor of anesthesia at Dalhousie—has focused his research on making anesthesia safer, including identifying and mitigating risks of developing POCD. He is working in partnership with co-lead Dr. Gail Eskes, an NSHA-affiliated scientist and professor of psychiatry and psychology & neuroscience at Dalhousie.

*“We are creating tools that will help us to assess people’s risk of POCD before surgery, and to investigate whether any post-operative cognitive changes are linked to the surgical/anesthesia variables routinely monitored during the surgery,” says Dr. Eskes. “More information on risk and outcome can help patients make better-informed decisions and potentially identify ways that surgery and anesthesia protocols can be adjusted and monitored to minimize the risk.”*

Dr. Schmidt and Dr. Eskes have teamed up with other researchers in the Department of Anesthesia, as well as

computer science professor Dr. Stan Matwin, to develop these tools. A grant from the NSHA Research Fund allowed the researchers first to show that the Dalhousie Computerized Attention Battery (DalCAB, a series of tests Dr. Eskes’ team developed to measure various cognitive functions) is feasible to use and sensitive enough to detect small changes in cognition after surgery.

Now the researchers are conducting a larger study with 100 more surgery patients. By comparing the cognitive performance of these patients to that of a large control group of people who are not undergoing surgery, they aim to confirm what cognitive changes are occurring and what factors about the patient, the type of surgery and the anesthesia are influencing these changes. This study is funded by the Centre for Aging and Brain Health Innovation (CABHI), based in Toronto.

*“Huge amounts of data are collected during surgery... our computer science collaborator, Dr. Matwin, is working on machine learning algorithms that will collapse this into meaningful information that will allow us to identify what factors play the biggest role in risk for POCD,” notes Dr. Eskes. “Our goal is to create tools that hospitals around the world could use to identify patients at risk and optimize assessment and intraoperative protocols to best protect people’s brains.”*



# Distance Health Care

## New remote technologies protect patients' hearts

NSHA researchers are leading the way to keeping patients with cardiac arrhythmia safe. Many of these patients receive implantable defibrillators that monitor their heart rhythm patterns and correct any irregularities by setting a steady pace or sending a shock to the heart. But, as cardiologist Dr. Ratika Parkash explains, as many as 18 per cent of Nova Scotians with ventricular tachycardia (the most life-threatening arrhythmia) refuse the device because they would need to travel a long distance to Halifax for regular device check-ups that ensure their safety.

*"The trip to Halifax to have the defibrillator checked is too costly and time-consuming for some patients... they opt out even though it puts them at higher risk of dying," says Dr. Parkash. "That's why we are developing and testing methods of monitoring the function of the devices from a distance."*

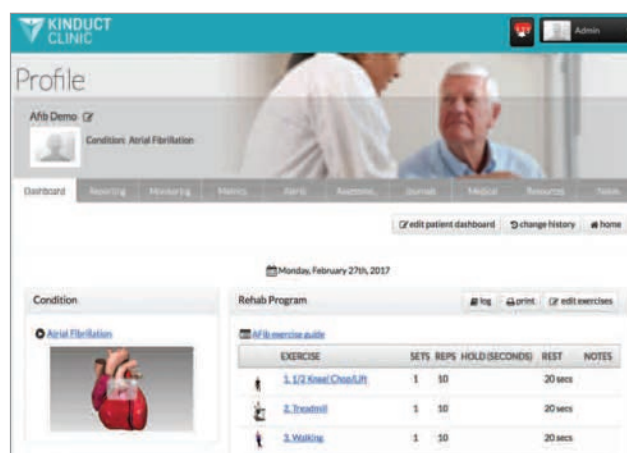


Dr. Ratika Parkash and heart patient Rose Anne MacIsaac, a member of the patient advisory council for one of Dr. Parkash's studies

The problem is not confined to Nova Scotia. In fact, Dr. Parkash is heading an 18-centre, Canada-wide study to test a remote technology that allows patients to plug their defibrillator into a wall outlet, through which it transmits information about its own function to their device clinics. If there are any problems, the patient must bring in the device for servicing. The researchers are also testing a web-based app called VIRTUES (Virtual Integrated

Reliable Transformative User-driven E-health System) that allows clinic staff to send personalized information directly to patients about their devices and how they're helping them. Dr. Parkash is part of the Cardiac Arrhythmia Network that developed VIRTUES.

Locally, a \$25,000 grant from the NSHA Research Fund has allowed Dr. Parkash to team up with Kinduct, a Halifax-based health technology firm. Together they're developing and testing Kinduct AF and Kardiomobile, a platform for monitoring and educating people with atrial fibrillation, an arrhythmia of the heart's upper chambers.



A look inside the Kinduct AF app

*"When they have symptoms, patients put their finger on a wireless pad that is essentially a single-lead ECG," Dr. Parkash explains. "This interacts with an app that gathers the heart rhythm data, puts it into a PDF and sends it to the patient's phone along with personalized advice through the Kinduct AF platform about what to do. Patients can also use the app to message their care providers."*

The new technologies are already making an impact, even in the testing stage. *"We're getting very positive feedback from patients," Dr. Parkash says. "We're doing a massive overhaul of the follow-up system, putting more power and information in patients' and providers' hands and connecting them for easier, more effective information exchange."*



# Distance Health Care

## Putting proven tools in place to manage joint problems, cut surgery waitlists

Nova Scotians with severe hip and knee pain will receive more timely care, customized to their needs, with the rollout of a suite of new technologies across the province this year.

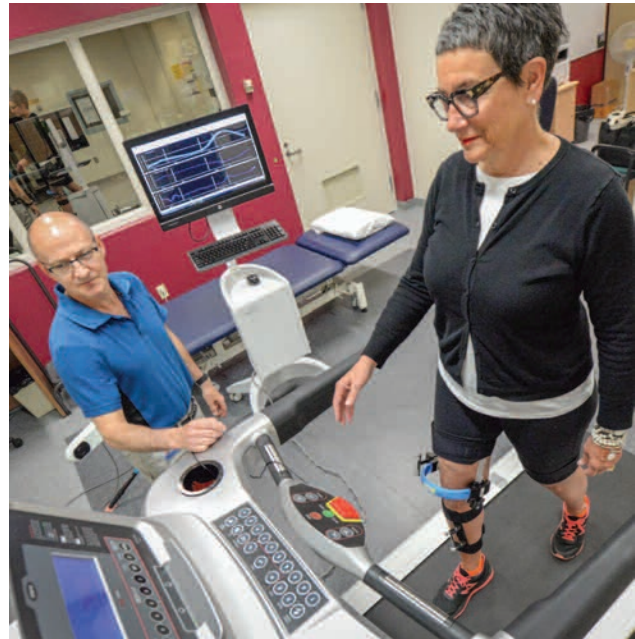
*“This is the culmination of five years of clinical studies to validate the effectiveness of these tools,”* says Dr. Michael Dunbar, orthopedic surgeon and leader of the Atlantic Canada Opportunities Agency-funded project first announced in 2014 as Mobility@Capital Health. *“Now we are in the implementation science phase.”* New ACOA funding of \$2 million announced in 2019 is supporting NSHA to determine exactly what needs to be done to integrate the now-proven tools into patient care province-wide.

The project is a partnership between NSHA, ACOA and three private firms: Emovi, makers of KneeKG, a knee-assessment system that analyzes the 3-D structure and function of the knee in motion; OrthoMX, a local company that developed InStride, a smartphone app that tracks and analyzes walking patterns (gait); and another Halifax firm, Kinduct Technologies, whose Kinduct Clinic web portal grants patients access to their own orthopedics records, gait analysis and KneeKG reports, customized exercise plans and instructions.



Image of the InStride app

*“These tools work together to give patients the opportunity to play a more active role in their own care, relieve the burden of unnecessary travel, and provide faster access to the most appropriate interventions,”* notes Dr. Dunbar. *“KneeKG,*



*KneeKG assessment systems in Halifax, Dartmouth, Cape Breton and the Annapolis Valley will identify which knee osteoarthritis patients to refer to surgery and which to refer to physiotherapy. The system will also indicate which exercises are optimal for stabilizing joint function—to delay or avoid the need for surgery and/or improve surgery’s results.*

*for example, allows us to evaluate if a person with osteoarthritis of the knee needs to see a surgeon urgently or if targeted physiotherapy exercises will improve joint function, relieve pain and reduce the urgency of the need to see a surgeon. This alone will take enormous pressure off wait times for surgery consults and joint replacement surgeries.”*

After surgery, patients will use InStride to capture information about their walking patterns on their phones and send it directly to their surgery team. *“Their gait patterns can tell us if something is not going as expected after surgery,”* notes Dr. Dunbar. *“If it’s a risk, they will need to come in for an appointment. If not, they may be able to avoid an unnecessary trip to Halifax.”*

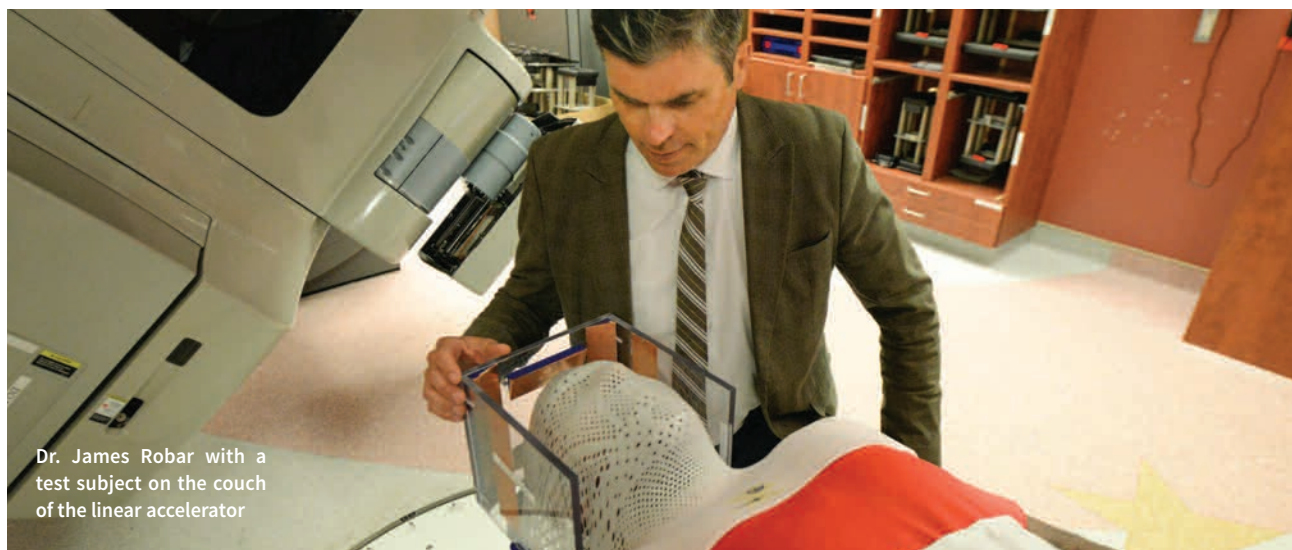
Nova Scotia is the first province in Canada to test and then adopt such an integrated set of tools for assessing and monitoring patients from a distance.





# Technological Advancements

Pioneering safer radiation technologies



Dr. James Robar with a test subject on the couch of the linear accelerator

Precision is the key to safe and effective radiation treatments that destroy cancer cells without harming healthy tissues—especially when irradiating around the vital structures of the brain or spinal cord. Here, the goal is to focus the radiation to cover the target within a millimetre. The challenge is to achieve this degree of accuracy when the location of the target—a human being—is constantly moving.

*“Even when patients with brain tumours are immobilized under a mask attached to the table, they are able to move up to several millimetres,”* says Dr. James Robar, chief of medical physics at NSHA and professor of radiation oncology at Dalhousie. *“We have to be able to detect their motion instantly, so we can intervene in the event of motion by either adjusting the treatment beam or realigning the patient.”*

Dr. Robar has invented a motion-sensing technology that detects even the slightest of a patient’s movements, in all three dimensions, by measuring a change in electrical charge versus electrical potential between an array of conducting sensors and the patient, many times per second.

*“Our intention is to commercialize the motion-tracking device so it is made available to patients around the world,”* Dr. Robar says. *“Not just for cranial tumours, but other cancers where there are vital structures to protect. In treating*

*spinal tumours, for example, the tumour may be just millimetres from the spinal cord, which we need to protect.”*

The Atlantic Canada Opportunities Agency’s Atlantic Innovation Fund and Germany-based Brainlab AG have invested \$3.6 million to support the development of this technology and four other innovations underway through Dr. Robar’s team.

Dr. Robar’s group has a track record of translating research into commercialization and clinical use. For example, Dr. Robar is advancing precision radiation as co-founder of Adaptiiv Medical Technologies Inc., a Halifax firm that is developing software solutions for customized patient accessories used in radiation therapy. These include patient-tailored boluses which ensure that the radiation dose is sufficient and accurate for tumours near the skin. Previously, clinicians had to hand-fabricate these from rubber or wax.

*“Adaptiiv software uses the data from a patient’s existing CT scan and allows the practitioner to develop a device that will fit perfectly to the patient,”* Dr. Robar explains, adding that Adaptiiv has grown from three employees to 21 and is selling its technology in 11 countries so far. *“As clinical medical physicists and scientists, we are uniquely positioned to identify challenges on the front lines of health care and develop innovations to address them.”*





# Technological Advancements

## NSHA partners in world's first studies of new MRI technology

Nova Scotians will be the first in the world to have access to brand new magnetic resonance imaging (MRI) technology, thanks to a research and development partnership between a Canadian firm, Synaptive Medical, and the Biomedical Translational Imaging Centre (BIOTIC) at the QEII Health Sciences Centre.

*"This is a whole new concept in MRI," says BIOTIC's scientific director, Dr. Steven Beyea. "Synaptive has re-engineered the equipment so it can be used in the emergency setting for brain-imaging studies of people coming in with acute neurological symptoms."*

MRI is a far more sensitive tool than CT for imaging the brain, but the machines are typically so large and require thousands of litres of liquid helium to operate, it has not been feasible to situate them in emergency rooms. The new MRI, a 0.5T magnet called Evry, is designed to image just the head and does not require liquid helium, making it compact enough to place at the point of care.



Michelle MacPherson (left), director of MRI Product Development, Synaptive Medical, Dr. Steven Beyea and Alex Panther (right), director of MRI Research & Development, Synaptive Medical

If someone comes in with dizziness, for example, clinicians need to determine if this is something acute that requires immediate treatment and a hospital stay, or simply an inner ear problem that could be treated through an outpatient clinic. When it comes to that diagnosis, the best technology for detecting pathology in the brain is MRI, Dr. Beyea says.

BIOTIC is partnering with Emergency Medicine, Neurology and Neurosurgery to design a series of clinical studies exploring the potential uses and benefits of the Evry MRI in an emergency setting.

*"This new partnership marks the culmination of two years of discussions between BIOTIC and Synaptive."*

*"If the research evidence shows the new equipment has value—in terms of diagnostic confidence, better use of health care resources, and patient experience—Canadians may see the Evry MRI landing in emergency rooms all across the country," Dr. Beyea says. "It could become the new standard of care."*

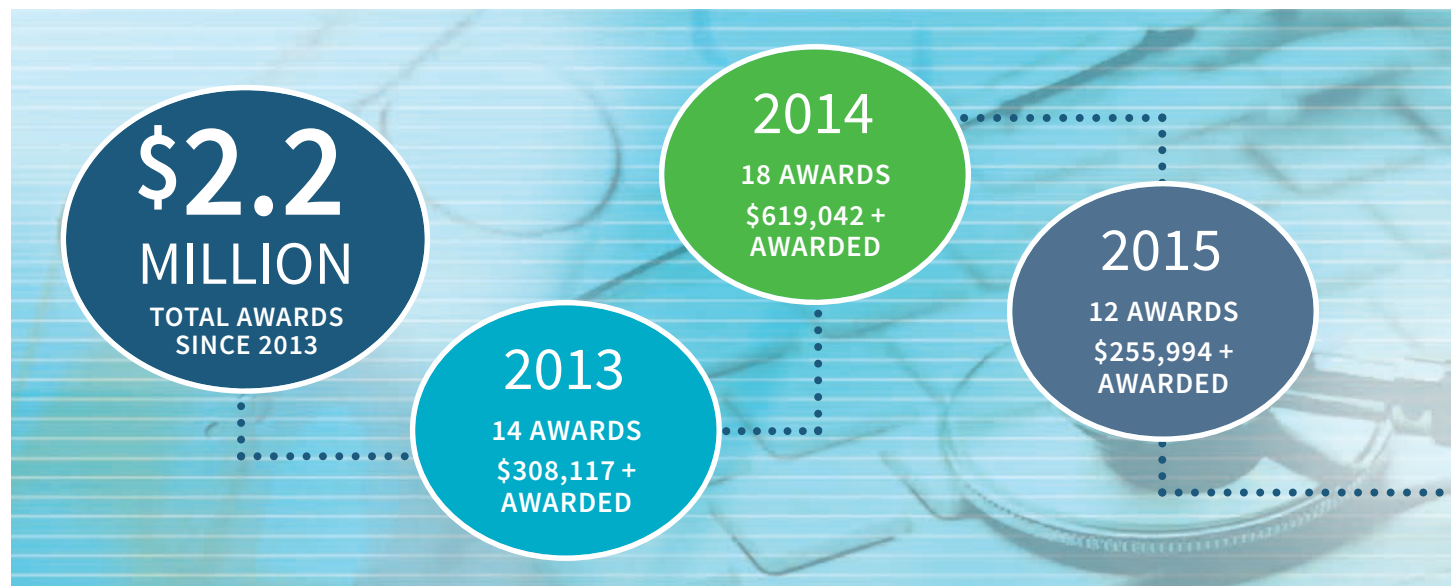
Renovations are underway to house the Evry MRI in the BIOTIC facility at the QEII, metres away from the Charles V. Keating Emergency and Trauma Centre. The Atlantic Canada Opportunities Agency has invested \$700,000, while the Research Nova Scotia Trust is contributing \$1.26 million to the project. Synaptive is providing \$1.4 million of in-kind contributions, marking a significant investment in Nova Scotia.

*"This new partnership marks the culmination of two years of discussions between BIOTIC and Synaptive," says Dr. Beyea. "They want to work with us to bring this new technology to the world."*



# Translating Research Into Care

Five years of research partnerships raise the bar on quality care



Since launching in 2013, Translating Research Into Care (TRIC) health care improvement research program has awarded more than \$2 million to 87 research teams at the QEII Health Sciences Centre and the IWK Health Centre to apply the latest research evidence to improving patient care.

*“Most of the funded projects were designed to improve service delivery and patient outcomes in core areas, such as primary care, acute care, chronic care, emergency care, rehabilitation, and mental health,”* notes Sandra Crowell, program leader for research development at NSHA. *“While many of the projects are still underway, we are already seeing benefits.”*

Among its many positive impacts, the TRIC program has encouraged the formation of dozens of new interdisciplinary and collaborative research teams at the QEII, NSHA and IWK. At the core of each team is the partnership between a scientific lead and an administrative lead.

*“It is a unique feature of TRIC that, in order to be funded, a project must be co-led by a scientist and a health system administrator or leader,”* notes Crowell. *“This ensures that research is designed to solve real-world problems and put results into action to create meaningful and sustainable change.”*

As one QEII researcher remarked in an evaluation of the TRIC program, *“The requirement of collaboration between administrative and scientific co-PIs from the outset of the conceptualization of the project to its completion is truly inspired... we plan to try to use this approach in all of our clinical research projects.”*

While much of the TRIC-funded research is still in progress, most studies have already published or presented preliminary findings and are well on the way to achieving their stated objectives. These include to:

- improve patient-reported outcomes
- reduce unnecessary interventions
- reduce need for health care
- reduce unnecessary costs
- reduce wait times

*“We are grateful to the QEII Foundation and IWK Foundation for supporting the TRIC program. It is stimulating a new way of thinking about health research in Nova Scotia,”* notes Crowell. *“It’s involving people who had never before seen themselves as researchers, creating a stronger research culture and a greater appreciation of how much difference we can make when we work together to bring our practices and systems in line with the evidence.”*

# Translating Research Into Care



## Shining a new light on diagnostic imaging in the emergency department

A series of TRIC grants is allowing one research team at NSHA to develop a new approach to managing patients who present to the emergency department with back pain.

*“Back pain is the third most common reason why people show up in emergency rooms across Canada—but only three per cent of these patients have a serious underlying problem that warrants emergency medical intervention, such as a tumour, disc infection or fracture,”* notes study lead Dr. Jill Hayden, an NSHA-affiliated scientist who is working in partnership with the Department of Emergency Medicine. *“And yet our research shows that 30 per cent of these patients are being sent for diagnostic imaging studies in emergency. Ideally, we think only about 10 per cent of patients would be sent for diagnostic imaging.”*

Such unnecessary diagnostic imaging bogs down the flow of patients through emergency and can cause undue stress and worse outcomes for patients if a structural abnormality unrelated to their back pain is found.

With TRIC funding, Dr. Hayden and her collaborators in Emergency Medicine have developed educational materials to help patients understand when diagnostic imaging is

useful for assessing the causes of back pain—and when it can cause more harm than good.

Dalhousie medical students have played an important role in the research, thanks to additional funding support from the medical school’s Research in Medicine program.

The strength of the TRIC-funded work enabled Dr. Hayden to secure \$800,000 from the Canadian Institutes of Health Research to run a four-year study in four emergency departments across Nova Scotia and two in Ontario.

*“We are recruiting 4,000 patients into this study, which will test a clinical decision tool we’re developing,”* Dr. Hayden says. *“The goal is to have a checklist physicians can use to rapidly identify the combination of factors that make it most likely a patient will benefit from diagnostic imaging for their back pain.”*

The researchers will follow the patients for one year. *“It’s an extensive follow-up survey,”* notes Dr. Hayden. *“It will shed a lot of light on how back pain is managed, with what results for patients, whether they received diagnostic imaging in the emergency department or not.”*





# The Power of Genomics

Mapping mental illness risk paves the way to earlier, more effective intervention



NSHA psychiatrists Dr. Martin Alda and Dr. Rudolf Uher are leading a Genome Canada-funded study to map 2,000 children's genetic risk of serious mental illness, with a focus on bipolar disorder.

*"We follow the participants, some for up to 20 years, to test the predictive power of the genetic risk scores," says Dr. Alda, noting that he and Dr. Uher are working in collaboration with the international Psychiatric Genomics Consortium. "Over time we will learn which of the millions of genetic markers for serious mental illness are most influential, in which combinations."*

Ultimately, the researchers are aiming for an accurate risk-prediction tool, so that young people can be monitored and diagnosed quickly if illness develops.

*"It is critical to know who is becoming ill and to distinguish between depression, bipolar disorder and schizophrenia early on," Dr. Alda says. "Suicide rates are very high in these diseases. Instead of risking a long period of trial and error, we want to be able to diagnose early and select the right treatment from the start."*

In fact, the Genome Canada study is also looking at genetic predictors of who will respond to which long-term treatments. *"We're collaborating with computer scientists to*

*crunch the data," notes Dr. Alda. "This will shed light on the meaning of the genetic profile."*

Genetic profiling, of course, carries certain risks of its own. That's why the study is also examining the ethics of returning genetic test results to the study's young participants.

*"We do not communicate risk unless there is action that can be taken to reduce the risk," says Dr. Uher, noting that this project is the first to disclose genetic information to minors. "For example, the presence of a certain marker increases the risk of serious mental illness eightfold among people who use cannabis, but has no effect on risk in the absence of cannabis. We would let participants with this marker know, because it is very important for them to avoid using cannabis."*

If there is nothing that can be done to reduce an individual's risk, Dr. Uher says the most ethical approach is to focus on personal strengths and support the development of healthy self-perceptions, attitudes and behaviours.

*"Parents who learn that their child is at risk may unwittingly treat the child as vulnerable in a way that undermines the child's confidence," Dr. Uher notes. "People can even stigmatize themselves based on such risk. Our goal is for genetic counselling to empower, not to stress."*



# The Power of Genomics

## Understanding how bacterial strains affect people with Lyme disease

Physicians in Lunenburg County are teaming up with infectious diseases specialists in Halifax—Dr. Todd Hatchette, Dr. Lisa Barrett and Dr. Shelly McNeil—to learn how different strains of Lyme-disease-causing *Borrelia* bacteria affect patients differently. A hotspot for blacklegged ticks, the main carriers of the bacteria, Lunenburg County has the highest rate of Lyme disease in Canada.

*“The Lunenburg physicians are helping us recruit patients into a long-term study we’re launching with the Canadian Lyme Disease Research Network, which was created with a \$4 million grant from the Canadian Institutes of Health Research,” explains Dr. Hatchette. “We’ll be collecting and analyzing blood samples and skin biopsies taken from the characteristic Lyme disease rash, and tracing patients’ experience, treatment and outcomes over time.”*

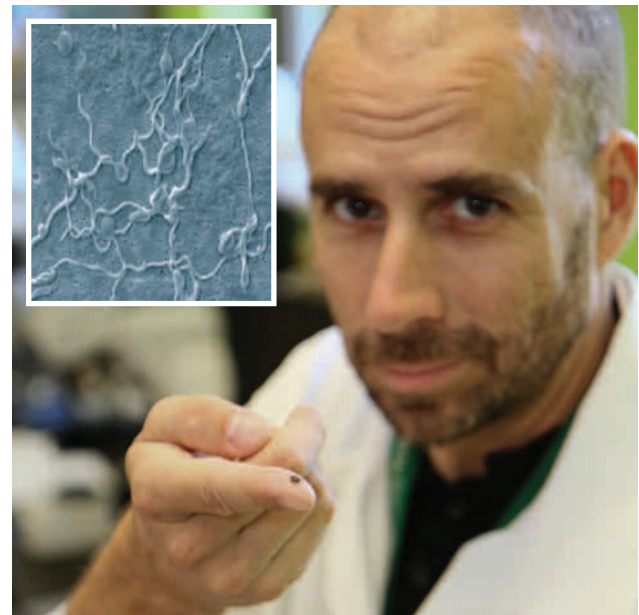
“Together these studies will allow us to determine what strains are showing up in the ticks and compare these to the strains showing up in people...”

At the same time, Genome Canada is funding the researchers to conduct a study that will see a team of tick-collectors out in the field around Lunenburg. These ticks will be sent to collaborators at the National Microbiology Lab in Winnipeg, who will identify what strains of the *Borrelia* bacteria the ticks are carrying. Genomics researchers at Dalhousie University’s Centre for Comparative Genomics & Evolutionary Bioinformatics will do further molecular analyses of the *Borrelia* strains in humans.

*“Together these studies will allow us to determine what strains are showing up in the ticks and compare these to the strains showing up in people,” Dr. Hatchette says. “We will learn how many unique strains of the *Borrelia* bacteria we have in Nova Scotia and be able to see which symptoms*

*are associated with which strains of bacteria and how the severity of symptoms varies by strain.”*

As Dr. Hatchette explains, some strains may cause a severe infection that affects the whole body, while others may produce only a minor infection that’s contained to the location of the original tick bite.



Dr. Todd Hatchette with a tick. Inset: *Borrelia burgdorferi*, a common Lyme-disease-causing bacterial strain

*“Ultimately, we want to know how the strain variation affects the clinical presentation of Lyme disease and eventual outcomes for patients,” he says. “This work will also evaluate whether this strain variation affects testing and lay the groundwork for developing more sensitive tests to improve diagnosis of early infection.”*

There is another future benefit to this research. The CIHR funding has allowed the NSHA researchers to hire a research nurse and begin creating the infrastructure for clinical research in Lyme disease. *“There are already vaccines for Lyme disease in the development pipeline,” Dr. Hatchette says. “We want to have our clinical research capacity up and running and ready to roll with early-phase vaccine trials.”*



# Nova Scotia Health Authority Research Fund Awards

September 2018 Nova Scotia Health Authority Research Fund Award Recipients			
NAME	DEPARTMENT	AWARD	RESEARCH DESCRIPTION
Dr. Jonathan Bailey	Anesthesiology	\$4,844 Cat. 3	Health care resource and costs comparison between spinal anesthesia in a block room versus general anesthesia for primary hip and knee arthroplasty: an economic analysis
Dr. Garrett Barry	Anesthesiology	\$4,893 Cat. 3	Factors associated with rebound pain after peripheral nerve block for ambulatory surgery: a single-centre retrospective cohort study
Dr. Susan Bowles	Geriatrics	\$25,000 Cat. 2	Pharmacist led intervention to improve medication use in frail older inpatients: sustainability and impact on rehospitalization and mortality
Dr. Sean Christie	Neurosurgery	\$25,000 Cat. 2	Can we better predict long term success of permanent spinal cord stimulators?
Dr. Ian Davis	Infectious Disease	\$21,374 Cat. 2	Does increased vancomycin MIC increase the risk of complications in patients with methicillin sensitive Staphylococcus aureus blood stream infections? A retrospective review
Dr. Matthew Grandy	Family Medicine	\$24,944 Cat. 2	Primary care prescribing patterns for non-cancer patients on chronic and high dose opioid therapy: an observational study using Electronic Medical Record data
Dr. Weei-Yuam Huang	Pathology	\$24,958 Cat. 2	Analysis of unclassified sarcoma using targeted RNA sequencing
Dr. Caitlin Lees	Palliative Medicine	\$3,852 Cat. 3	Completion of medical assistance in dying in Nova Scotia: what have we learned so far?
Dr. Janny Ke	Anesthesiology	\$5,000 Cat. 3	Machine learning modelling of intraoperative hemodynamic predictors of 30-day mortality and major in-hospital morbidity after noncardiac surgery: a retrospective population cohort study
Dr. William MacKinnon	Pathology	\$4,870 Cat. 3	Is there overlap between cutaneous nodular hidradenoma and adenomyoepithelioma? Clarification of a nosologic quandary
Dr. Ruth Martin Misener	School of Nursing, Dalhousie University	\$24,936 Cat. 2	How is complexity experienced and categorized in primary care practices in Nova Scotia? Developing and validating a complexity tool for primary care
Dr. Natalie Parks	Neurology	\$3,262 Cat. 3	Comorbidity and persistence of disease-modifying therapy for relapsing remitting multiple sclerosis
Dr. Alex Pizzo	Psychiatry	\$4,607 Cat. 3	Factors involved in the development of anxiety
Dr. Karthik Tennankore	Nephrology	\$24,774 Cat. 3	Validation of a risk prediction model for urgent dialysis after ambulance transport to the emergency department
Dr. Mehmet Topyurek	Psychiatry	\$2,521 Cat. 3	The association between caffeine intake, cognitive functioning and symptomatology in schizophrenia patients
Dr. Amanda Vinson	Nephrology	\$35,091 Cat. 1	Kidney graft loss in female recipients of male kidneys: the effect of pre-transplant pregnancy





## March 2019 Nova Scotia Health Authority Research Fund Award Recipients

NAME	DEPARTMENT	AWARD	RESEARCH DESCRIPTION
Dr. Michael Carter	Pathology	\$49,990 Cat. 1	Molecular profiling of Merkel cell carcinoma and related tumors
Dr. Lee Kirby	Physical Medicine & Rehabilitation	\$24,415 Cat. 2	Effectiveness and cost utility of wheelchair skills training for caregivers of manual wheelchair users: a randomized waitlist controlled trial
Dr. Lisa Barrett	Infectious Disease	\$25,000 Cat. 2	Assessing a model for hepatitis C elimination: measuring patient, provider, and health systems outcomes during point-of-care testing an intervention to increase access to care
Dr. Kathryn McIsaac	Outcome Scientist, Research & Innovation	\$25,000 Cat. 2	Does neighborhood influence rotavirus infection? A population based study exploring neighborhood inequalities and incidence of acute gastroenteritis
Dr. Andreu Costa	Diagnostic Radiology	\$25,000 Cat. 2	Comprehensive liver health MRI to diagnose and stage non-alcoholic steatohepatitis
Dr. Sharon Clarke	Diagnostic Radiology	\$24,119 Cat. 2	Diagnoses of hepatocellular carcinoma using free breathing dynamic contrast-enhanced MRI and recurrent convolutional neural networks: a pilot study
Scott Kehler	Geriatric Medicine	\$25,000 Cat. 2	Frailty as a mediator of long term cardiac rehabilitation outcomes
Dr. Jacob Alant	Surgery, Neurosurgery	\$25,000 Cat. 2	Occult bacteria discitis and Modic change in patients receiving surgical therapy for lumbar disc herniation
Dr. Sonja McVeigh	Medicine	\$25,000 Cat. 2	Plasma melatonin levels after acute traumatic spinal cord injury in individuals with complete and incomplete cervical spinal cord injury
Dr. Ali Carter	Emergency Medicine	\$24,774 Cat. 2	Understanding the experience of patients and families with non-cancer advanced disease states in accessing palliative support for symptom crises
Dr. Ali Imran	Endocrinology	\$25,000 Cat. 2	Acromegaly facial features – novel strategies comparing patients, specialists, and computerized facial recognition software
Dr. Edmund Tan	Anesthesia	\$24,913 Cat. 2	Preoxygenation for endotracheal intubation: high flow versus conventional preoxygenation therapy
Amanda Hagen	Psychiatry	\$5,000 Cat. 3	Dose response relationship of alcohol on self-relevant negative thought content in major depressive disorder
Dr. Sean Rasmussen	Pathology	\$5,000 Cat. 3	Implementing deep learning for computer-assisted diagnosis of signet ring cell carcinoma

## NSHA Research Fund Committee

Dr. Kim Good, <i>Co-Chair</i>	Dr. Jillian Banfield	Dr. Kelly Dakin	Dr. Todd Hatchette	Dr. Jennifer Payne
Dr. Gordon Gubitz <i>Co-Chair</i>	Dr. Lisa Barrett	Dr. Gail Eskes	Dr. Chris Kenyon	Dr. Madelaine Plourde
	Dr. Steven Beyea	Dr. Dan Gaston	Dr. Olga Kits	Dr. Ravi Ramjeesingh
	Dr. Jeremy Brown	Dr. Ron George	Dr. Jason LeBlanc	Dr. Gabrielle Richard
	Dr. Cynthia Calkin	Dr. Andrew Glennie	Dr. Emily Marshall	Amanda Tinning
	Dr. Sean Christie	Dr. Judah Goldstein	Dr. Paige Moorhouse	Dr. Robin Urquhart
	Dr. Sharon Clarke	Dr. Wenda Greer	Heather Neville	



# QEII/IWK Translating Research Into Care (TRIC) Awards

## May 2018 TRIC Award Recipients

NAME	AWARD	RESEARCH DESCRIPTION
Dr. Jennifer Hancock & Patricia Daley	\$2,995 Level 1	Promoting resiliency in ICU health care professionals
Dr. Jill Hayden, Dr. Sam Campbell & Louise Cornish	\$3,000 Level 3	Opioid use following opioid prescription for non-specific low back pain in Nova Scotian emergency departments
Dr. Jennifer Jones & Kim Munroe	\$2,937 Level 1	Implementation of virtual digestive care medical neighborhoods in Nova Scotia
Dr. Erna Snelgrove-Clarke & Nancy Cashen, Diane O'Reilly, Dr. Gail Tomblin Murphy & Jennifer West	\$2,924 Level 1	Building a research team: caring for women who live with obesity during pregnancy, birthing and post-partum

## November 2018 TRIC Award Recipients

NAME	AWARD	RESEARCH DESCRIPTION
Dr. Alix Carter & Lori Sanderson	\$2,988 Level 1	Feasibility assessment for a provincial palliative notification system to reduce interventions for patients receiving palliative care transported by ambulance to the emergency department
Dr. Paige Moorhouse & Brian Butt	\$3,000 Level 1	Applying a frailty lens to care planning on medicine inpatient units
Dr. Rick Gibson & Dr. Tara Sampalli	\$2,931 Level 1	Integrating quality in practice: understanding the needs for education, training and practice supports in primary health care
Dr. Judah Goldstein & Angela Quinn	\$2,972 Level 1	The co-creation of an emergency department-based discharge-to-assess (D2A) model of care: a planning grant
Dr. Robert S. Green & Lewis Bedford	\$3,000 Level 1	Planning for development, implementation and evaluation of a standardized trauma transfer record: surveying the opinions of physicians and trauma patients in Nova Scotia
Dr. Benjamin Heisler & Marcy Saxe-Braithwaite	\$2,999 Level 1	Review of policy associated with postoperative management of patients with obstructive sleep apnea
Elizabeth Wilcox, Valorie Shaddick & Debbie Burns	\$2,997 Level 1	Laying the groundwork to implement an early warning score at Colchester East Hants Community Centre
Dr. Lisa Barrett & Charles Heinsteint	\$59,998 Level 3	Positive prevention: community-based implementation of HIV prevention tools for harm reduction
Dr. Jordan Sheriko & Krista Sweet	\$59,940 Level 3	Nova Scotia Hip Surveillance Program for Youth with Cerebral Palsy

## TRIC Grant Review Committee

Dr. Erna Snelgrove-Clarke & Victoria van Hemert <i>Co-Chairs, May 2018</i>	Dr. Melissa Andrew Dr. Richard Braha Matt Campbell Dr. Jill Chorney Dr. Amy Grant Mary Ellen Gurnham	Dr. Jill Hatchette Dr. Jill Hayden Sandi Kidston Dr. Margot Latimer Jyl MacKinnon Anne MacPhee	Dr. Lidija Marusic Randi Monroe Brad Osmond Annette Rushton Holly Sinclair Dr. Phil Tibbo	Dr. Robin Urquhart Jennifer West Kirk Yanofsky Dr. Robin Urquhart
Dr. Jill Hatchette & Randi Munroe <i>Co-Chairs, November 2018</i>				

# Award Totals for Research Conducted at NSHA

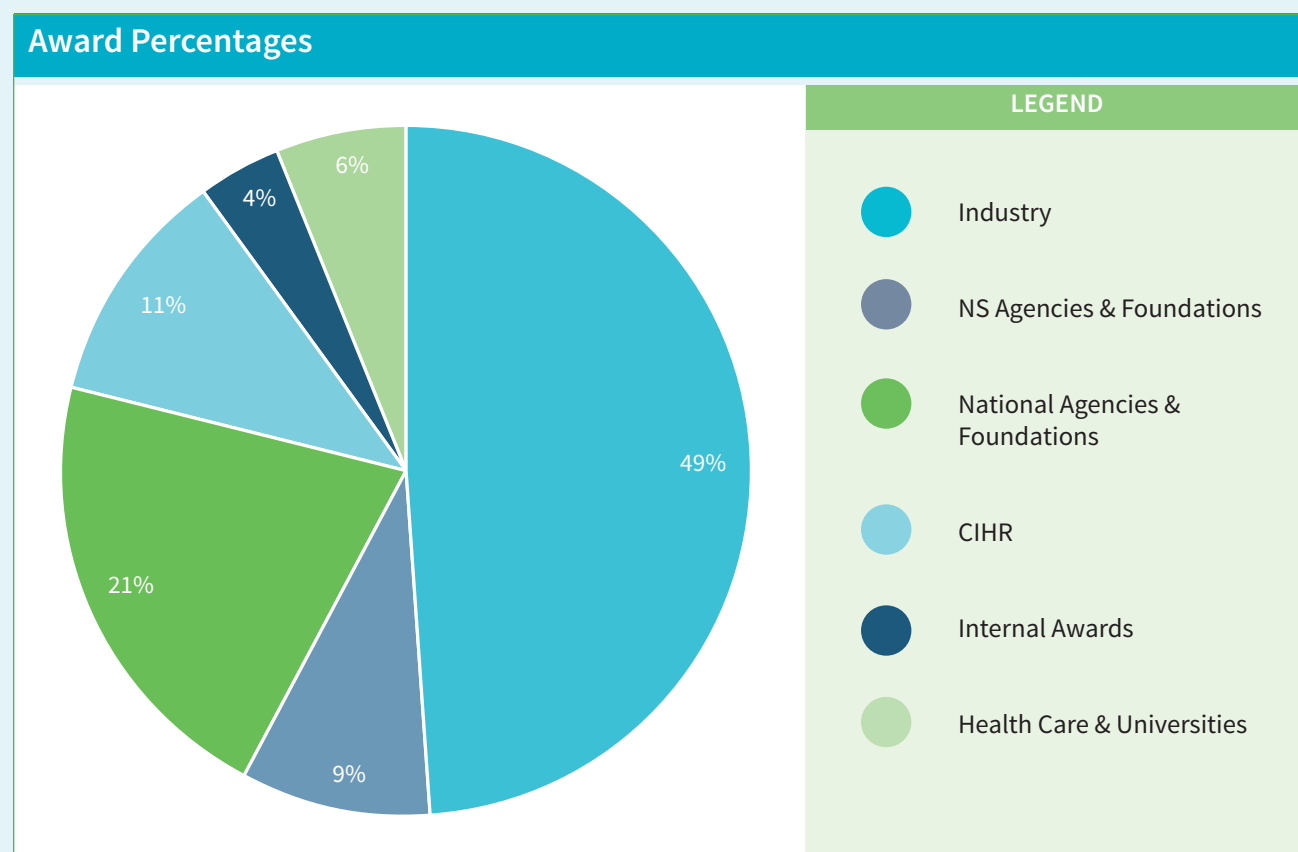
2018-2019 Fiscal Year



Research Grants & Contracts		
	ADMINISTERED AT NSHA	ADMINISTERED AT DALHOUSIE
Research Grants	\$13,264,180.20	\$1,611,242.74
Research Contracts	\$10,577,725.36	\$202,089.87
Total	\$23,841,905.56	\$1,813,332.61
Grand Total: \$25,655,238.17		

## Source of Awards for Research Conducted at NSHA

2018-2019 Fiscal Year







# Nova Scotia Health Authority - All Research Accounts

Statement of Revenue and Expenses for the Twelve Months Ended March 31, 2019

Revenue and Expenses			
	Actuals 18/19	Actuals 17/18	Variance
<b>Opening Balance April 1</b>	<b>42,349,698</b>	<b>\$ 37,135,939</b>	
<b>Revenue</b>			
Grants*	14,618,455	13,950,422	668,033
Contracts*	8,121,102	7,989,999	131,103
Interest and Realized Gain on Investments	3,016,096	2,474,458	541,638
Federal Research Support Program	880,658	928,809	(48,151)
Donations & Other Revenue	403,309	615,764	(212,456)
Ethics Review Fee	318,976	210,000	108,976
RMU Consulting Fee	88,900	105,600	(16,700)
Record Retention Fee	63,774	44,715	19,058
<b>Gross Revenue 2</b>	<b>27,511,269</b>	<b>\$ 26,319,767</b>	<b>\$ 1,191,502</b>
<b>Expenses</b>			
<b>Compensation</b>	<b>14,316,527</b>	<b>13,499,285</b>	<b>(817,242)</b>
<b>Supplies and Services Expenses</b>			
Purchased Services/Professional Fees	1,472,610	1,206,116	(266,494)
Transfers Offsite	2,313,188	2,925,148	611,960
Diagnostic & Therapeutic	1,187,198	1,811,507	624,309
Overhead to Dalhousie	697,190	708,929	11,739
Maintenance	595,062	297,116	(297,946)
Equipment	488,126	295,144	(192,983)
Travel/Professional Development	436,338	699,505	263,167
Travel/Patient	379,339	278,320	(101,018)
Printing/Office and Computer Supplies	375,710	215,276	(160,434)
Pharmacy Services and Drugs	283,981	364,813	80,832
Other Expenses	254,940	365,492	110,552
Medical/Surgical Supplies	254,297	147,834	(106,464)
Communications	44,178	62,578	18,399
Recoveries of Expenses	(470,627)	(344,710)	125,917
	<b>8,311,531</b>	<b>8,172,610</b>	<b>(138,920)</b>
<b>Total Expenses</b>	<b>22,628,057</b>	<b>\$ 21,671,895</b>	<b>\$ (956,162)</b>
<b>Net Inflow/Outflow</b>	<b>4,883,212</b>	<b>4,647,872</b>	<b>235,340</b>
<b>Unrealized Gain (Loss) on Investments</b>		<b>565,887</b>	<b>565,887</b>
<b>Ending Balance March 31, 2019</b>	<b>47,232,910</b>	<b>\$ 42,349,698</b>	<b>\$ 4,883,212</b>
<b>Overhead Distribution</b>			
	<b>18/19</b>	<b>17/18</b>	<b>Variance</b>
CZ Research Services	1,076,275	1,227,496	(151,221)
CZ Research Development	242,175	311,523	(69,348)
EZ Research	41,871	13,375.01 2	8,496
University Departments	376,483	382,822	(6,339)
Faculty of Medicine, Dalhousie University	320,707	326,107	(5,400)
<b>Total Overhead</b>	<b>2,057,511</b>	<b>2,261,323</b>	<b>(203,812)</b>

\*Includes overhead

# Nova Scotia Health Authority Research Staff and Research Ethics Board



**Dr. Gail Tomblin Murphy**  
Vice President, Research & Innovation  
Nova Scotia Health Authority

**Patti Green**, Executive Assistant



## Research & Innovation Team

### Research Team

Jennifer Thurlow, Interim Team Lead, Research  
Michelle Roden, Administrative Assistant  
Hannah Abel, Coordinator, Contract Facilitation & Support  
Stacey Pyke, Administrative Coordinator, Contracts & Grants  
Andrea Dean, Program Manager, Research Education  
Michele Chappell, Program Manager, Research Quality

### Research Methods Unit (RMU)

Daniela Meier, Manager  
Sandra Pauls, Finance & Administrative Officer  
Prosper Koto, Health Economist  
Steve Doucette, Senior Biostatistician  
Dr. Olga Kits, Qualitative Methodologist  
Kara Matheson, Biostatistician  
Chris Theriault, Senior Research Database Specialist

### Research HR & Corporate Services

Dawn Munroe, HR & Corporate Services Lead  
Sheryl-Lynn Forward, Administrative Coordinator

### Innovation Team

Dr. Jayne Sierens, Interim Team Lead, Innovation  
Amy Wilson, Publications Coordinator

Dr. Kathryn McIsaac, Health Outcomes Scientist  
Sandra Crowell, Program Leader, Research Development  
Paula Steeves, Admin. Coordinator, Research Development

### Research Ethics Board Team

Dr. Jordan Warford, Research Ethics Manager  
Nadine Ransome, Administrative Coordinator  
Starla Burns, Ethics Coordinator  
Joan Morrison, Ethics Coordinator  
Pamela Trenholm, Ethics Coordinator

### Zone Research Facilitators

Chrissy Boyle, Eastern Zone  
Dr. Daniel Marsh, Western Zone

### Research Financial Services

Dave Denman, Manager  
Jane MacLeod, Senior Financial Analyst  
Steven Cromlish, Financial Analyst  
Kaitlyn Hinks-Churchill, Accounting Clerk

## Research Ethics Board (REB)

### Research Ethics Board Executive

Dr. Chris MacKnight, Executive Chair  
Dr. Sarah Kirby, Co-Chair  
Dr. Andrew Jarvie, Co-Chair  
Sue Pleasance, Co-Chair  
Dr. Osama Loubani, Co-Chair  
Dr. Anne Marie Krueger-Naug, Co-Chair  
Gredi Patrick, Co-Chair  
Dylana Arsenault, Zone 1 Executive Representative

Dawn Fougere, Zone 2 Executive Representative  
Natalie Oake, Zone 3 Executive Representative  
Dr. Jordan Warford, Research Ethics Manager

In addition to the NSHA Research Ethics Board executive and office staff, the board has 110 volunteer members. These members are drawn from the community, the legal profession, medical and health staff and hospital employees.

This document was produced by Nova Scotia Health Authority Research & Innovation.

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