Nova Scotia Health Authority
Research Annual Report 2016

CONTENTS

Research Leads to Better Outcomes and Better Care

Research provides us with the essential evidence we need to address the challenges we face in providing high-quality, cost-effective care to meet the health needs of our population. The Nova Scotia Health Authority (NSHA) has embraced research as a core operating principle in the planning, implementation and evaluation of new approaches to care.

Dr. Patrick McGrath

NSHA has identified seven streams of service delivery—primary health care, mental health and addictions, perioperative care, critical care and trauma, emergency care, cancer care and maternal newborn care—and declared that future development in each of these streams will be guided by research evidence.

To support this research focus, we've hired senior researchers, project coordinators and a health outcomes scientist to lead province-wide efforts, along with research facilitators in Eastern, Northern and Western zones. Together, these new research-focused staff members are reaching out across the province to get people involved in research in their own communities.

The importance of local research cannot be overstated. By identifying challenges in our own institutions and communities, pulling together teams to explore problems and potential solutions, and then implementing and evaluating those solutions, we can effect changes that meet the real needs of patients and families. At the same time, we can dramatically improve patients' experience of care and their health and wellness down the road.

We introduced the Translating Research Into Care (TRIC) grant program three years ago and with funding from the QEII Foundation and the IWK Foundation, the TRIC program awards grants to research teams led by a researcher and an administrator who've teamed up expressly to find practical solutions to ongoing health system or delivery challenges. Bringing administrators into the research fold is having a transformational effect, as they see first-hand how valuable the evidence is or will be in their efforts to streamline services, cut unnecessary spending and improve the outcomes of care.

As a result of the hard work and commitment of our leaders, researchers and research support staff throughout NSHA, we are seeing a cultural shift. Research is becoming a key part of the way we do business, not a sideline or a luxury. It is essential—to attracting and retaining the very best clinicians, to creating jobs and opportunities in the knowledge economy, to planning efficient and effective services, and to providing clinical care that safeguards the health and improves the wellbeing of our people.

Patrick McGrath OC, PhD, FRSC, FCAHS
Integrated Vice President of Research, Innovation & Knowledge Translation
Nova Scotia Health Authority & IWK Health Centre

Researchers Seek Better Public Access to Primary Health Care

Researchers at the Nova Scotia Health Authority (NSHA) are key players in a concerted effort to identify the most effective ways to improve the public's access to primary health care services province-wide.

"We know we need to adapt services and delivery models to meet the complex health care needs of our population," says Dr. Tara Sampalli, a PhD researcher appointed to NSHA in 2016 to lead research and innovation in primary health care and chronic disease management across the province. "The challenge is to determine what changes will be effective, efficient and affordable. Well-designed, relevant research can tell us if proposed changes are feasible and measure their impact on the quality and outcomes of care."

In Nova Scotia, an aging population and some of the highest rates of chronic disease in Canada are placing an increasing strain on the health system as a whole—and primary health care in particular. Most people receive their health care from primary care providers, such as family physicians and nurse practitioners, throughout their lives, and rely on these providers for access to specialist care.

"We're very excited about the growing emphasis on making research a guiding force in the re-design of primary health care."

"Our immediate focus is on identifying the most pressing questions, fostering partnerships and building capacity to answer those questions," notes Dr. Sampalli. "This involves a lot of engagement province-wide."

NSHA's Primary Health Care team is reaching out to researchers, clinicians and health-system administrators across Nova Scotia, to involve them in the research effort. "We've hosted fun events and learning sessions across Nova Scotia to get people talking about research, to build their research skills and get them thinking about their potential role in research," says Stephanie Wood, project coordinator in Primary Health Care. "From here we can go on to build research teams, develop proposals and seek funding."

The Primary Health Care team is working with numerous groups to promote the research agenda, including NSHA's Research Services office and the Research Methods Unit (RMU), Dalhousie's Department of Family Medicine, and large collaborations such as the Maritime SPOR Support Unit (MSSU) and BRIC NS. Part of CIHR's Strategy for Patient-Oriented Research, BRIC NS (Building Research for Integrated Primary Health Care) is drawing researchers, policymakers, clinicians and patients from across the province into interprovincial research projects in such areas as assessing frailty in primary care, reducing polypharmacy in long-term care, and improving end-of-life care in the community.

"We're very excited about the growing emphasis on making research a guiding force in the re-design of primary health care," says Dr. Fred Burge, the Department of Family Medicine's director of research. "We're working very closely with our partners to apply the primary care research expertise we have here to investigating what practice, policy and service-delivery changes will lead to the most accessible, effective health care for Nova Scotians."

One of the most pressing problems is Nova Scotians' steadily declining access to a family doctor. Statistics Canada data shows that the percentage of Nova Scotians with a regular medical doctor dropped from 93.6 in 2010 to 89.4 in 2014. Meanwhile, NSHA is getting more calls than ever to its "Need a Family Practice" line, a service that attempts to connect "unattached patients" to a family doctor or nurse practitioner in their area.

The MAAP-NS study (Models and Access Atlas of Primary Care in Nova Scotia) is exploring this access gap. Family Medicine researcher Dr. Emily Gard Marshall is leading this Nova Scotia Health Research Foundation-funded study, in collaboration with Dr. Sampalli, Dr. Rick Gibson (NSHA's Central zone head of family practice), and others who plan health services.

The MAAP-NS researchers have surveyed every primary care practice in Nova Scotia on issues of access, comprehensiveness of services and models of care. The data will shed light on what changes will better connect patients to the services they need.

"MAAP data has already informed the spread of the Urgent Care Centre model to additional communities in Central zone, improving access and continuity of urgent primary care after hours," Dr. Sampalli notes. "It will guide decisions about how primary care services in general are organized and funded."

Maamoun Almeslmani and two of his children, Tuqa (centre) and Hasan (left), at the Halifax Transitional Health Clinic for Refugees

Connecting Refugees to Health Services

What once was a trickle has turned into a flood, with the arrival of 1,400 refugees in Nova Scotia in 2016. As health care providers scrambled to prepare facilities, teams and protocols for assessing and serving refugees' immediate health needs, researchers were looking ahead to how best to move families out of refugee-specific transitional services and into primary care services in their new communities.

Dr. Tara Sampalli teamed up with Graeme Kohler, primary health care health services manager in NSHA's Central Zone, to develop and test a transition process. They received a Translating Research Into Care (TRIC) grant to get started.

"The first issues we address with refugee families are infectious-diseases checks and immunizations, cancer screenings, and chronic disease management," notes Kohler. "This is done with help from interpreters, in conjunction with other settlement activities. But eventually we need to connect families to a practitioner in their own community and make room for new families in the transitional clinic."

"The welcome we've received is amazing," says Maamoun, who arrived in Halifax from Syria with his family in January 2016. "We will never forget the kindness of people here in Halifax."

The question is, how do providers know when families are ready for their own primary care provider? Is their English good enough? Do they have the means to travel to another clinic? How should the transition process unfold?

Dr. Sampalli and Kohler and their colleagues are designing and testing a transition process, including readiness screening tools. "We're the only ones in Canada doing this research," Dr. Sampalli says. "We want to partner with other provinces to shape and evaluate the health services transition process for refugees and share our findings with other countries grappling with this issue."

Pioneering New Technologies: Atlantic Innovation Fund (AIF) Update

Since 2011, NSHA has partnered with Atlantic Canada Opportunities Agency's Atlantic Innovation Fund (ACOA AIF) on four large commercialization projects. ACOA has invested $8.6 million in these projects, while NSHA and other funding partners have contributed another $7.3 million. All of the projects are on track to deliver innovative technologies that will improve the outcomes of patient care while creating new jobs and generating royalties to be re-invested in research at NSHA.

Visualizing Single Neurons in the Eye

"We are trying to make a quantum leap in diagnostic imaging," says QEII-affiliated scientist, Dr. Balwantray Chauhan, Mathers Chair and director of research in Dalhousie's Department of Ophthalmology & Visual Sciences. "We are getting closer and closer to being able to image individual retinal ganglion cells. It is the Holy Grail of glaucoma diagnosis."

Retinal ganglion cells relay information from photoreceptors and bipolar cells in the retina to the brain for interpretation. These messenger cells slowly deteriorate in glaucoma, one of the most common blinding diseases in the world.

"We expect to have a device ready for clinical use in one to two years," says Dr. Chauhan, who is collaborating with Germany's Heidelberg Engineering on the breakthrough technology. "The device will allow us to directly visualize these cells, to observe their structure and function in great detail. This will help us understand the nature and progression of glaucoma, and provide earlier diagnosis and more accurate monitoring over time. It will even help us develop and test better therapeutics."

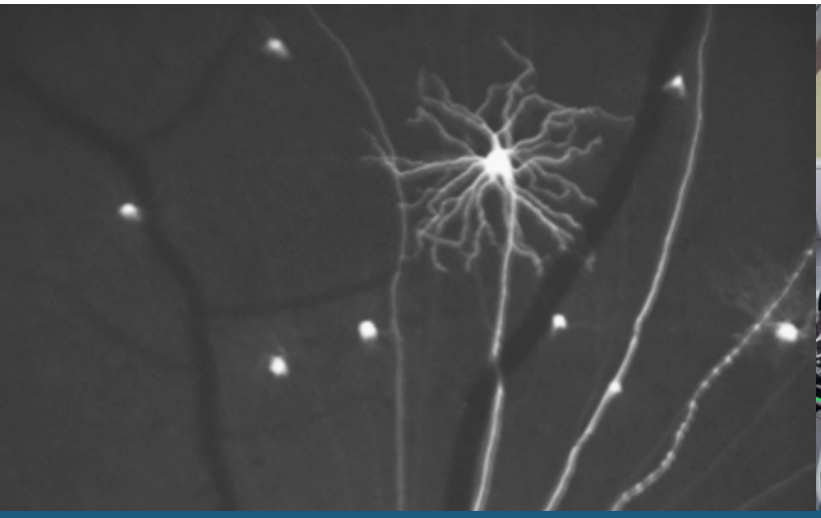
A Look Inside the Middle and Inner Ear

The great limitation in diagnosing and treating disorders of the middle and inner ear has always been the inability to obtain high-resolution images of the delicate structures inside this bone-encased area. This will no longer be the case, thanks to ultrasound and optical imaging devices developed by NSHA/Dalhousie researchers, Drs. Jeremy Brown and Rob Adamson.

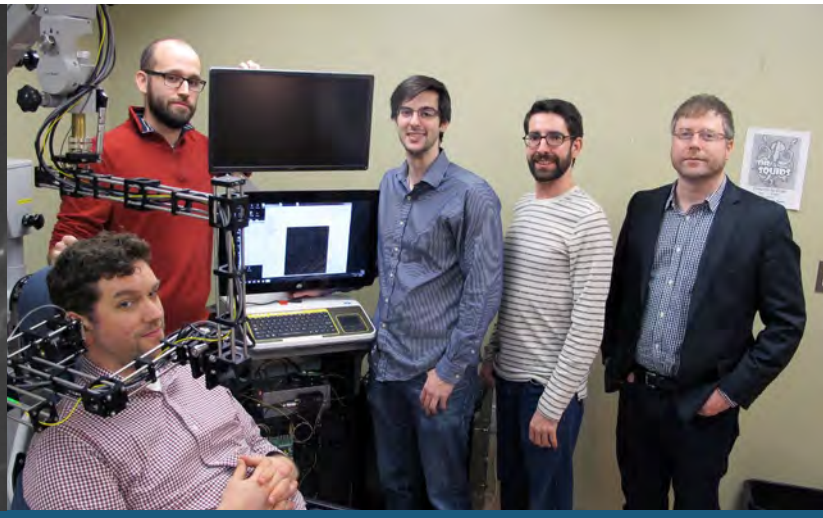
"We've developed high-frequency ultrasound and optical coherence tomography probes that provide better images, more safely and less invasively, than any other technologies available," says Dr. Brown, who's been collaborating with Dr. Adamson and NSHA/Dal otolaryngologist Dr. Manohar Bance for nearly a decade. "Our commercial partner, Conavi Medical Inc., also sees great potential to use the probes in endoscopic heart and brain surgeries."

Conavi has licensed the prototype ultrasound technology, which is already generating royalties for NSHA, Dalhousie and the research team. Drs. Brown and Adamson have launched Daxsonics Ultrasound to develop more ultrasound-based technologies—the start-up company already employs 15

One type of neuron imaging with all ganglion cells labelled



Project scientist Dr. Robert Adamson (seated) tests the optical imaging device with Dan MacDougall, Josh Farrell, Dr. Matthew Jahns and Dr. Jeremy Brown



people full-time and is earning substantial revenues after only three years in operation. A second spinoff company will focus on commercializing the optical technologies.

Taking Orthopedic Research in Stride

The latest product out of the M@CH (Movement at Capital Health) AIF is InStride, a smartphone app that allows people to monitor their walking pattern from home and share it with their clinical care team. "InStride uses the accelerometers in your smartphone to capture and analyze changes in your individual pattern," explains Barbara Campbell, CEO of OrthoMX Inc., a local spinoff partner to M@CH. "Before and after surgery, and throughout physiotherapy, gait changes can indicate whether additional follow up is necessary and surgeons' time can go to those patients who need it most." Orthopedic surgeon Dr. Michael Dunbar is the driving clinical force behind M@CH, which is developing products to improve outcomes of orthopedic surgery. In addition to InStride's Ortho MX, M@CH includes Quebec-based partner Emovi, which is validating its KneeKG diagnostic technology for knee pathologies, and Halifax-based Kinduct, which is developing an online physiotherapy platform of exercises for knee, hip and spine patients. "KneeKG diagnostics and the Kinduct platform work well together to determine and provide the best physiotherapy exercises to stabilize an individual's joints before and after surgery, to reduce pain and improve surgery success,"Dr. Dunbar says. "NSHA physiotherapists are using these tools with our research patients and they love them."

The InStride app

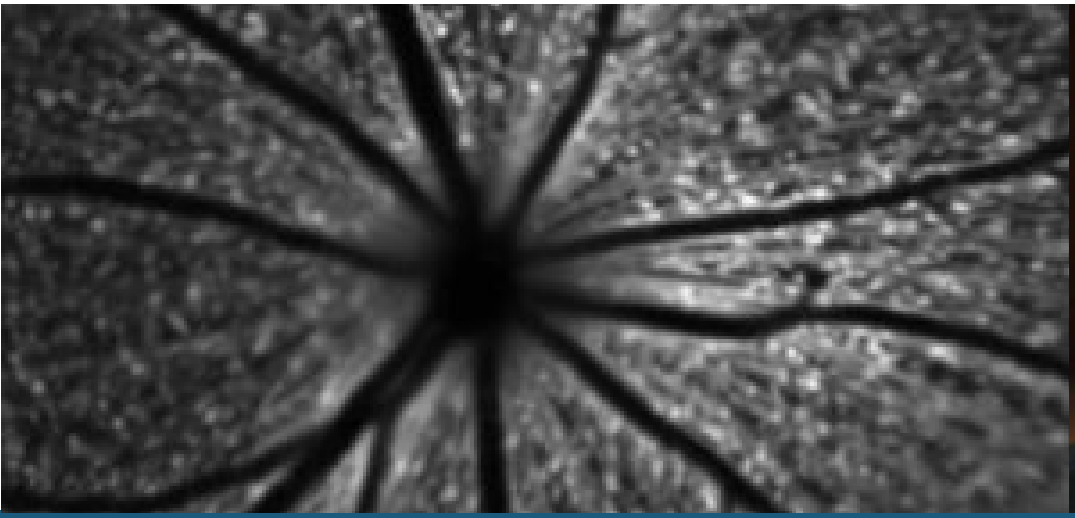
New Apps for MRI

BIOTIC's research scientists, engineers and clinician scientists have teamed up with NSHA and Dalhousie clinical researchers in an effort to develop powerful new software applications for GE Healthcare's MRI hardware.

"We've formed a genuinely collaborative relationship with GE's senior scientists that's helping them and us advance not only this project but a host of other R&D initiatives," says Dr. Steven Beyea, scientific lead at BIOTIC (Biomedical Translational Imaging Centre). "It's been a very productive first year."

BIOTIC's team has already submitted to GE the first versions of software packages designed to improve the diagnosis of prostate cancer, fatty liver disease and brain tumours. They've launched a small-scale clinical research trial with prostate cancer patients to see if the new software renders more information about the cancer than standard MRI investigations and are also testing the neuroimaging application in patients. At the same time, they're validating the liver disease-scanning software in preclinical studies. "We're building entirely new ways to collect and analyze MRI data," notes Dr. Beyea. "If successful, licensing these applications will generate long-term revenues for NSHA research."

A single retinal ganglion cell imaged in a living mouse eye



Dr. Steven Beyea at BIOTIC

Working with Families to Prevent Mental Illness in Children

Mental health researchers at NSHA are leading a long-term study to learn what helps children stay healthy and well, even when they have a family history of serious mental illness that may increase their risk of developing a similar disorder.

Families Overcoming Risks and Building Opportunities for Wellness—known as FORBOW—is enrolling youth and their parents, including families in which one or more parent has been diagnosed with major depression, bipolar disorder or schizophrenia.

"Parents are very open to joining our study," says FORBOW lead researcher Dr. Rudolf Uher, NSHA psychiatrist and professor in Dalhousie's Department of Psychiatry. "Many of them are concerned by the possibility that one or more of their children could go on to develop an illness like theirs and want to do whatever they can to reduce that risk."

Families with children as young as one and old as 21 can enroll in the study, which will follow them for five years or longer to see what factors best predict—and prevent—serious mental illness.

"I've always worried that my son might develop a mental illness," says one woman with bipolar disorder who enrolled her family in the study soon after it launched in 2013. "He suffers from tremendous anxiety. It's reassuring to know he's being carefully monitored through his teen years for early signs of potentially more serious illness."

Anxiety is one of the early antecedents to serious mental illness that the FORBOW researchers look for and track in the study children. A rapidly changing emotional state (known as "mood lability"), unusual perceptions, and the sudden, brief loss of an ability (such as speech or hearing), are also warning signs of potential trouble ahead. But the researchers look even deeper.

"We examine the children's learning styles, how they think, go about remembering a story, or solving a problem," Dr. Uher says. "This is a relatively new area of brain research, but it may be that people with certain ways of thinking are more susceptible to mental illness than people with different cognitive styles." The assessments are rigorous but the researchers make them fun. "Our team takes the children through a series of carefully designed activities,

Kimberly, Ivy and Erica are part of the FORBOW study

including puzzles and games, which reveal a great deal about their cognitive function and psychological state," says mental health nurse and FORBOW research manager, Jill Cumby. "We also assess the parents' mental health history, look for current signs of severe mental illness, and identify any additional supports they may need."

Families can choose to take part in sub-studies involving DNA analysis of saliva samples and MRI (magnetic resonance imaging) scans of the brain. "These studies will shed light on the genetics of mental illnesses and how they may affect the structure and function of the brain," Cumby says. "They may also reveal potential new ways to identify kids at the highest risk who would benefit most from early intervention."

Children who show early signs of elevated risk are enrolled in FORBOW's intervention arm, SWELL (Skills for Wellness). "We know that building children's coping skills and resilience can prevent them from developing serious mental illnesses," Dr. Uher says. "We want to know what methods are most acceptable to children and families and have the most protective effects."

"Nova Scotia is a great place for this kind of research. Our population is so willing to contribute to the research—families from one end of the province to the other are involved."

Given that anxiety is highly predictive of risk, for example, the researchers ensure that anxious parents receive treatment for their anxiety, and teach them parenting skills so they can help their children better manage anxiety as well.

"Very few research teams in the world are working with families in this way," notes Dr. Uher. "Nova Scotia is a great place for this kind of research. Our population is so willing to contribute to the research—families from one end of the province to the other are involved."

Dr. Uher and his research team (10 staff members and about 20 collaborating psychiatrists and psychologists at NSHA and the IWK Health Centre) received a five-year $1.2 million Foundation Grant from the Canadian Institutes of Health Research (CIHR) in 2016.

Top to bottom:
Research associate Ryan Gainer, cardiac surgeon Dr. Keir Stewart, patient Murray Barkhouse and his wife Eileen

Murray and his family were able to make a truly informed decision about Murray's surgery (performed by Dr. Stewart) using the tools conceived by Ryan Gainer and Dr. Greg Hirsch

Better Heart Surgery Outcomes: Researchers Pioneer Decision-Making Tools

Researchers in the Division of Cardiac Surgery are putting vital knowledge into patients' hands to help them make well-informed treatment decisions for themselves. They've developed visual decision aids that graphically quantify each patient's risk of each potential negative outcome of cardiac surgery—based on their age, health status and frailty.

"You can run words and numbers by people about their relative risk of an adverse event from surgery, but delivering the information this way does not really sink in when people are feeling overwhelmed," says Dr. Greg Hirsch, cardiac surgeon, professor and head of the Division of Cardiac Surgery. "We've found a way to literally show them, by plotting their risks on 10-by-10 dot plots to visually represent their risk out of 100 for each negative outcome."

The research team received a Translating Research Into Care (TRIC) grant to transform paper-based decision aids and in-person coaching into an online platform that will allow them to roll out their informed consent/shared decision-making process across Nova Scotia and, eventually, the Maritimes.

"We want people—particularly elderly people with multiple health conditions that make them frail and susceptible to adverse surgery outcomes—to be able to make informed decisions about surgery," notes Dr. Hirsch. "We're working with family doctors and cardiologists across the province to ensure they're aware of these tools and can provide them to patients facing decisions about heart surgery. Optimally, patients would receive this information and decision support early in the diagnostic testing process, at or before the dye-test stage."

In previous research, Dr. Hirsch and his colleagues showed that more patients over the age of 80 are being referred for heart surgery, that more prospective heart surgery patients are frail, and that frailty is a major risk factor for dying from a procedure, being faced with a long stay in hospital, or needing to be discharged to a nursing home (rather than their own home).

"We want people to fully understand the risks surgery poses for them… we also want them to understand the risks of NOT having the surgery," says Dr. Hirsch. "Only then can they make a truly informed choice, based on their own goals and values."

This October, Dr. Hirsch and his team wrapped up a Canadian Institutes of Health Research (CIHR)-funded clinical trial comparing their informed consent/shared decision-making process to usual care.

"Most patients—96 per cent—chose to go ahead with the proposed surgery, regardless of the decision-making process," says cardiac surgery research associate, Ryan Gainer. "But we found that those who received the visual aids and decision coaching understood the risks and benefits of surgery better, were less anxious and depressed, and more comfortable and well-prepared, going into surgery. And, our post-operative follow up found they were more satisfied with their care."

"We want people to fully understand the risks surgery poses for them… we also want them to understand the risks of NOT having the surgery," says Dr. Hirsch. "Only then can they make a truly informed choice, based on their own goals and values."

In comparison, other studies have found that patients' comprehension of the risks and benefits of surgery is poor after standard informed consent processes for all types of interventions. "Our results are a significant breakthrough in terms of improving patient understanding," Gainer says. "This is critical in a group of patients who are at high risk for adverse outcomes."

An important key to the effectiveness of the researchers' approach is the ability to accurately assess patients' frailty and predict their risk of various adverse outcomes. "We've been working with our colleagues in the Division of Geriatric Medicine to test a frailty index they've developed here," notes Dr. Hirsch. "We're finding this to be much more sensitive than standard frailty measurement tools."

At the same time, the researchers are working with Dr. Ansar Hassan's research team at the New Brunswick Heart Centre on a Dalhousie Medical Research Foundation Molly Appeal-funded study that aims, among other goals, to identify and validate biomarkers of frailty. "We're looking for increasingly accurate tools to help us predict how an individual will respond to various procedures," Dr. Hirsch explains. "We want to provide personalized medicine that empowers and engages people to produce the best possible outcomes."

Translating Research Into Care (TRIC)

48

Funding awards since 2013

2013

- Program inception
- 14 awards
- $300,000+ awarded

2014

- 18 awards
- $640,000+ awarded

Since 2013, the QEII Foundation and the IWK Foundation have provided funds to help research teams close the gap between evidence and practice through the Translating Research Into Care (TRIC) grant program. The first of their kind to be funded in Canada, these grants combine the expertise of scientists and health administrators, who work together to fuel direct and positive changes for health care, including better patient outcomes, reduced wait times and improved access to care.

Projects range from investigating new systems for managing the flow of patients through busy emergency departments, to testing new ways of embedding frailty screening into primary care, to transforming the pre-cardiac surgery decision-making process so patients truly comprehend the benefits and risks.

"The level of care provided at the QEII would not be possible without our generous donors who believe in the power of research," says Bill Bean, President and CEO of the QEII Foundation. "TRIC grants are creating lasting changes in the delivery of health care now and bringing researchers closer to finding tomorrow's cures."

TRIC grants fund projects that aim to:

- improve patient outcomes
- improve the safety of health care
- improve access for underserved populations
- reduce wait times
- reduce the need for health care
- reduce unnecessary health care costs

Every TRIC project must be co-led by a scientific investigator and an administrative investigator. The administrative co-lead must commit to provide funding or in-kind support to absorb the operating costs of the research and to implement the health system change that results from the completed study.

"The unique and defining feature of TRIC is the researcher-administrator partnership," says the program's creator, Dr. Patrick McGrath, Integrated VP of Research, Innovation and Knowledge Translation at NSHA and the IWK. "It ensures, first, that the research addresses the most relevant priority issues in our health care system. Secondly, it guarantees the commitment from the health authority to provide the resources to put the results of the research into action."

Health Care Improvement Research Program

$1.4 million

Total awards since 2013

2015

- 12 awards
- $300,000+ awarded

2016

- 4 awards
- $200,000+ awarded so far

(November 2016 not yet announced)

"A novel way to support collaborative research that can be quickly implemented and evaluated"

- Scientific co-principal investigator, QEII

The local research community has responded enthusiastically to the TRIC program, which provides funding at three distinct levels:

- Level 1 planning grants provide researchers with up to $3,000 to form workable teams, scope out potential research questions, conduct literature reviews and develop research proposals.
- Level 2 and 3 grants provide up to $30,000 and $60,000, respectively, to conduct the proposed research project.

"The 'levels' approach is working very well," says Sandra Crowell, who manages the TRIC program at NSHA and the IWK. "We're finding that many Level 1 grant recipients are going on to successfully apply for Level 2 or 3 grants, and Level 2 and 3 grant recipients are encouraged to secure funding from provincial and national funding agencies for further research. TRIC grants are helping our researchers form relationships, get established and build on success."

Local support is increasingly important in today's highly competitive funding environment. "Funding success rates at the Canadian Institutes of Health Research (CIHR) are now less than 10 per cent," notes Dr. McGrath. "Experience and data our researchers gain through TRIC-supported projects positions them for greater success in national funding competitions, while developing sustainable solutions to ongoing local challenges."

The TRIC program also requires research teams to include the patient voice in their research. This helps to ensure the research is focused on the real needs of patients and that the patient experience informs the research. "The TRIC program provides a unique opportunity for researchers, health care providers and administrators to co-act through interdependent, practical and innovative means," says one successful applicant. "The focus on patient engagement and swift implementation of the proposed research actions make the TRIC competition stand out as a valuable and forward-thinking resource at the forefront of health care improvement and advancement in Nova Scotia."

"Excellent research program that encourages new relationships and thinking about research to lead to health system change and improved patient outcomes."
- Scientific co-lead, QEII, May 2014

Improving Survival and Quality of Life in Throat Cancer

Head and neck surgeon Dr. Matthew Rigby has been monitoring mouth and throat cancer patients' treatment outcomes for more than a decade. He started a database as a research project with Dr. Mark Taylor when he was a medical student at Dalhousie in the mid-2000s and has continued to build on it ever since.

"Because of the location of these tumours, treatments can have a major impact on quality of life," Dr. Rigby says. "People's facial appearance, their ability to speak, to chew and swallow their food, can all be affected. For many patients, it is devastating."

Dr. Rigby is pioneering new surgical techniques and protocols at the QEII Health Sciences Centre and using the database to measure their impact on survival and quality of life.

"We're developing a new protocol that involves having a pathologist examine the resected tissues under a microscope, during the operation"

"Traditionally, it has been very difficult to get at these tumours surgically without splitting the jaw and moving it aside," notes Dr. Rigby. "But this requires extensive reconstruction, with a long recovery and high risk of complications. So, treatment regimens have often bypassed surgery altogether to focus on radiation and chemotherapy."

While radiation and chemotherapy treatments can effectively vanquish some kinds of throat cancer—especially the HPV-positive type that is rapidly rising in prevalence—the high doses required to kill the cancer can cause extensive damage to skin, muscle, bone, teeth and nerve tissue.

That's where laser surgery comes in. "It's impossible to manoeuvre a scalpel in this area, going in through the mouth, but we can get there safely with lasers," says Dr. Rigby, who trained in the laser removal of throat tumours at the Mayo Clinic and brought the technique back to the QEII, now one of a select few centres in North America that's using it for throat cancer. "As a result, we can surgically remove the tumour and either avoid or lower the doses of radiation needed to eradicate any stray cells and prevent a recurrence. Chemotherapy is often not needed at all."

The results piling up in his database show patients are doing well with the laser surgery/radiation combination—treatment is easier to endure and lingering effects not as serious. Now Dr. Rigby and his colleagues in otolaryngology and pathology are moving to formally implement and assess yet another improvement to throat cancer treatment.

"We're developing a new protocol that involves having a pathologist examine the resected tissues under a microscope, during the operation, as we go," Dr. Rigby explains. "If the pathologist detects any cancerous cells in the margins, we can go right back in to remove more tissue, and then test it again to make sure we have negative margins."

Pathologist Dr. Martin Bullock has co-developed the margin assessment protocol with Dr. Rigby. "The importance of clear margins in cancer surgery cannot be overstated," Dr. Bullock says. "Ensuring that no cancerous tissue remains is the key to preventing a local recurrence."

One study, for example, found a recurrence rate of 55 per cent among patients who had positive margins following throat cancer surgery, compared to a 12 per cent recurrence rate among those had negative margins.

"We are going to analyze our past outcomes data to determine what the rate of positive margins was before this protocol was in place, and then collect and analyze the data going forward as we apply the new protocol in our surgeries," Dr. Rigby says. "We expect that 15 to 20 per cent of patients had positive margins before, and that this rate will decline to 5 to 10 per cent with the new protocol in action."

Dr. Rigby and Dr. Bullock have teamed up with Dr. Laurette Geldenhuys, division head and service chief of Anatomical Pathology at the QEII, and ENT surgeons, Drs. Rob Hart, Mark Taylor and Jonathan Trites, to assess the impact of the protocol on patient outcomes and to develop a sustainable implementation plan.

"If we can increase the odds that our patients will leave the operating room with negative margins, we will dramatically reduce their risk of recurrence and boost their chances of survival to more than 95 per cent," Dr. Rigby says. "These patients will also be spared the effects of high-dose radiation and chemotherapy, to the benefit of their long-term quality of life."

Dr. Martin Bullock and Dr. Matthew Rigby review margins on samples taken mid-surgery

Managing Back Pain in the Emergency Department

Emergency physicians have teamed up with an epidemiologist and knowledge translation expert to see how they can better manage the daily flow of people showing up in emergency with severe back pain.

"Every shift, I see two or three patients with acute back pain," says Dr. Kirk Magee, an emergency physician and trauma team leader at the QEII Health Sciences Centre. "We need to determine how we should be assessing and treating these people in emergency, in the absence of emergency-specific evidence-based guidelines."

Dr. Magee mentioned the dilemma to Dr. Jill Hayden, an NSHA-affiliated scientist and associate professor in Dalhousie's Department of Community Health & Epidemiology who, as a former chiropractor, knows back pain well. Together with Emergency Medicine chief, Dr. Sam Campbell, they applied for and received two small Translating Research Into Care (TRIC) grants.

"Our literature review found little about who presents to emergency with back pain and what management approaches are most efficient and effective in this setting," Dr. Hayden explains. "Now we're collecting data on patients as they present—who are they, the location, severity and probable cause of their pain, why they chose emergency instead of their family doctor, how they were managed, and with what outcomes."

The researchers are using their preliminary data to seek funding for a much larger study. "Back pain is a huge problem in Canada," notes Dr. Hayden. "From 60 to 80 per cent of people will experience back pain in their lives while, in any given month, approximately 30 per cent have disabling back pain."

Even though the percentage of people with back pain who present to emergency services is low (in the three per cent range), Canadian Institute for Health Information data shows back pain is the third most-common complaint presenting to emergency departments in Canada.

"A very small percentage of people who come to emergency with back pain have a serious underlying condition, such as an infected disk or cancer," notes Dr. Magee. "But the vast majority do not and there is strong evidence x-rays are not

Dr. Kirk Magee provides patients with strategies for managing low back pain while gathering data about severity and probable cause

helpful in most cases… a clinical decision tool would help us determine who should have diagnostic imaging studies to rule out serious conditions."

Then there is the issue of treatment. More than half of patients who present to emergency with back pain leave with a prescription—about a third for opioids. "Our scoping review found studies reporting that some patients who present to emergency with back pain are indeed seeking opioids," Dr. Campbell says. "Physicians need a reliable tool to help them identify when the risk of misuse would outweigh the benefits of temporary pain control."

"Back pain is a huge problem in Canada. From 60 to 80 per cent of people will experience back pain in their lives while, in any given month, approximately 30 per cent have disabling back pain."

Ultimately, the researchers aim to develop and validate education programs, assessment tools and clinical practice guidelines to help emergency department clinicians provide the best evidence-based care.

"Many patients with back pain are going to the emergency department," says Dr. Hayden, "and it is important that we know how to manage them appropriately."

Building Capacity for Research Province Wide

Kathryn McIsaac, Health Outcomes Scientist

NSHA has expanded its capacity for research province-wide, hiring a full-time health outcomes scientist in the Central Zone, engaging part-time research facilitators in the Eastern, Northern and Western zones, and bringing everybody together in skills-building and priority-setting sessions.

The Right Services in the Right Place

Dr. Kathryn McIsaac was thrilled to join NSHA from the University of Toronto in March 2016. As health outcomes scientist, she provides leadership in the design, conduct, analysis and publication of primary health care and perioperative care research. "There are many exciting opportunities to put research into action as we plan for more integrated health services to meet emerging needs in the province," Dr. McIsaac says.

One of her first priorities is to map the demographics and distribution of various health problems in Nova Scotia's population, along with the location and utilization of health services across the province. "This map will become a vital guide in deciding where various services should be located," she explains. "We have to make sure we're matching services to community needs. In an area with high rates of obesity, for example, we need to ensure access to appropriate diabetes, cardiac and orthopedic care." As services are re-designed and re-distributed across Nova Scotia, Dr. McIsaac and her collaborators will evaluate the outcomes of the new configuration to ensure people are receiving the services they need, when and where they need them.

Chrissy Boyle, Eastern zone

Robin Latta, Northern zone

Daniel Marsh, Western zone

Taking Research into the Zones

Research facilitators in NSHA's management zones made tremendous progress in 2016, raising awareness about research opportunities and supports among health professionals, administrators, academics, and students from one end of the province to the other. "I see a promising opportunity to create a vibrant collaborative research community," says Northern zone research facilitator, Robin Latta. "We already have projects underway in health-care associated pneumonia and distress in childbirth and have a number of proposals in the works." In Western zone, facilitator Dr. Daniel Marsh is working to build research competencies among NSHA staff and encourage innovative thinking. "Some of the most impactful projects are improving care pathways and empowering patients to self-manage chronic conditions," he says. "I've been most involved in a project to help people access services for stress and depression in the wake of a diabetes diagnosis." People are enthusiastic about research in Eastern zone, especially as they learn more about the research education and funding supports available to them. "We're seeing teams forming, and going out into communities to really listen to what people have to say about barriers and challenges," says zone research facilitator Chrissy Boyle. "It is the passion for knowledge and best practice that drives these teams, with genuine care and concern for the community at the heart of this research."

Nova Scotia Health Authority Research Fund Awards

March 2016 Nova Scotia Health Authority Research Fund Award Recipients

Name	Department	Award	Research Description
Joshua Armstrong	Geriatric Medicine	$3,000	Constructing a Measure of Frailty in the Canadian Longitudinal Study on Aging Database
Lindsay Corbin	Public Health	$9,150	Health Equity Impact of Breastfeeding Peer Support through Alternative Media
Manal Elnenaei	Pathology & Lab Medicine	$15,000	Myeloma Tumor Bank for Molecular and Epigenetic Studies
Laine Green	Diagnostic Imaging	$15,000	Transverse Venous Sinus Stenosis on Magnetic Resonance Imaging in Patients with Idiopathic Intracranial Hypertension: A Pilot Study
John Hanly	Rheumatology	$15,000	Cognitive Dysfunction in Systemic Lupus Erythematosus: A Pilot Neuroimaging Study
Weei-Yan Huang	Anatomic Pathology	$14,847	Characterization of a Novel 5p13.1 Amplification in Colonic Carcinoma with Neuroendocrine Differentiation
Samantha Jang-Stewart	Emergency Medicine	$3,197	Outcomes of Patients Presenting to the Emergency Department with Low Back Pain
James Kiberd	Hematology	$4,680	A Prospective Observational Study Assessing the Impact of Oral Anticoagulation on Menstrual Blood Loss in Women of Child Bearing Age with Venous Thromboembolic Disease Using the PBAC Score
John-Paul King	Diagnostic Imaging	$5,000	Detection of Hip Cartilage Delamination Using Quantitative T1rho MRI
Christiana MacDougall-Fleming	Mental Health & Addictions	$3,216	A Social Work Exploration of Distress in Childbirth
John MacNeil	Anatomical Pathology	$4,954	Expression of Germ Cell Marker OCT4 in Primary Central Nervous System Diffuse Large B Cell Lymphoma
Anca Matei	Obstetrics & Gynecology	$5,000	Has Knowledge Changed Outcomes? Loop Electrosurgical Excision Procedure, Abnormal Cervical Histology, and Risk of Preterm Delivery
Arnold Mitnitski	Geriatric Medicine	$15,000	Biological Age in Relation to Frailty
Heather Neville	Pharmacy	$14,958	Self-Medication Program at the Nova Scotia Rehabilitation and Arthritis Centre (NSRC): Patient Outcome Study
Andrew Orr	Ophthalmology	$14,958	Establishment of a Genetic Database on Open Angle Glaucoma
Tara Sampalli	Primary Health Care	$15,000	Prospective Observatory Study of Group Visits in Primary Health Care in Nova Scotia – Towards Better Access, Continuity of Care and Better Outcomes
Jai Shankar	Diagnostic Imaging	$15,000	Computed Tomography Perfusion in Determination of Brainstem Death in Patients with Severe Head Injury at the Time of their First Diagnostic Imaging - A Pilot Study
Sherry Stewart	Psychology	$15,000	Exploring Marijuana Use in Veterans Recovering from Post Traumatic Stress Disorder (PTSD): A Cure Reactivity Experiment
Olga Theou	Geriatric Medicine	$14,949	Testing of the Pictorial Fit-Frail Scale in the Geriatric Day Hospital
Benjamin Whatley	Neurology	$4,552	Measuring Cognition and Cognitive Reserve in Patients with First Seizure or New Onset Epilepsy

September 2016 Nova Scotia Health Authority Research Fund Award Recipients

Name	Department	Award	Research Description
Chris Blanchard	Medicine/Cardiology	$14,973	Getting Heart Disease Patients More Active and Less Sedentary: An eHealth/mHealth Feasibility Study
Alix Carter	Emergency Medicine	$14,631	The New Role of EMS in Palliative Care: A Qualitative Study of the Perspectives and Experiences of Paramedics and Health Care Providers in Nova Scotia
Derek Fisher	Psychiatry	$14,970	An Investigation of Sex as a Mediating Factor of the Auditory Mismatch Negativity's Utility as a Biomarker in Early Phase Psychosis
Jennifer Jones	Gastroenterology	$46,339	Evaluation of Provincial Geographic Variation in Access to Inflammatory Bowel Disease Care: A Patient Oriented Research Project
Jason LeBlanc	Pathology & Laboratory Medicine	$14,968	Urine Antigen Detection - A Goldmine for Pneumococcal Surveillance
Alex Legge	Rheumatology	$4,960	Constructing and Validating a Frailty Index (FI) as a Novel Measure of Health Status in Patients with Systemic Lupus Erythematosus (SLE)
Emily Marshall	Family Medicine	$15,000	The Lived Experience of Unattached Patients in Nova Scotia: A Mixed Methods Study
Karthik Tennankore	Nephrology	$14,980	Physical Activity and Sedentary Behaviour in Dialysis: A Pilot Study
Noreen Walsh	Pathology & Laboratory Medicine	$14,582	Molecular Findings in Different Subtypes of Merkel Cell Carcinoma and their Biological Implications

The NSHA RF stimulates and supports original research at NSHA. It supports the NSHA mission of putting patients first and achieving excellence in care through constant improvement and commitment to patient safety and quality care.

NSHA Research Fund Committee

Dr. Kim Good, Co-Chair
Dr. Gordon Gubitz, Co-Chair

Dr. Stacy Ackroyd
Dr. Jillian Banfield
Dr. Lisa Barrett
Dr. Steven Beyea
Dr. Jeremy Brown
Dr. Heather Butler
Dr. Cynthia Calkin
Dr. Sean Christie
Dr. Sharon Clarke
Dr. Kelly Dakin
Dr. Gail Eskes
Dr. Ron George
Dr. Andrew Glennie
Dr. Wenda Greer
Dr. Todd Hatchette
Dr. Chris Kenyon
Olga Kits
Dr. Jason LeBlanc
Dr. Emily Marshall
Dr. Paige Moorhouse
Heather Neville
Dr. Jennifer Payne
Dr. Madelaine Plourde
Dr. Gabrielle Richard
Dr. Jai Shankar
Amanda Tinning
Dr. Robin Urquhart

Translating Research Into Care (TRIC) Awards

The TRIC health care improvement grants program began in 2013 to foster research aimed at translating clinical science into improved service delivery and patient care at the QEII Health Sciences Centre (QEII). The program offers three levels of funding support for research that will immediately benefit patient care. All TRIC grants are co-led by a research scientist and a health centre administrator. The research costs associated with the grant are covered by the TRIC funding award. Operational costs associated with the grant come from within current health centre budgets to help ensure that the change is sustainable. Funding for TRIC grants at the QEII Health Sciences Centre is provided by the QEII Health Sciences Centre Foundation.

November 2015 TRIC Award Recipients

Name	Award	Research Description
Tara Sampalli & Graeme Kohler	Level 1 $2,931	Identifying and Implementing Value-Based Strategies to Enable Optimal Primary Health Care for the Refugee Population in Nova Scotia: A Central Zone Initiative
Sean Christie & Randi Monroe	Level 1 $3,000	Improving Patient Access to Spine Care through Implementation of an Evidence-Based Multidisciplinary Spine Clinic
Robin Urquhart & Mary Ellen Gurnham	Level 3 $50,781	Testing an Educational Intervention to Enhance the Interprofessional Team's Capacity to Care for Older Adults in Acute Care

May 2016 TRIC Award Recipients

Name	Award	Research Description
Jai Shankar & Vicki Sorhaindo	Level 3 $58,662	Implementation of a CT Perfusion as the Ancillary Test of Choice for Neurological Determination of Death in Intensive Care Units: Prospective Evaluation
Phillip Tibbo & Trevor Briggs	Level 3 $59,545	An Investigation of the Effectiveness of Peer Support Interventions on Transitions from a Specialized First Episode Psychosis Program to Community Mental Health Care

TRIC Grant Readers & Reviewers - Nov 2015, May 2016

Dr. Patrick McGrath, Chair

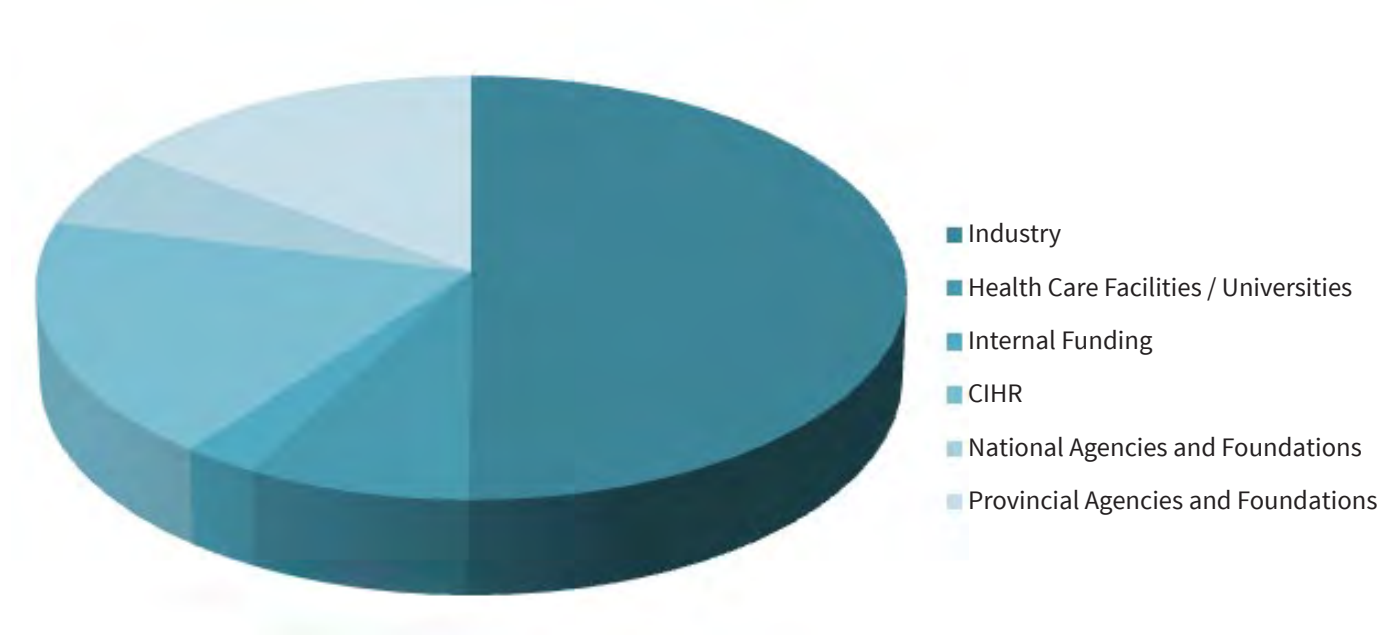
Dr. Stacy Ackroyd
Dr. Lisa Barrett
Dr. Richard Braha
Susan Butts
Sharon Calder
Matt Campbell
Jonathan Dyer
Dr. Amy Grant
Mary Ellen Gurnham
Stephen Hartlen
Dr. Jill Hatchette
Dr. Jill Hayden
Dr. Christine Herman
Jim MacLean
Pam MacMillan
Kunyi Mangalam
Dr. Lidija Marusic
Randi Monroe
Dr. Tony Otley
Belinda Parker
Mike Sangster
Dr. Isabel Smith
Dr. Erna Snelgrove-Clarke
Dr. Karthik Tennankore

Awards for Research Conducted at NSHA 2015-2016 Fiscal Year

	Administered at NSHA	Administered at Dalhousie University
Research Grants	$ 13,291,837.27	$ 2,310,964.43
Research Contracts	$ 8,791,896.89	$ 2,305,318.70
Total	**$ 22,083,734.16**	**$ 4,616,283.13**

Total: $26,700,017.29

Source of Awards for Research Conducted at NSHA 2015-2016 Fiscal Year



Nova Scotia Health Authority - Research
All Research Accounts
Statement of Revenue and Expenses
for the Twelve Months Ended March 31, 2016

	Actuals 15/16	Actuals 14/15	Variance
Opening Balance April 1	**33,499,073**	**$ 31,287,567**	
Revenue			
Grants	14,348,618	14,929,594	(580,976)
Contracts	7,326,602	6,900,378	426,224
Interest and Realized Gain on Investments	875,017	892,196	(17,179)
Federal Research Support Program	773,743	719,389	54,354
Donations & Other Revenue	262,635	426,142	(163,507)
Ethics Review Fee	325,500	273,226	52,274
RMU Consulting Fee	121,100	85,100	
Record Retention Fee	44,151	58,840	(14,689)
Gross Revenue	**24,077,366**	**$ 24,284,864**	**$ (207,498)**
Expenses			
Compensation	**13,594,382**	**12,998,215**	**(596,166)**
Supplies and Services Expenses			
Clinical Laboratory Services	521,527	496,891	(24,636)
Communications	35,264	34,532	(732)
Diagnostic Imaging Services	336,683	330,608	(6,075)
Equipment	556,828	3,651,775	3,094,947
Maintenance	139,995	354,368	214,373
Medical/Surgical Supplies	146,301	152,447	6,147
Other Expenses	763,682	772,216	8,533
Overhead to Dalhousie	623,444	560,322	(63,122)
Pharmacy Services and Drugs	334,307	341,152	6,845
Printing/Office and Computer Supplies	326,728	327,574	846
Purchased Services/Professional Fees	1,100,669	1,231,979	131,310
Recoveries of Expenses	(297,077)	(407,725)	(110,648)
Transfers Offsite	2,620,323	1,974,513	(645,810)
Travel/Professional Development	527,100	524,010	(3,090)
Travel-Patient	270,734	319,103	48,369
	8,006,507	**10,663,763**	**2,657,257**
Total Expenses	**21,600,889**	**$ 23,661,979**	**$ 2,061,090**
Net Inflow/Outflow	**2,476,477**	**622,885**	**1,853,592**
Unrealized Gain (Loss) on Investments	**(544,341)**	**1,588,621**	**2,132,962**
Ending Balance March 31, 2016	**35,431,210**	**$ 33,499,073**	**$ 1,932,137**

Overhead Distribution

	15/16	14/15	Variance
NSHA Research Services	985,941	942,929	43,012
NSHA Research Development	217,325	191,159	26,166
University Departments	373,988	336,404	37,584
Faculty of Medicine, Dalhousie University	249,456	223,918	25,538
Total Overhead	1,826,711	1,694,410	132,300

Research Staff & Research Ethics Board (REB)

Patrick McGrath, OC, PhD, FRSC, FCAHS
Integrated Vice President
Research, Innovation & Knowledge Translation
Nova Scotia Health Authority & IWK Health Centre

Sandra Englehutt, Executive Assistant

nova scotia health authority
Research Services

Research Services Staff

Lisa Underwood, Director
Michelle Roden, Administrative Assistant

Alicia Benton, Coordinator, Contract Facilitation & Support
Jennifer Thurlow, Coordinator, Grant Facilitation & Support
Stacey Pyke, Administrative Coordinator, Contracts & Grants
Jayne Sierens, Project Manager, Institutional Awards

Julia Enikeeva, Program Manager, Research Quality
Janet Gallant, Program Manager, Research Education
Judith Thompson, People Services Manager
Amy Wilson, Publications Coordinator

Research Financial Services
Chris Collier, Manager, Research
Jane MacLeod, Financial Analyst, Research
Hawley Dowe, Finance Officer, Research

Research Development and Planning
Sandra Crowell, Program Leader
Elaine Strohm, Administrative Assistant

Zone Research Facilitators
Chrissy Boyle, Eastern Zone
Robin Latta, Northern Zone
Daniel Marsh, Western Zone

Research Ethics Board (REB)

Research Ethics Board Executive:
Dr. Chris MacKnight, Chair
Dylana Arsenault, Co-Chair
Dr. Helena Piccinini-Vallis, Co-Chair
Dr. Andrew Jarvie, Co-Chair
Dr. David MacDonald, Co-Chair
Dr. Osama Loubani, Co-Chair
Dr. Anne Marie Crueger-Naug, Co-Chair
Gredi Patrick, Co-Chair
Dylana Arsenault, Zone 1 Executive Representative
Dawn Fougere, Zone 2 Executive Representative
Melissa Lee-Ross, Zone 3 Executive Representative

Ken Jenkins, Manager
Nadine Ransome, Administrative Coordinator
Starla Burns, Ethics Coordinator
Noreen Millar, Ethics Coordinator
Joan Morrison, Ethics Coordinator
Pamela Trenholm, Ethics Coordinator

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 staff and hospital employees.

The NSHA Research Annual Report *is produced by NSHA Research Services:*

- Content – Melanie Jollymore
- Design – Amy Wilson
- Photography – Gerard Walsh & Amy Wilson

For more information about our Annual Report, *please contact :*

Amy Wilson, Publications Coordinator
amy.wilson@nshealth.ca
902-473-5156

On the cover—left: Maamoun, Tuqa and Hasan Almeslmani; right, top to bottom: Dr. Robert Adamson; Kimberly, Ivy and Erica; Dr. Martin Bullock and Dr. Matthew Rigby; Murray Barkhouse and Dr. Keir Stewart

Nova Scotia Health Authority Research Services
117-5790 University Avenue
Halifax, NS B3H 1V7 Ph: 902-473-7906
http://www.nshealth.ca/research