November 2018

Partnering for a Better Future for Health Care

Ontario Universities Policy Discussion Series

Partnering to deliver solutions for today, and tomorrow

ONTARIO'S UNIVERSITIES
Partnering for a better future

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Introduction

In today's fast moving world, the symptoms of a health-care system under pressure can be seen and felt by hospitals, patients and families in communities across the province.

Ontario's health-care system risks facing even greater pressures as the population continues to age, the need for more complex care grows and technology continues to advance at a rapid pace.

In response, Ontario's universities are working to help Ontarians live independent, fruitful lives, while also promoting greater efficiencies and reducing the growing burden placed on our province's health-care system.

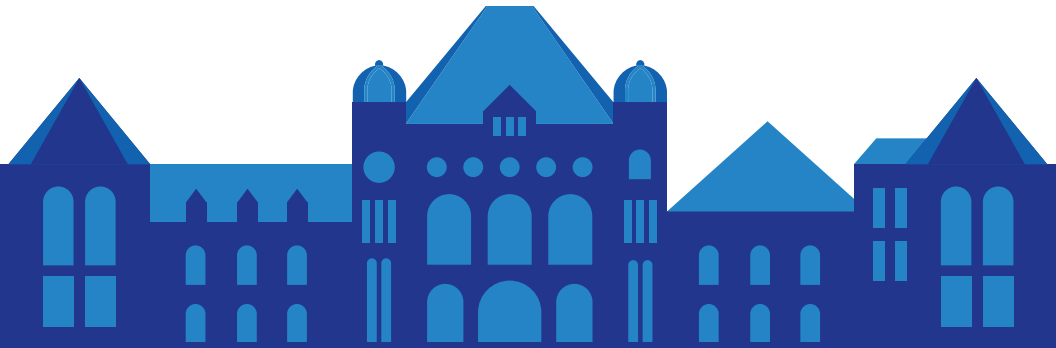
Universities are partnering with hospitals, agencies, health-care providers and local communities to help provide the kinds of innovative solutions the province will need.

From creating the life-saving technologies that improve quality of life, to training the physicians, nurses and other health professionals that deliver the highest-quality care to the people of Ontario – our universities play a critical role in strengthening the province's health-care system.

This booklet features some of the highly trained and adaptable health-care professionals that are putting the knowledge gained at Ontario's universities into practice in our communities.

You will also find a few examples of the innovative research developed at universities that is helping keep Ontarians healthy, at home and out of hospital.

There is no 'one size fits all' approach to improving health-care. We hope that by working together with partners in the sector, Ontario's universities can ensure access to the latest research and technology; produce advances in preventative care; train the health professionals our province needs; and support the development of age-friendly communities in order to build a better future for our students, communities and the province.



As Ontario's population grows and ages, it is estimated that health-care spending will account for 55 per cent of Ontario's program spending by 2050, up from 42 per cent today.

Improving Access with a Strong Workforce

Finding better and more efficient ways to deliver care is vital to building a better future for our students, our communities and our province. Ontario's universities play a crucial role by training the doctors, nurses and other highly skilled medical and administrative professionals that provide our communities with the highest-quality care.

A strong primary care system provides an excellent foundation to care for our aging population and the increasing number of people with complex chronic diseases. University health-care graduates contribute to improved health outcomes and lower costs, helping Ontario continue to meet the future health-care needs of the province.

The province's health-care system depends on the many thousands of dedicated and high-quality health professionals that gain their knowledge and skills at one of the 20 provincially-funded universities.

Registered Nurses

Rapid advances in technology and the growing need for more complex care for the people of Ontario requires a highly trained and flexible workforce. The province will need dedicated and adaptable professionals that support an efficient, effective and sustainable health-care system that puts the patient first.

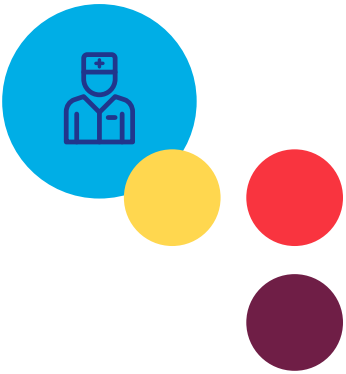
Ontario's universities are committed to educating and training the highly skilled nurses who are pivotal in providing the best possible care for patients and their families in this dynamic and increasingly complex world. Here's how:

- **Keeping up with demand:** Nurses are in high demand. In fact, almost all graduates from Ontario's nursing schools are employed within six months of leaving school. Our universities are integral to the renewal of our nursing workforce. Our 14 university schools of nursing graduate almost 4,500 students from Bachelor of Nursing, Master of Nursing and Doctoral programs each year.
- **Caring for an aging population:** The demand for good, caring and skilled nurses will only continue at a time when there are more seniors than children living in Canada. Ontario's universities are working hard to prepare adaptable, highly trained graduates to care for the aging population and to promote healthy aging at home. Nearly all university programs provide graduates with specialized knowledge and experience in care of older adults, including clinical placements in long-term care homes and in the community.

Our 14 university schools of nursing graduate almost 4,500 students from Bachelor of Nursing, Master of Nursing and Doctoral programs each year.

- **Ensuring patient safety, health outcomes and cost-effectiveness:** The majority of Ontario's acute and cancer care hospital patients have complex care needs. There is evidence linking the education, competencies and skills provided by RNs with lower mortality rates, improved patient satisfaction and health outcomes, and better financial outcomes for the health system through reduced complications and costly readmissions.

Nurses comprise the largest single regulated health profession in Ontario, with more than 105,000 registered nurses, 51,000 registered practical nurses, and 3,100 nurse practitioners contributing to the well-being of patients and our health-care system.



- **Hands-on experience:** There is a strong emphasis on hands-on learning, with about half of all learning taking place on the job. Nursing students are arriving into the workplace job-ready and in the best possible position to help patients, in part thanks to new technologies that allow them to work through the proper procedures in dozens of high-risk scenarios.
- **Collaboration:** Universities understand the importance of working together to meet the needs of patients, their communities and the health-care system as a whole. That's why:

  › Universities and colleges are partnering to prepare RNs at the baccalaureate level, creating efficiencies in process, shared infrastructure and delivery.

  › Hundreds of health and social service agencies partner with universities to provide clinical placements for students.

  › University nursing faculties take a collaborative approach to research that contributes to ongoing improvements in patient care.

Nurse Practitioners

Finding a health care provider, especially in remote and rural areas, can be challenging. But with the expanding role of nurse practitioners (NPs) as primary care providers, access to quality health care is becoming easier.

Primary Care NPs are educated through two different university programs: the Ontario Primary Health Care Nurse Practitioner Program is a unique advanced nursing education program offered through a partnership of nine Ontario universities; and the University of Toronto Primary Health Care Global Health Program offered in the Greater Toronto Area. Both programs are giving patients more choices and showing them that NPs are a viable option for primary care services.

Here's how:

- **Filling an Important Gap:** As Ontario's population of seniors grows from 16.4 per cent in 2016 to 25 per cent by 2041, more NPs will be needed. In fact, the number of NPs in Ontario's nursing workforce has more than tripled over the past nine years. With a 97 per cent employment rate in Ontario, NPs improve access to high-quality, cost-effective care and help reduce pressure on our health-care system.
- **Providing High Quality Care:** NPs are registered nurses with advanced preparation and education who provide primary, acute and specialty health care services. NPs complement the role of family physicians and other health care providers because they can work independently, perform physical exams, order tests, diagnose and treat illnesses, set and cast fractures, write prescriptions, admit and discharge patients from hospitals and provide referrals.

DID YOU KNOW?
Ontario universities graduate 10,000+ students from health programs each year, including 4,300+ registered nurses, approximately 240 nurse practitioners and 1,400+ doctors.

The nine-university program started in 1995 and graduates about 160 new Primary Health Care NPs each year.

- **Addressing chronic health conditions:** NP graduates provide advanced nursing care to patients with complex acute, critical and chronic health conditions. They support patients of all ages, including those with chronic conditions like diabetes, heart disease, cancer and mental illness.
- **Promoting efficiencies:** NPs improve access to primary health care and reduce the number of patients without a health care provider. They decrease non-urgent emergency room visits, treat non-mobile patients in their homes and long-term care facilities, reduce the use of multiple medications and ultimately decrease health care costs.
- **Meeting the diverse needs of the communities they serve:** NPs practice in areas with poor access to health care and support seniors, Indigenous and vulnerable urban populations. Uniquely, the Ontario Primary Health Care Nurse Practitioner Program educates NPs in nine different regions of the province to provide care for rural, remote, northern and Francophone communities.

The nine-university 'flagship' program in Canada is an efficient model that shares faculty, curriculum, resources, knowledge, governance and an online distance education hub, in a high quality, cost-effective, province-wide approach to NP education.

Physicians

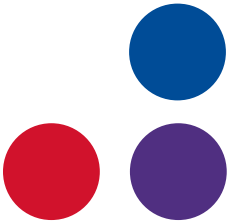
Over the last several years, Ontario's universities have partnered with government to successfully expand the number of family doctors and specialists in the province. Additionally, Ontario's six family medicine programs continue to train family doctors to work in underserved communities across the province, transforming family medicine and improving access for patients. As a result:

MORE PHYSICIANS:

- 2.1 million more Ontario patients now have access to primary health care and are no longer "unattached" patients, according to Ontario Medical Association figures.
- Ontario's six faculties of medicine more than doubled the number of family medicine residents and improved health-care delivery in more than 155 communities.
- Ontario Faculties of Medicine have increased the number of residency positions in Psychiatry by 35 per cent in the past decade, from 57 first-year positions in 2008 to 77 in 2018. This has begun to help the government address wait times and high need for mental health care.

IN MORE REMOTE PARTS OF THE PROVINCE:

- Ontario's universities are partnering with hundreds of communities to prepare doctors to work in towns, villages and cities across the province. The result of this approach has been a substantial increase in the number of physicians per 100,000 people in all regions of the province.
- Universities are providing local training opportunities across Ontario so that, following their residency training, more family physicians will stay and work in rural, remote and northern areas of the province.



More medical learners have chosen a career in rural, remote and northern medicine thanks to a curriculum that exposes learners to community medical practice.

USING INNOVATIVE APPROACHES TO TRAIN AND RECRUIT:

- The Distributed Medical Education (DME) programs place medical learners in more than 300 communities across Ontario, allowing them to develop a skillset unique to practicing medicine in smaller, remote and rural areas and involving thousands of community physicians in educating the next generation of doctors.
- A pipeline has been created for communities to recruit physicians who will help them meet their local health care needs today and in the future.

ONTARIO'S UNIVERSITIES

Building a Robust Health-Care System through Innovation

While the training of thousands of high-quality health professionals is crucial to strong and accessible health care, Ontario's universities are also partnering with government and industry to find creative solutions to make health-care delivery more available and cost-effective.

The remainder of this booklet highlights how the research conducted on university campuses is bringing together leaders in health care, business and technology. These collaborations have led to innovations and community programs that support our province's aging population, ensure all Ontarians remain healthy within their communities and contribute to an efficient health-care system.

Helping Our Aging Population Live Independently

The number of older adults in Ontario is growing. While the majority of these seniors want to age at home, half of them say they will need help within the next five to 10 years to do so.

Ontario's universities are working with government and health care stakeholders to ensure that our aging population receives the care it needs outside the hospital. With seniors representing the fastest-growing demographic of internet users (70 per cent are online every day), there is a real opportunity to better integrate technology into seniors care.

To date, technological solutions developed on university campuses have resulted in improvements in remote monitoring and mobility, at-home treatments, and social programs to keep older Ontarians healthy and engaged, preventing or delaying the onset of physical and cognitive decline.

Improving Mobility

Keeping seniors independent

Mobility in seniors is one of the most important factors in staying independent, less likely to fall and out of hospital. Deploying a smart wearable device to track wear and tear to the knee and give early warning of any problems with the joint – one of the most crucial to seniors' mobility – is just one of a broad array of solutions and devices researchers at McMaster University's Institute for Research on Aging are working on to keep the elderly mobile and active. Other initiatives include studying the physical causes and prevention techniques for falls and hip fractures, and using simulators to study the capabilities of older drivers to keep them safe and on the road for longer.

Do-it-yourself arthritis treatment

Osteoarthritis, the most common form of arthritis, is a highly prevalent chronic condition that affects many older Canadians. Its burden on the health-care system is expected to increase with Canada's aging population. In Ontario, health-care costs among patients with osteoarthritis have been found to be two-to-three times higher than for non-osteoarthritis patients. To ease this burden, Ryerson University researchers have found a way for Ontarians to treat their osteoarthritis at home, providing pain relief and keeping patients out of hospitals and clinics. They are developing a handheld ultrasound device that is just as powerful as desktop machines used in the hospital, and will retail for less than $500.

Researcher from University of Waterloo

Remote Monitoring

Monitoring patients at home

Common smart home devices are being used to monitor the physical movement, sleep patterns and behaviour of patients, especially the elderly – taking remote home health monitoring to a new level of sophistication. The Ubiquitous Technology Lab (UbiLab) at the University of Waterloo is working with industry partner ecobee, deploying the company's smart home thermostats and in-home sensors to generate data on physical activity and sleep quality to ensure older Ontarians are keeping healthy and active.

Digitized nursing for rural and remote patients

The health equipment and supply ordering processes that home care providers rely on are often paper-based and inefficient. To create efficiencies and improve access to services for remote and rural patient care, nursing and business researchers at Trent University have developed asecure and interactive software called Connected Care Communications that digitizes the equipment and supply ordering process, thereby saving home care service providers and government health agencies time and money, and improves patient care.

Improving Social Engagement

Preventing cognitive and physical decline through games

Nursing home residents in North America spend an average of 70 per cent of their day sitting alone, waiting, and doing nothing. Almost 50 per cent of residents in Canada lose their ability to walk within the first year of admission. To delay and combat this physical and cognitive decline, researchers at the University of Ottawa partnered with nursing home residents, administrators, and health-care professionals to create MouvMat. The interactive game takes the form of a floor mat, turning familiar games such as BINGO or Snakes and Ladders into life-size - physically engaging participants. It's the first of its kind to be designed for and with significant input by older adults and nursing home residents. By increasing physical, cognitive, and social engagement in older adults, institutions save money with decreased staff burden, and the Canadian health-care system saves $11 billion in health care expenditures by delaying or preventing transitions into increased levels of care.

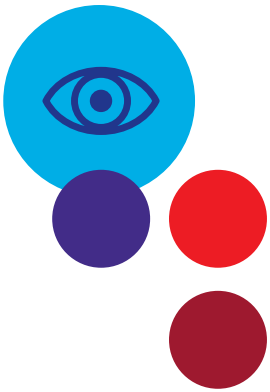
Almost 50 per cent of residents in Canada lose their ability to walk within the first year of admission to a nursing home.

Improving quality of life with social robots

With a growing number of older Ontarians wanting to live independently for longer, new advancements in robotic technology can help ensure they remain in their homes. Social and personal care robots designed at the University of Toronto facilitate daily activities and cognitive exercises for seniors, acting as a social motivator by providing words of encouragement and task assistance. One such robot named Casper reminds seniors when to eat and helps with meal preparation, enabling older adults to lead healthy and engaged lives.

Supporting All Ontarians in their Homes, Workplaces and Communities

Beyond the province's aging populations, university-generated solutions to health-care services are reaching all Ontarians where they live, work and play – from urban areas to rural and Northern communities. New technologies are allowing people to regularly track their health within their own communities, often avoiding the need to be admitted or readmitted into the hospital.



At-Home Treatments

Improving communication in ALS patients

Major advances in technology could allow people with ALS to effectively communicate with their families, caregivers and medical staff. Researchers at Algoma University's Brain Computer-Interface Lab have created a process where patients with neurodegenerative diseases, like ALS, can communicate quicker and more effectively through a sensor-equipped cap connected to a computerized device. Using their eyes, they are able to select letters on the display screens in order to form words and sentences. Still in development, the device will be a cost-effective and accessible method of communication for patients.

Many Canadians are receiving virtual mental health care help through a digital platform called TranQool.

Accessing mental health services at home

Many Canadians are receiving virtual mental health care help through a digital platform called TranQool. The tool allows users to connect with licensed therapists from home through secure video chats, and access online resources such as cognitive behavioural therapy assignments, thought diaries, goal identification for therapy, and a daily emotional tracker. Entrepreneurs from OCAD University's Imagination Catalyst incubator designed the tool with the goal of increasing access to mental-health therapy while making it more affordable. The company was recently acquired by Markham-based employee health provider, HumanaCare.

Managing chronic disease with a smart watch

Chronic obstructive pulmonary disease (COPD), a lung disease that includes chronic bronchitis and emphysema, affects 3.7 per cent of Ontarians 50-64 years old, and eight per cent of Ontarians over 65. University of Toronto researchers are developing a smart watch and self-management application for patients with COPD. The device uses computer algorithms to detect the cough, heart rate, and respiratory rate of the user, allowing for early detection of acute exacerbations, preventing hospitalization.

Gaining timely access to mental health services

In any given year, one in five Canadians experiences a mental illness or addiction problem. By the time Canadians reach 40 years of age, one in two have—or have had—a mental illness. To help patients gain timely access to the mental health services they need, York University researchers have developed an Interactive Computer-Assisted Client Assessment Survey (iCCAS) for depression, anxiety, post-traumatic stress and alcohol abuse for use in primary health care settings. The team has worked in partnership with North York General Hospital and community-based clinics where the survey has been applied and evaluated.

Workplace Health And Safety

Keeping remote workers healthy and safe

A unique, 40-foot mobile lab visits workers in Northern industries such as mining, forestry, pulp and paper and firefighting, providing them with occupational health and safety training in remote areas of Northern Ontario. Operated by Laurentian University's Centre for Research in Occupational Safety and Health (CROSH), and in partnership with employers, safe workplace associations and government, the vehicle is outfitted with innovative portable equipment to study factors such as fatigue, accident prevention, vibration-induced injury, heat stress, and nutrition to promote safety and prevent workplace injury.

Staying cool underground

Workers, such as miners, who work in hot environments often experience heat stress without realizing it, leading to a variety of different heat illnesses. Brock University researchers have partnered with Sudbury-based mining company Jannatec Technologies to create a vest for miners with the technology to monitor and control body temperature. The vest adapts to how hard they're working, how hot it is, and what they're doing at the time to generate different levels of body heat and cool the miner down accordingly.

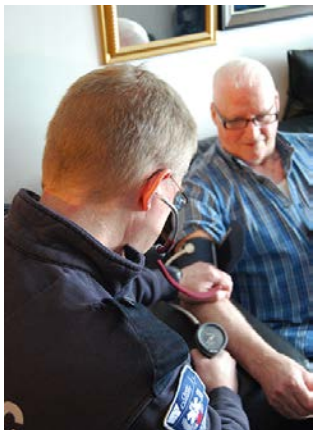
Mental health in the workplace

Mental health is an issue that impacts every workplace in Canada. A Nipissing University researcher is leading an investigation into stress, mental health and leaves of absence in the workplace. The project is looking at seven professions: medicine, dentistry, nursing, midwifery, professors, teachers and accountants.

Accessing Community Services

Keeping those struggling with chronic disease out of the hospital

Many Ontarians living with congestive heart failure, diabetes and chronic obstructive pulmonary disease are forced to go to emergency rooms to get the support they need to manage their chronic illnesses. Future Health Services, a paramedic programs is leveraging remote monitoring technology so that frequent 911 callers with chronic illnesses can receive care at home. The program, as Queen's University researchers have found, has dramatically reduced the number of 911 calls and emergency room visits among program participants and is helping improve patient outcomes and reduce costs in the health-care system.



Managing juvenile diabetes through innovative community programming

Maintaining a healthy lifestyle is one of the most important choices youth with Type 2 Diabetes can make in order to prevent complications from the disease. In partnership with Sun Life Financial, Wilfrid Laurier University has launched a community outreach program to improve activity levels and nutrition in youth with Type 2 Diabetes and their caregivers, as a way to manage their diabetes and prevent complications. The Sun Life Financial Centre for Physically Active Communities engages Laurier students to design and deliver physical activity programs and monitor their success.

Increasing community access to services

Taking an innovative health idea or product to market allows more Ontarians to access the product that can potentially transform their lives. University-based incubators bring together the necessary resources – from high-quality students and researchers to leaders in business and health care – to turn a health solution into a product accessible by many. Through the University of Windsor's incubator, two health-care start-ups were created. Sarjan develops digital platforms to help patients perform physical therapy at home, while Walk-in Express is a clinic-patient management application, tested locally in walk-in clinics across Windsor.

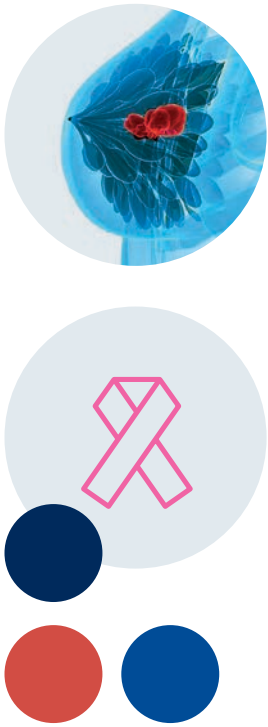
Finding Efficiencies in Health Care

Improvements to diagnostics, procedures, treatments and administrative processes have led to a more efficient and effective provincial health-care system. Through innovative methods, products, and services, Ontario's universities are partnering across sectors to commercialize products and strengthen health-care delivery in Ontario.

Improving Diagnostics

Detecting breast cancer early in women most at risk

For women who are at a higher-than-average risk for breast cancer due to dense breast tissue, traditional screening methods often lead to suspicious yet inconclusive imaging results, delaying detection and effective treatment. In partnership with the Thunder Bay Regional Health Research Institute, the Reznik Lab at Lakehead University is developing and commercializing a new technology for imaging of breast cancer, addressing an unmet need amongst women at higher risk. The technology allows for a significant reduction of the radiation dose associated with traditional breast imaging, while improving sensitivity and detectability of small and deep tumors in comparison with currently available breast-dedicated imagers.



Big data saving tiny babies

Premature babies are at greater risk of infection, respiratory, cardiovascular and neurological issues. Working with IBM and Toronto's Hospital for Sick Children, the Artemis Project at the University of Ontario Institute of Technology uses sensors to monitor babies and harness big data to identify complex problems, detecting life-threatening conditions before visible symptoms appear, and reducing the amount of time the babies spend in critical care.

Researchers at The university's G. Magnotta Lyme Disease Research Lab

On the trail of Lyme disease

The long journeys often taken by Lyme disease patients through the health-care system before correct diagnosis can be drastically reduced if University of Guelph researchers succeed in their quest to transform testing and treatment of the elusive pathogen. The university's G. Magnotta Lyme Disease Research Lab is working on identifying biomarkers and prognostic indicators, and testing and treatment options for the disease. It plans to help develop a national collaborative network of scientists, clinicians and patients to battle the growing incidences of the debilitating disease.

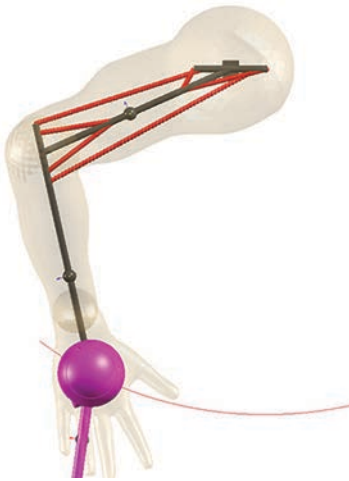
Finding More Effective Treatment

Improving treatment in breast cancer patients

Breast cancer is the most common form of cancer in Canadian women, accounting for one in four cancer diagnoses. It is also the second leading cause of cancer deaths among women, after lung cancer. Determining a breast cancer patient's response to chemo-therapy at an early stage of treatment could allow doctors to more quickly determine whether patients would do better with another therapy. Laurentian University researchers, in partnership with Health Science North, have come up with a test that can do exactly that, measuring the effectiveness of chemotherapy as early as a patient's first treatment. It is called a RNA Disruption Assay. The technology has been licensed to Rna Diagnostics Inc., and is improving patient treatment, experiences and outcomes for breast cancer patients around the world.

Rehabilitation after a stroke

Approximately 300,000 Canadian stroke survivors have reported that motor impairment in their hands and fingers prevents them from independently performing daily tasks. Robotic machines are often used to exercise and rehabilitate patients' limbs after a stroke. But before the machines can effectively interact with people, they must be trained using a simulated limb that is as close to the real thing as possible. University of Waterloo researchers have created a musculoskeletal model of the human arm to help these scientists design robotic rehabilitation machines that sense a patient's needs and adjust accordingly. The researchers worked in partnership with Quanser, Toronto Rehabilitation Institute, Maplesoft and Grand River Hospital.



Streamlining Processes

A formula for solving hallway medicine

Hospitals and their staff are working hard to prevent, manage and address wait times in order to provide Ontario residents with effective, sustainable health care in a timely and appropriate way. To support their efforts, Western University researchers have proposed a simple, statistics-based tweak to emergency room intake procedures to cut delays and potentially eliminate hallway medicine. The study proposes a method that tracks how patients are doing based on their current condition, which will allow them to accumulate "priority" points while they wait – minimizing the number of patients that are forced to wait beyond their targeted times.

Rethinking palliative care

Thousands of patients in Canada go through palliative care each year, but more information is needed to gauge whether they are receiving the best care in ways that ease the burden on the health-care system. With the rapid aging of the population, and with hospital-based palliative care costing at least seven times more than home-based palliative care, the research promises to help develop a better, more efficient and patient-centred system. Wilfrid Laurier University is leading this national project to develop quality indicators for palliative care providers across the country.

Algorithms saving lives

Parkinson's disease is a complex neurodegenerative disease that affects many Canadians. It has the third highest cost on the health-care system, after Alzheimer's disease and other dementias and epilepsy. And, the number of Canadians over 40, living with Parkinson's disease, is projected to increase by 65 per cent by 2031. Carleton University researchers are using machine-learning algorithms and big data to better identify the damaged tissue and proteins in the body that play a role in neurodegenerative diseases. By processing data on a scale unimaginable until recently, these researchers are transforming medical procedures and treatments for Parkinson patients.

Researcher from Carleton University

Predicting and preventing epidemics

Math is being used to help the province better respond to outbreaks and public health emergencies by helping predict potential population areas for infectious diseases. A team led by York University is looking at solutions that include the use of vaccines to combat hospital-acquired infections such as C.difficile, how to most effectively target the right population segments for flu vaccines and the impact of childhood immunization on disease transmission.

Researcher from Brock University

Safer Procedures

Advancing medical imaging

Medical imaging is essential to medical care and treatment in Canada – 1.7 million Canadians underwent magnetic resonance imaging (MRI) in 2012. A proper MRI reading means patients are typically injected with a "contrast agent" to make the images appear clearer for doctors to diagnose. However, recently, the U.S. Food and Drug Administration has been investigating the risks associated with this agent. Brock University researchers are developing safer contrast agents, using new molecules that produce MRI images without entering the body's organs. The result will be sharper images, more effective diagnoses and safer outcomes.

Saving lives through neonatal art

Surgeons must perfect their technique before attempting high-risk procedures on fetuses in the womb and on newborns. Practice on life-like models is key. OCAD University and Mount Sinai Hospital have partnered to create a series of accurate and responsive fetal models that simulate the complexity of developing bodies and fetal abnormalities. These models give surgeons the visual and tactile information they need, allowing them to practice required procedures before they perform them in utero, saving many babies' lives.

Transforming the Operating Room

A new technology that provides real-time 3-D mapping of a patient's anatomy during operations will dramatically increase surgical efficiency, leading to major cost savings for the health-care system. This light-based technology has been invented by a Ryerson University and University of Toronto researchers. The technology helps surgeons navigate the patient with fine-tuned accuracy and also minimizes the traditional use of X-ray scans during surgery, ensuring better outcomes.

Further reading

Discover the many different ways in which Ontario's universities are partnering for a better future for Ontario at www.ontariosuniversities.ca/partnerships

REPORTS INCLUDE:

50 Ways Universities are Partnering with Employers

50 Ways Universities are Partnering for Stronger Communities

50 Ways Universities are Partnering with Colleges

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