# CANADIAN
# Healthcare Technology

CANADA'S MAGAZINE FOR MANAGERS AND USERS OF INFORMATION SYSTEMS IN HEALTHCARE | VOL. 24, NO. 7 | OCTOBER 2019

## INSIDE:

PHOTO: COURTESY OF VOXNEURO

The first-of-its kind VoxNeuro system tests the cognitive health of patients suffering concussions and other head injuries, and in the future, the declining mental health of the elderly. By pinpointing functional areas that are not performing well, clinicians can recommend rehab therapies that produce faster results for patients and are more cost-effective for the healthcare system. **SEE STORY BELOW.**

# Innovative EEG system leads to more effective rehab

BY JERRY ZEIDENBERG

HAMILTON, ONT. – A McMaster University spin-out company, called VoxNeuro, has produced technology that allows clinicians to precisely gauge the level of brain activity in persons who have suffered head injuries – such as concussions – or those who have experienced a cognitive decline, including the elderly.

Using EEG technology that's coupled with new proprietary algorithms for interpreting the data, VoxNeuro allows patients to be tested, non-invasively, in a matter of an hour, as opposed to the traditional form of testing that can take three days.

Moreover, the testing accurately pinpoints which functional areas of the brain are normal, and which are showing deficiencies. These functional areas include working memory, automatic attention, reactive attention, language comprehension and executive function – all of which can affect a person's day-to-day behaviour.

The EEG-based testing contrasts with current methods of assessing patients with brain injuries for cognitive functioning, where a clinician sits with the patient, asks questions and subjectively scores the responses.

"Up to 43 percent of the patients whose brain functioning is assessed after a head in-

> **The VoxNeuro system actively tests different parts of the brain to assess strengths and problems.**

jury walk out of the hospital with the wrong diagnosis," said Dr. John F. Connolly, co-founder of VoxNeuro and director of the Centre for Advanced Research in Experimental & Applied Linguistics (ARiEAL) at McMaster University.

He is also co-director of the centre's Lan-

guage, Memory & Brain Lab, and is the creator of the patented assessment and much of the methodology that's at the heart of VoxNeuro's approach.

By objectively assessing brain function, and by evaluating the activity in various regions of the brain, patients can be quickly directed into more useful forms of rehab therapy.

"Instead of trying eight forms of therapy to see what works, we can tell rehab clinicians that, 'These are the areas you need to focus on,'" said James Connolly, co-founder and CEO of VoxNeuro. "Instead of guessing what might work, we can tell them what will accelerate recovery."

VoxNeuro brings scientific testing, diagnosis and treatment planning to the exercise, instead of guesswork and trial-and-error.

He noted the information leads to better patient outcomes and reduced costs, as less

# EEG system allows clinicians to precisely gauge level of brain activity

CONTINUED FROM PAGE 1

time is needed for the patient to recover or progress.

James Connolly is the son of Dr. John F. Connolly, and as a former corporate executive with experience in business development in Canada and the United States, James is leading the commercialization of the technology along with COO and co-founder, Kimberly Elliott. He serves as CEO of VoxNeuro.

Also guiding the company is Sam Chebib, who serves as chairman and Chief Strategist. Previously, Chebib was the CEO of Toronto-based Nightingale Informatix, a leading developer of electronic medical records for physicians in Canada and the United States. The company was purchased by Telus Health, which has been integrating the technology into its own EMR system.

VoxNeuro was formally launched in 2017 and makes use of 25-years worth of peer-reviewed, globally funded research. Its flagship assessment centre is located at McMaster University, where VoxNeuro is currently accepting patients, and has offices at the IBM Innovation Space in Hamilton, Ont.

It is also providing clinical services and conducting original research within ARiEAL, a research centre with multiple active studies in concussion. For example, a research project in the centre is currently assessing members of the McMaster University football team for signs of cognitive damage that may have been suffered in past concussions.

It intends to reassess football players who experience concussions during the current season; it will also assess all the players after the season ends.

Dr. Connolly and his team are at the forefront of research into the effects of concussions on athletes – something that has been gaining attention in recent years but is still not fully understood. "Concussion is complicated," said Dr. Rober Boshra, Director of AI & Technology at VoxNeuro.

"Athletes who suffer concussions may feel okay after a few weeks, but sometimes they're really not," he said. The functional EEG testing can accurately determine if they've suffered damage to various areas of brain function.

Moreover, said Dr. Boshra, "If they get hit again, it can be a lot more traumatic."



VoxNeuro's leadership team includes Dr. Kyle Ruiter, Dr. John F. Connolly, and Dr. Rober Boshra.

In addition to sports injuries, concussions can be suffered in car accidents, falls, and other incidents. A recent study by the Toronto Rehab Institute estimates there are 150,000 concussions a year in Ontario alone. "That's what people thought was the figure for all of Canada," said Dr. Connolly, noting the incidence of concussion has been greatly underestimated.

Researchers are now starting to link abnormal behaviour in some persons to concussions they have suffered – both recently and in their pasts. "Some people don't fully recover," said Dr. Connolly.

EEG is sometimes used in hospitals to test patients for brain function and activity. However, the tests are largely performed while the patient is in a "resting state". That is, he or she isn't performing any mental or intellectual tasks.

By contrast, VoxNeuro's technology takes the patient through a series of words, images and tasks and asks him or her to respond. By measuring the "active" responses, or lack of them, VoxNeuro can accurately determine which areas of brain function have been injured or is malfunctioning.

The tests are done with electrodes attached to the patient's head, using a cap. The leads pick up levels of electrical activity in the brain while patients are looking at a computer screen and responding to images and sounds. The data are collected and analyzed by computer technology; reports can be turned around and delivered to attending clinicians within 48 hours.

Already, VoxNeuro's technology is being used by St. Joseph's Hospital, Hamilton. The Sports & Exercise Institute in Toronto will be launching a Toronto-based assessment centre later this year, and nationally, Bayshore Therapy & Rehab is using it to build out their concussion program.

In the near future, VoxNeuro will be adding cloud-based AI processing to the analysis. As it collects more data, the company will devise a system that can detect abnormalities with even greater degrees of granularity; it will be able to indicate which rehab activities will be more effective in a particular patient, with a greater amount of precision. "We may even be able to predict who is at risk of various problems in the future, by analyzing the data," said Dr. Boshra.

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# CANADIAN Healthcare Technology

CANADA'S MAGAZINE FOR MANAGERS AND USERS OF INFORMATION TECHNOLOGY IN HEALTHCARE
**Volume 24, Number 7  October 2019**

Address all correspondence to Canadian Healthcare Technology, 1118 Centre Street, Suite 207, Thornhill ON  L4J 7R9 Canada. Telephone: (905) 709-2330. Fax: (905) 709-2258. Internet: www.canhealth.com. E-mail: info2@canhealth.com. Canadian Healthcare Technology will publish eight issues in 2019. Feature schedule and advertising kits available upon request. Canadian Healthcare Technology is sent free of charge to physicians and managers in hospitals, clinics and nursing homes. All others: $67.80 per year ($60 + $7.80 HST). Registration number 899059430 RT. ©2019 by Canadian Healthcare Technology. The content of Canadian Healthcare Technology is subject to copyright. Reproduction in whole or in part without prior written permission is strictly prohibited. Send all requests for permission to Jerry Zeidenberg, Publisher. **Publications Mail Agreement No. 40018238.** Return undeliverable Canadian addresses to Canadian Healthcare Technology, 1118 Centre Street, Suite 207, Thornhill ON  L4J 7R9. E-mail: jerryz@canhealth.com. **ISSN 1486-7133.**

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# Health Sciences North celebrates five years of virtual critical care

BY JASON TURNBULL

SUDBURY – In the Intensive Care Unit at Health Sciences North, you'll find some of the sickest patients in the hospital, with many facing life threatening conditions. But these aren't the only patients the staff are caring for. On any given day, staff may help save the life of someone who could be hundreds of kilometers away.

Just a few steps away from the ICU you'll find HSN's Virtual Critical Care Unit, with its room full of computer monitors. There's also a huge map on the wall of Northeastern Ontario, covered in dots, each marking a hospital that's connected to the system.

Every hour of every day, with the help of a webcam and a specialized broadband connection, these hospitals can connect to an expert team when they are faced with a patient needing critical care.

Virtual Critical Care (VCC), relatively new in Canada, was pioneered at HSN in 2014. With the help of telehealth technologies, patients requiring critical or lifesaving care have immediate access to a team of critical care experts including physician specialists, critical care nurses, pharmacists, and respiratory therapists.

With its vast geography and complex weather patterns, Northeastern Ontario presents huge challenges to providing timely, lifesaving medical care to a sparse population.

Dr. Derek Manchuk, Chief of Critical Care at HSN, and Medical Lead for VCC for the NE LHIN, says as the tertiary care centre for the region, Health Sciences North



Members of the Virtual Critical Care Unit at HSN use telehealth to assist hospitals across Northern Ontario.

PHOTO: CARRIE DUNCAN, COMMUNICATION SPECIALIST WITH HEALTH SCIENCES NORTH

has a responsibility to step up, as many rural hospitals don't have critical care teams and see critically ill patients infrequently.

"We are the lifeline for the region. During these calls we are able to collaborate and coach teams through the situation, which not only helps the current patient, but may also help the next patient, as we are providing real-time education during these calls."

Dr. Stephen Saari, one of only three physicians in the community of Chapleau, five hours northwest of Sudbury, says he couldn't imagine practicing medicine without VCC.

"We're all family doctors, and don't have additional training in critical care medicine. But by dialing into the VCC team, it gives us

the confidence to care for our patients. It's like we have an entire team standing right next to us, giving us direction, checking on vitals, accessing lab results and imaging."

HSN is now connected to 29 hospitals across the Northeast LHIN. This includes four hospitals and two nursing stations that are part of the Weeneebayko Health Authority, along the James Bay Lowlands.

"It's very important for us to be there and connect with those communities and build those relationships," says Melissa Bertrand, Manager of the VCC Program at Health Sciences North. "We're able to build partnerships and share our medical expertise to improve health outcomes for those patients, while also sharing our educational resources."

VCC allows more people to receive care closer to home, which benefits the patient and the healthcare system. Over the past five years, VCC has consulted in the cases of 1,504 patients and facilitated over 2,821 virtual visits, allowing more than 620 patients to remain in their home hospitals surrounded by their local support systems.

Approximately 30 percent of these patients avoid transport, resulting in annual savings of over $10 million in transportation costs.

HSN's model for Virtual Critical Care is attracting attention from other healthcare leaders across Canada and around the world. Renee Fillier, a Virtual Critical Care Nurse at Health Sciences North, says, "There was a pediatric virtual critical care started in Vancouver based on our model. The Northwest LHIN now has a Regional Critical Care Response unit based on our model. So do other LHIN's in southern Ontario. There was also a delegation from Barbados that came here to learn from our approach. So it's spreading everywhere."

Going forward expanding telehealth and the VCC service is a priority for the organization. As part of the new 2019-2024 Strategic Plan, Health Sciences North is planning to work with community partners across Northeastern Ontario to expand virtual care models and remote patient monitoring in mental health and addictions, pediatrics, and chronic disease programs, all with the goal of reducing the need for patients to travel for quality healthcare.

*Jason Turnbull is a Communication Specialist with Health Sciences North.*

# 'In-hospital' patient tele-monitoring program devised at UHN

BY MARIJANA ZUBRINIC
AND LUKE BRZOZOWSKI

TORONTO – A system that improves safety and saves money is a home run for a hospital, and University Health Network's Patient Tele-Monitoring Program has managed that feat.

The system was developed to address a rising expense: patient sitters. These people provide personal, around-the-clock observation, intervening and preventing patients from accidentally injuring themselves through falls, removing lines, or not following through their treatment plans.

To address the rising number of adverse post-surgery events in vulnerable patients, UHN and other North American hospitals have been increasing the use of sitters in recent years. Although effective at reducing the number of adverse events, direct personal patient observation is a rapidly growing financial burden on Canada's healthcare. It calls for a technology-backed alternative.

Working closely with the Sprott Department of Surgery, UHN's Techna Institute designed, built and successfully implemented innovative technology to

provide 24/7 remote observation of patients at risk for adverse events.

This first-in-Canada Patient Tele-Monitoring Program allows a two-way communication between a trained tele-monitor technician and up to six patients at a time from outside their hospital rooms.

Using off-the-shelf hardware for its mobile camera units, speakers and microphone, paired with an embedded Linux system, the server can determine camera names, IP addresses, and video encoding formats.

The Tele-Monitoring application can connect to the cameras, and the person observing can set up a layout to monitor multiple patients simultaneously. Overlays of the patient's name, site, floor, room number, and call information to dispatch help are displayed in an overlay for each video source.

The remote observer can associate each patient's video feed in the software with a nurse and dispatch number so that a call can rapidly be placed, when needed, with a "touch-to-call" icon in the application.

When a patient moves, the motion detector sends notifications through a computer to the technician, providing a

back-up to the human vigilance of the operators.

The system allows the technician to verbally direct the patient to keep their treatments in place or stay in their bed if getting up by themselves is unsafe. The technician can also rapidly make a dispatch call through touch-based interac-



Staff monitoring at-risk patients at UHN.

tion, with the patient room and event displayed in the touched video feed.

Integrated within the UHN network, the program has been implemented across the Toronto General and Toronto Western Hospitals, as well as at the Princess Margaret Cancer Centre, and has received rave reviews from its users.

The efficiency of having one full-time technician over six sitters on an on-call basis has saved hundreds of thousands

of dollars in operating expenses and has also improved the predictability of the expense.

While UHN is targeting a 60:40 mix of in-room and remote observation, some units have already transitioned 80 percent of their cases to the new system, while maintaining a high level of patient safety.

Dr. Shaf Keshavjee, Surgeon-in-Chief at UHN and the clinical lead and sponsor of this project, said "the Telemonitoring Program at UHN has not only developed advanced and innovative technology to improve patient safety, but has also led to savings in the cost of constant monitoring of patients at risk."

With the cost of bedside sitters constantly increasing, the Patient Tele-Monitoring Program has shown a significant reduction in sitter-associated healthcare spending, without compromising patient safety. To help other hospitals with this challenge, the Techna Institute is leading UHN's activities to disseminate the technology and clinical processes.

*Marijana Zubrinic, RN, MScN, NP, Leads the UHN Telemonitoring Program; Luke Brzozowski PhD, is Senior Director, TECHNA Diagnostics and Technology Innovation.*

# Newfoundland and Labrador extends telehealth into homes and offices

BY BLAIR MEDD

ST. JOHN'S, NL – The Newfoundland and Labrador Centre for Health Information (NLCHI) is taking the next evolutionary step for telehealth services through its new Home-Based Telehealth initiative. Currently in its pilot phase, Home Based Telehealth will put a new and modern spin on the age-old 'house call' by connecting patients to physicians from the comfort of their homes and offices.

The birth of Telehealth in Newfoundland and Labrador traces its roots to the pioneering work of the late Dr. Max House, who in 1976 sought a more effective way to treat his patients in the rural and remote areas of the province.

Embracing the challenges associated with Newfoundland and Labrador's vast geography and dispersed population, telehealth has grown to become a significant tool within the provincial health system for keeping patients closer to home when seeking medical care.

"Telehealth and other virtual care services are a natural fit for Newfoundland and Labrador's healthcare system," said Cindy Clarke, Director of eHealth Programs Community & Virtual Care, NLCHI. "As people further embrace technology in their lives, we have the opportunity to enhance healthcare access and delivery to all ages and regions."

As the lead for the provincial Telehealth program, NLCHI has witnessed first-hand the significant growth of the service. In the past seven years, Telehealth usage has increased by over 70 percent, with over



Dr. Kris Luscombe, regional chief of psychiatry, sees the majority of his patients by using telehealth.

21,000 appointments using this technology this past year.

Recently, through an investment from the Atlantic Canada Opportunities Agency, NLCHI has been expanding and improving provincial telehealth technologies and services from standalone regional locations into new and innovative offerings.

As part of the expansion project, the telehealth program has gone through significant technology upgrades to enhance the quality of appointments. It has also implemented a provincial scheduling tool to improve clinical workflows and has added additional regional sites – now numbering over 100 locations province-wide.

New clinical areas have been added to both extend the reach of telehealth to additional patient groups and further reduce the need for patient travel. This includes adult and pediatric emergency services and long-term care, increased access to community and public health services, and pathology appointments.

NLCHI is now leading the provincial telehealth program into a new area outside of the traditional acute care settings and into patient homes and physician offices.

"Support for telehealth in central Newfoundland has revolutionized the way I deliver psychiatric care in just the past few years," said Dr. Kris Luscombe, Regional Chief of Psychiatry, Central Health and a Home-Based Telehealth pilot user.

"With a modern electronic medical record system, improved technology and expanded clinical and technical support systems, I now have a practice where the majority of my patient encounters are by Telehealth."

Dr. Luscombe added, "This is a great service to my large remote population, providing better access and service equity to both rural and urban citizens. I see further opportunities to increase access as we expand telehealth into homes, which can further improve monitoring and continuity of care."

The Home-Based Telehealth program will open new doors for patients and clinicians to interact and connect, saving time, travel and expenses for patients, and improving the effectiveness of Newfoundland and Labrador's healthcare system.

What began with Dr. House's vision of greater access to medical services in the rural Baie Verte region has grown into a provincial network of communications tools and healthcare professionals. They are connecting with patients and colleagues through technology, innovation and a desire to improve health outcomes and the healthcare experience.

For more information on NLCHI visit: www.nlchi.nl.ca or follow on Twitter @NLCHItweets

*Blair Medd is Director of Communications at the Newfoundland and Labrador Centre for Health Information.*

# Shaping the future of healthcare delivery: the value of virtual visits

The need to innovate and modernize healthcare delivery is not new. Over the past two decades, a broad range of technologies have been introduced that interconnect healthcare providers to enable integrated care of their patients.

With EMR penetration among primary care physicians in Canada now reaching 85% and streamlined communications among healthcare professionals helping to deliver enhanced continuity of care, important progress has been made to improve the provider-patient experience and engage patients in their own health management.

As encouraging as this progress is, the question facing providers, policy-makers and citizens alike is: how do we bring healthcare delivery to the next level?

Today, 86% of Canadians own a smartphone and almost 100% of those under the age of 45 access the Internet every day. The impact of mobile devices on individual lives and industries is transformative and is not slowing down.

The healthcare sector is not exempt from this disruption and the consumer-like expectations it has fostered with individuals. While inherent factors are hindering the adoption of new technology in the healthcare industry, the general consensus is a desire for fundamental change.

New findings from The Future of Connected Healthcare report, released by the Canadian Medical Association, illustrate Canadians' perspectives on healthcare and the advance of technology. As the report highlights, a large proportion of Canadians believe that connecting data, technology and innovation can help cure their ailing healthcare system. According to the Ipsos poll of 2,005 adults:

• 73% believe virtual care will improve access to healthcare services;
• 71% believe virtual care will lead to more timely care; and
• 67% believe virtual care will lead to overall better healthcare.

Introducing new technologies into existing modes of operating comes with challenges. However, other sectors have met and overcome these trials and today, it is the turn of Canada's healthcare sector.

In the US, consumer usage of virtual care doubled between 2016 and 2017 and about half of workers now have access to virtual healthcare. In the United Kingdom, an early adopter of virtual care thanks to government-supported telemedicine and telehealth programs, penetration of tech-supported care is the highest per capita in the over-65 category of any global market.

Yet, when it comes to virtual care in Canada, a great divide exists between current demand (71%) and its current rate of adoption (9%).

We are faced with a significant opportunity for the Canadian healthcare ecosystem. Virtual care is often discussed from the patient or consumer perspective. And, indeed, many forms of virtual care employ an important 'patients first' approach.

However, physicians also want to be able to conduct virtual visits from within their EMRs in order to provide even bet-

> **When it comes to virtual care in Canada, a great divide exists between demand (71%) and current adoption (9%).**

ter care to their patients and have more productive practices. For example, leveraging virtual care for certain follow-up visits can reduce wait times for in-clinic consultations for patients who need a face-to-face encounter.

Conducting virtual consultations with specialists can cut the time required to accurately assess a patient's needs and get the right form of care started. Efficiencies such as these can be linked back to spe-

cific returns to the health system overall.

The use of digital health technology and mobile access to care can be game changers, not only for how care is delivered and accessed, but in terms of addressing lost productivity.

For its part, TELUS Health is proud to be at the vanguard of modernizing healthcare delivery for citizens from coast to coast. In addition to offering solutions for physicians, pharmacists, insurers and health authorities and their patients, TELUS Health is also a leading enabler of virtual care in Canada.

Babylon by TELUS Health and Medisys on-Demand, powered by Akira, can provide patients and employees with immediate access to clinical insight to assess their symptoms and guide them to the appropriate sources of care – a virtual physician visit, an in-person consultation, or an emergency room.

The solution to addressing the major challenges barring the widespread adoption of virtual care to all Canadians will be a collaborative effort requiring steadfast political will, bold leadership and a willingness to collaborate in new ways across sectors and throughout the healthcare ecosystem. By adapting these approaches, Canada can deliver a new standard of care – one that ranks alongside the best healthcare systems in the world.

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# What to expect when you include patients and families in projects

TORONTO – Increasingly, hospitals and other healthcare organizations are seeking the input of patients and families when they craft electronic health records, portals and other solutions. After all, the solutions are ultimately for the benefit of patients, and it's seen as prudent to get their feedback and address their concerns from the get-go. However, knowing how best to do this type of engagement in the healthcare IT context can be difficult.

Recently, a group of researchers led by Dr. Gillian Strudwick, an independent scientist at CAMH, studied the role of patient and family engagement in healthcare IT projects by conducting a literature review, holding focus groups and organizing a day-long symposium. After learning more about some of the roadblocks to increased patient and family participation in these projects, Dr. Strudwick and her colleagues identified several recommendations.

For example, when committees are formed to design or develop an electronic system, patients or family members should be involved. Financial compensation, as well as holding meetings at times that are convenient to them – such as evenings, rather than the daytime, when they are at their own jobs – are other important factors to consider.

As a next step, Dr. Strudwick and her colleagues hope to create a guide or set of tools to further help organizations when working with patients and families on healthcare IT initiatives.

She said the project first emerged a few years ago. "We started to see a whole movement of patient and family engagement in healthcare. We wondered why we weren't engaging patients and families as frequently in this space (health information technology) when it was seemingly being used everywhere else."

Dr. Strudwick noted that some organizations were starting to include patients in the design and roll-out of apps. But there was very little involvement in the creation of large-scale systems, like enterprise EMRs, despite the fact that these systems centred on the patients themselves.

"We learned that those working in healthcare organizations to implement health IT solutions needed tools and strategies for greater patient involvement," she said.

The researchers uncovered many useful ideas and issues. To ensure meetings for patients and families are held at convenient times and places, it was suggested that videoconferencing be used more extensively, so that more patients and family members could easily participate in meetings, or at least monitor them.

Follow-ups were also mentioned as an important issue. In some cases, patients participated in meetings, but received no word afterwards on whether ideas or suggestions were carried out.

As the report noted, "The beginning of projects often involves a meeting where high-level ideas are shared and plans are made. However, there often is no follow through or updates afterwards. A patient who attended the symposium said that, "Everybody walks away and then there's no accountability, no touch points."

That being said, it's important to communicate regularly with committee members – something that shouldn't be difficult to do using e-mail and social media.

As cited in the report, "Communicating with participants also provides them with some transparency, letting them know how their feedback or insight is being incorporated. One family member expressed that they would like an update: 'It's been six months; this is what we've done so far, and this is how we've actually used your feedback.'"

At the symposium, one of the most pressing topics for participants was the recognition of power dynamics in meetings. It's difficult, in many cases, for patients and family members to feel comfortable sharing their perspectives in a room dominated by doctors, nurses, IT professionals and hospital executives. Having several patients and family members present in meetings may be one way of shifting some of this power imbalance.

Training for meeting facilitators was suggested, to ensure they can maintain an environment of mutual respect. As well, it was suggested that IT training for patients and family participants would help, as it would give them more expertise. "The training could even occur ahead of time," said Dr. Strudwick, "so you don't go in cold and are more comfortable with some of the terminology, concepts being discussed and background on the particular project."

Finding the right mix of people for a committee is always a challenge, too. It's important to have ethnic and gender diversity. And of course, "you want people who are committed and engaged."

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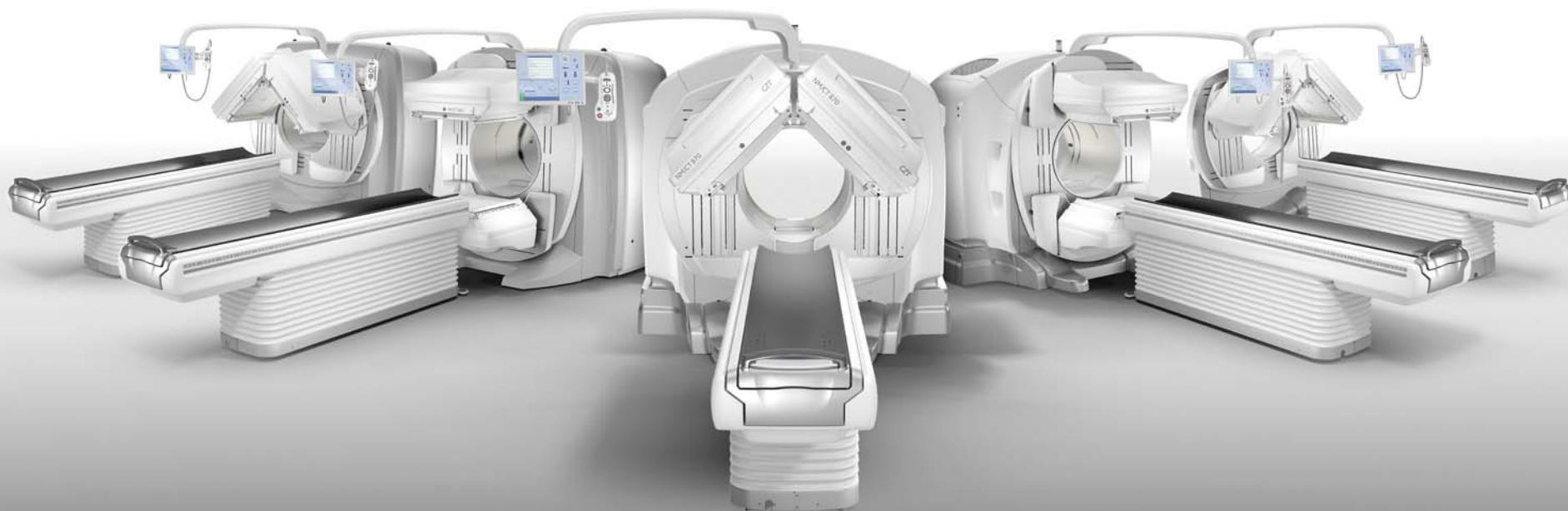


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# First patient in Canada treated on Sunnybrook's Elekta MR-Linac

BY ALEXIS DOBRANOWSKI

TORONTO – In August, members of Sunnybrook Health Sciences Centre's radiation team treated the first patient in Canada on its new MR-Linac, the Elekta Unity. It's the first machine in the world to combine radiation and high-resolution magnetic resonance imaging (MRI), and will let doctors at the Odette Cancer Centre target tumours and monitor their response to radiation with unprecedented precision – even as a tumour moves inside the body – thanks to the machine's real-time MRI guidance.

The team watched on MRI as a beam of radiation hit a glioblastoma. Seeing the radiation hit the target means the team can ensure exceptional precision, spare healthy tissue, and adjust the radiation target if needed.

As a founding member of the Elekta MR-Linac consortium and the first Canadian centre to install an MR-Linac, Sunnybrook's team made significant contributions to the development and implementation of this technology, beginning with an imaging research study. It is now embarking on a clinical trial called MOMENTUM (The Multiple Outcome Evaluation of Radiotherapy Using the MR-Linac).

"We are so excited that our efforts can now benefit patients," said Dr. Arjun Sahgal, radiation oncologist and head of Odette Cancer Centre's Cancer Ablation Therapy Program. "The Elekta Unity will help us target tumours more precisely, sparing the healthy surrounding tissue."

Dr. Brian Keller, medical physicist, has



Sunnybrook's Elekta Unity is the first in the world to combine radiation and high-resolution MRI for therapy.

been involved in the MR-Linac project since the beginning of 2013.

"The initial version of this machine was a research version, which was eventually upgraded to a clinical version able to treat patients," he said. "Over the years, our physics group in the Odette Cancer Centre has worked closely with Elekta to help validate this machine for clinical use, and to help produce a final product that is now able to treat patients.

"Witnessing the evolution of this technology from inception to clinical validation to patient treatment is a unique experience that exemplifies how basic science and teamwork can lead to real benefits for our cancer patients."

As medical director of Odette Cancer Centre Clinical Trials, Dr. Claire McCann has been involved from the ethics and regulatory perspectives helping to ensure the testing, evaluation, implementation and research use of this system from a clinical and research perspective is conducted accordingly.

"I have also been involved as a clinical medical physicist, working in the clinical implementation of the system in terms of creating novel workflows to build this adaptive radiation treatment paradigm that leverages the unique capabilities of this system," Dr. McCann said. "This has been a tremendous multidisciplinary effort involving physicians, therapists and physicists."

Dr. McCann is a co-investigator of the MOMENTUM study, the next phase in the clinical implementation of the MR-Linac. The data collected through MOMENTUM will help inform future novel treatment approaches on the machine.

Images will be taken on each day of a

patient's treatment, and radiation delivery will be adapted based on the image to target the tumour, even as the tumour moves inside the body. This optimal radiation treatment approach aims to improve patients' survival while also reducing damage to the surrounding healthy tissue.

Patients enrolled in MOMENTUM will be asked if they are willing to share their de-identified information about their treatment experience, including their MR images and quality-of-life information.

At Sunnybrook, the team of radiation oncologists will identify patients to be treated on the MR-Linac, based on indications that they believe are well-suited for this technology. The MOMENTUM study will focus initially on glioblastoma and prostate cancer, followed by pancreatic, head and neck, and cervical cancers.

Additional cancer sites will be rolled out in a controlled and systematic way, to ensure the delivery of safe, effective treatments on this new device.

The implementation of the MR-Linac technology and start of the MOMENTUM at Sunnybrook has been made possible by a large team of dedicated staff, including radiation oncologists, medical physicists, radiation therapists, researchers, MRI scientists and more.

"Through MOMENTUM, we will collect and contribute to data that will help researchers and oncologists here and around the world come up with the best ways of ablating tumours using this technology," said Dr. Sahgal. "This kind of work is so important for improving patient outcomes and experience."

# Virtual care revs up in BC, using technologies from Think Research

BY MICHAEL-JANE LEVITAN

Earlier this year, Toronto-based Think Research extended its virtual care platform to British Columbia. The company partnered with BC's Provincial Health Services Authority (PHSA) on a project to help test and expand the delivery of Virtual Health delivery across the province.

PHSA programs serve patients throughout B.C., which makes access a challenge for many people in remote and rural communities. Virtual Health bridges that gap, bringing physicians, nurses, and allied health professionals to patients' homes for services such as anywhere-to-anywhere counselling sessions, pre- and post-surgical assessment, and follow-up visits.

With stewardship from the PHSA's Office of Virtual Health (OVH), Think Research integrated its VirtualCare platform to better serve several specialty clinical areas, such as the BC Centre for Disease Control, BC Emergency Health Services, Trans Care BC, and BC Women's Hospital & Health Centre.

"It is truly exciting to redefine the boundary of health care in the digital age in collaboration with our clinical part-

ners," said Ying Jiang, the OVH project manager leading the initiative. "The best part is that our initiatives are always clinically led. We engage patients and providers to ensure the solution addresses compelling clinical and patient needs."

Patients enrolled in the project have cited numerous benefits, including convenience, cost savings, reduced travel, and ease of use.

A user survey found 90 percent of surveyed patients used the platform to save time and eliminate travel; 75 percent of clinicians found it very easy to use; and 100 percent of patients said they had no concerns with privacy or safety while using the platform.

Comments from registered patients reinforced the program's success. "I didn't have the expense and time needed to travel to Vancouver, and I saved on hotel costs. Big savings!" said one.

Another patient observed, "I loved not having to deal with the weekend traffic stress of BC Ferries." Clinicians and staff also noted that the tool fit into their workflows, "like any other appointment I would have scheduled."

Michele Fryer, director for the OVH, noted that, "PHSA policy requires the quality of virtual health visits must be equal to – or better than – the quality

of an in-person visit. Think Research has been working hard to ensure this is the case."

Many healthcare experts and members of the public are recommending that technology be used to reduce wait-time logjams in the delivery of healthcare and to improve medical outcomes. However, it's not always so easy – as the technological solutions offered don't always match the needs of patients and providers. Testing, fine-tuning and col-

> **PHSA policy requires the quality of virtual health to be equal to or better than the quality of an in-person visit.**

laboration are needed before systems can be ramped up effectively.

"Health systems across Canada face significant challenges with new technology adoption," Dr. Mohamed Alarakhia, Director of the eHealth Centre of Excellence. "We're often given new solutions without being consulted on whether they're the best way to solve our most pressing challenges. Physicians want to focus on their patients, not digital paperwork."

"To make an impact in the market, we need deep partner relationships with our clinicians, not a vendor-client dynamic," says Sachin Aggarwal, CEO of Think Research. "Engaging directly with frontline users early and often allows us to understand their pain points and tailor our products to better meet their unique needs."

Take for example, the eVisits Primary Care pilot program. Led by the Ontario Telemedicine Network (OTN) and considered to be the largest of its kind within primary care in Canada, it was launched in 2017 in the Waterloo-Wellington Region through a partnership between Think Research and the eHealth Centre of Excellence.

Its design process integrated feedback from physicians and patients, producing a virtual platform that makes it easy for patients to interact with their primary care provider. Appointments occur via the safe and secure platform using chat, audio, or video for both mobile and desktop devices.

Patient response to the new system has exceeded expectations, with approximately 15,000 virtual visits completed by 65 doctors. New doctors and patients continue to join.

"Beyond the positive patient impact,

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# Want to be a med-tech success story? Venture capitalists offer advice

**BY JERRY ZEIDENBERG**

TORONTO – Venture capitalists and private investors offered free advice to medical tech entrepreneurs who gathered at the MaRS HealthKick conference in early April. The take-aways?

• Be tenacious, because you may have to knock on the door many times before you find an investor who is willing to lay down some cash.

• Get ready to re-structure your start-up, because the people needed to create a company aren't necessarily the ones who can scale it up quickly. That means even you, the founder, might be out as the top gun.

• And finally, for Canadian start-ups, be prepared to step into the bigger U.S. or European waters quickly, as vencap investors agree the home market is too small a pond.

"Canada doesn't rate," commented Kelly Holman, Managing Director of Genesys Capital. At least it doesn't, he explained, when it comes to quickly building a business that can provide investors with 10 to 20 times return on their capital.

The MaRS technology accelerator in downtown Toronto hosted five days of presentations and meetings that aimed to enlighten would-be medical-tech entrepreneurs about becoming the next big thing, and offered introductions to financiers, consultants and potential partners.

It was all part of the city's annual Health Innovation Week.

A session on 'Early Stage Digital Health and Medical Device Investing' was moderated by Sheryl Thingvold, Senior Advisor at MaRS Venture Services.

On the topic of fast expansions to the United States, the financial experts noted that you've got to think differently. "In the U.S., it's a complex payment system, with many payors," said Gerry Brunk, Managing Director of Lumira Capital. "You have to show them how you can drive down costs and create savings. It's not just about clinical efficiency," which might be the case in Canada.

Help is often at hand in the form of partnerships with larger companies. Indeed, multinational companies are often looking to fast-track their own creative process by partnering with innovative but financially shaky start-ups. "They're desperate to innovate and to grow, and they've got huge pools of capital," said Brunk. But he warned entrepreneurs to "make sure your IP is looked after."

Holman observed that a partnership



Pictured left to right: Sheryl Thingvold, MaRS Venture Services; Gerry Brunk, Lumira Capital; Bill Carpou, Orange County Technology Accelerator Network; Kelly Holman, Genesys Capital; Sam Ifergan, iGan Partners.

with a multinational can give the fledgling company some stability, both financial and managerial. It can also provide an entrée into new markets and into the meeting rooms of new customers.

At the same time, the financiers noted that entrepreneurs must be wary of large companies and shouldn't be too willing to sign away their intellectual property rights. If possible, don't sign over exclusive rights to the technology to one company, and if possible, have two large strategic partners.

"Get more than one, if you can," said Holman.

Another way to get into the U.S. market is through an American accelerator.

On the panel at HealthKick Invest was Bill Carpou, CEO of the Orange County Technology Accelerator Network (OCTANe), located outside of Los Angeles. He told the crowded room that each year, OCTANe accepts 40 companies for coaching, training and assessments of their technologies, and it's welcoming Canadian innovators into the fold.

"We see 350 to 400 a year, and we select 40," said Carpou, noting the companies then go through a 16-week mentoring course. Since its inception in 2009, OCTANe has worked with 571 companies. "And 86 percent have been funded afterwards," said Carpou. "It's kind of unheard of."

Not only does OCTANe guide the companies, it also assesses their technologies, management and market readiness in 30 areas and creates its own metrics. "We need the analytics to back up what we're saying about these companies," said Carpou. "We give investors a set of analytics that compare the start-ups with successful companies."

To get in the door, however, a company must have the backing of a clinician. "All deal flow comes through physicians," said Carpou. "We don't look at you without physician endorsement."

OCTANe's motivation is to bring more medtech jobs and innovation to the Southern California region. He says that Canadians don't necessarily have to leave Canada; instead, they can use Southern California as a U.S. base.

And the organization has ties with the major hospitals and schools in the area, including Cedars-Sinai Medical Center, UCLA, and USC.

Of course, companies can go through drastic changes when expanding from a start-up with an interesting technology to a mid-sized or large competitor with major contracts and sales volumes. That means the founder of the company may have to step aside and let executives with marketing and management acumen take charge.

"We start with the science, but usually, the scientist is not the CEO," said panellist Sam Ifergan, Managing Partner of iGan Partners. "Different skill sets are needed."

That can be difficult for the founder – but if he or she really wants to grow the company, they must be willing to take on a different role.

Ifergan noted that it must always be an open discussion about the management strategy. "It's an unwritten rule that you don't surprise anyone."

Still, he said, you need to discuss from the start who will be running the company, and whether the founder will be required to let go of the reins.

How do you even get through the doors of a vencap company? "Call us," said Lumira Ventures' Gerry Brunk. He cautioned that an initial meeting will likely not result in an investment; indeed, it may take years. "We followed one company for 11 years, and then invested." Realistically, it normally doesn't take that long, if a company has an impressive technology, clinical endorsements and a few small tests that show promise. But it's key to show tenacity and resilience.

Said Holman: "I wouldn't dissuade you from cold calling until you get the no."

# Entrepreneurs must tell a story, solve problems, and have staying power

**BY JERRY ZEIDENBERG**

TORONTO – Waiting in limbo to hear if a healthcare organization is going to buy your innovation can be deadly – if it takes too long to reach a decision, a start-up company can run out of money or lose focus.

Nevertheless, the reality is that hospitals and other healthcare centres move slowly. Most make decisions by committee and require buy-in from numerous stakeholders.

"You need to have about a year's timeline or horizon – it will take that long [to make your case to an organization and get a yes or no]," said Jonathan Tafler, a senior director at Shoppers Drug Mart. Tafler was on a panel discussing the adoption of innovation at public and private healthcare institutions during the HealthKick conference.

"If you don't have that much time," he said, "don't get into it."

That being said, Tafler did emphasize that Shoppers Drug Mart is actively looking to innovate and welcomes outside partners. But you'll need to get the support of someone inside the company, and to do that will take time and energy.

"It has to start with a great story about how your innovation could help our customers or our business," he said. "Once you've got that story, don't stop telling it. You might have to tell it 10 times before you get any traction."

He noted that you might have to meet with various groups within Shoppers, as it's a very large company, and is now owned by the Loblaw corporation. "Wouldn't it be great if Loblaw, a 200,000-person company, had one person to go to for innovation? But it doesn't work that way," cautioned Tafler.

Innovation happens in many different places across the organization, so there are many different points of contact.

At Southlake Regional Health Centre, a large community hospital in Newmarket, Ont., there is a central office for innovation called CreateIT. Entrepreneurs can contact this office, or informally approach physicians or administrators in the hospital with a good idea.

> **"Once you've got that story, don't stop telling it. You might have to tell it 10 times before you get any traction."**

However, Rob Bull, vice president of finance, technology and innovation observed that delays can easily happen, even after you've got the ear and interest of a person at the hospital. "It's easy to get the innovation office interested – but the end-users may not be interested," said Bull. "Or funding may not be there."

Unfortunately, said Bull, "you may not find out for nine months," whether your project is approved.

"That doesn't mean the solution isn't good," said Bull. "It means it just didn't make the list of priorities."

Bull noted one success story that's been adopted by the hospital. It's a solution created by Medchart, a Toronto-based start-up that collects the medical records of patients – both electronic and paper – and stores them in digital form in a portal.

It dramatically speeds up the process of collating the records and makes them quickly available to patients who need them, or their representatives. "Some of the users are legal firms trying to get complete records for their clients," said Bull. "Now, they can do it all online, and faster than before."

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# Improving the quality of care for seniors? There's an app for that!

**REBECCA IHILCHIK**

We live in an app-ified world – and seniors' care is no exception. Among the many seniors' apps available on the market, some digitize or simplify tasks for a caregiver or health professional, while some allow older adults to access entirely new activities that can inform, entertain, or enrich their lives.

For the elderly, apps can provide a sense of agency when it comes to managing their healthcare needs. And apps offer a way for those who are homebound to more readily access a helpful resource when they need it.

A solution accelerator in the longevity sector, the Centre for Aging + Brain Health Innovation (CABHI), powered by Baycrest, helps Canadian and global innovators test, develop, and validate their promising products, practices, and services. Among more than 210 projects, CABHI supports a number of apps that are impacting the lives of older adults and their care teams. Here are four of them – all developed and tested in Canada:

**Health promotion for seniors:** We tend to engage with healthcare reactively – by diagnosing a problem or treating a symptom. Nova Scotia-based educational nonprofit Fountain of Health is disrupting the 'disease model' of healthcare by proactively promoting the ways seniors can embrace health and wellness in their everyday lives.

The non-profit's free Wellness App helps older adults adopt healthy habits based on five key actions: positive thinking, social activity, physical activity, brain challenge, and mental health. The app allows users to set goals and helps them achieve those aims by providing reminders and encouragement.

The app was developed by Dalhousie



**Pictured (L–R): Members of the deprescribing app team, Pam Howell, Dr. Barbara Farrell, and Rachel Grant.**

psychiatry professor Dr. Keri-Leigh Cassidy and is based in current science on healthy aging and cognitive behaviour therapy. With CABHI support, Fountain of Health is now scaling the app and other educational materials to healthcare providers across Canada. The Wellness App is available at fountainofhealth.ca.

**Helping to deprescribe:** According to a 2018 report by the Canadian Institute for Health Information, two out of three Canadians over the age of 65 are taking at least five different prescription medications. One in four of them take upwards of 10.

But in some cases, medications that worked well in the past are not the best choice now. In those circumstances, an intensive drug regimen is at best not helpful; at worst, it's downright dangerous. In response, many healthcare professionals are shifting toward deprescribing – re-evaluating their patients' medication intake and

reducing or stopping to prescribe particular drugs.

Deprescribing guidelines are available online and in print, but not in a manner convenient for busy healthcare professionals. With CABHI support, Dr. Barbara Farrell, a scientist at Bruyère Research Institute, led a team that developed an interactive smartphone app for use at patients' bedsides and in pharmacies. The app uses guidelines and algorithms to help healthcare professionals decide when and how to reduce medications safely, and how to monitor their effects. The app is available at deprescribing.org.

**Support for caregivers:** Up to 90% of people living with dementia will experience behavioural and psychological symptoms that will affect their caregivers – such as physical or verbal aggression, wandering, agitation, or resistance to support, in addition to others. These symptoms can

cause stress for caregivers that is itself associated with early or frequent admission to hospital and long-term care for the person living with dementia.

Dementia Talk App is a tool for caregivers to track behaviours and develop a care-plan to manage their loved ones' symptoms. The app's six features – a behaviour tracker, behaviour care plan, 'my team' sharing feature, medication list, calendar, and 'caregiver corner' – act as a cohesive one-stop shop for a caregiver's needs.

The app was created with CABHI support at Sinai Health System by Einat Danieli, a former occupational therapist who was inspired by her own experiences working with caregivers to create a technological solution that addressed their concerns.

Dementia Talk App is available on the App Store and on Google Play.

**Non-verbal communication assistance:** One of the biggest life changes for those living with advanced dementia can be the loss of ability to communicate verbally. The Linggo app, developed with CABHI support by Seneca College professor Ling Ly Tan, is an effective and affordable communication system for non-verbal individuals. Linggo uses intuitive visual representations to allow the user to select phrases or build sentences, which it then communicates in words onscreen and out loud.

The app incorporates machine learning to adapt to the individual user by learning their daily needs and preferences, making it highly customizable. Linggo not only helps non-verbal individuals to communicate, but also to maintain a sense of agency and independence. Users can include not only older adults living with dementia, but those who are non-verbal due to stroke or autism.

With support from CABHI, Linggo is being tested and will be made publicly available in the future.

# Support at your fingertips: Aby app helps people with multiple sclerosis

**BY ELISA BIRNBAUM**

Valerie Perreault was diagnosed with multiple sclerosis 27 years ago. A couple of years ago, when day-to-day life got a bit tougher for the 51-year-old author from Gatineau, Quebec, her doctor suggested she try a new app called Aby – and Perreault is glad she did.

The free app provides resources and support to people living with MS, helping them navigate their disease. It offers curated articles with tips, updated information and advice.

A journal feature allows patients to record their symptoms and appointments while keeping track of their moods. There are exercise videos too, developed by practitioners with experience working with MS patients. And an interactive feature allows users to connect with nurses who provide answers to their questions.

The daily journal is one of Perreault's favourite features. She uses it to track

her mood, sleep, energy level and mobility. "It reminds me that I have good days and that it's okay to have bad days too," she says. Perreault is also a fan of the fitness program and how it's broken up into 20-minute intervals, allowing for recovery between sets.

Since Aby launched in Canada in March of this year, the app has amassed more than 14,000 users nationwide. It is available for download on Google Play and on the App Store, which can also be accessed via aby-app.ca.

Ardra Shephard is also pleased with Aby. The award-winning blogger of Tripping on Air, which provides a frank, often-humorous look at her life with MS, Shephard is determined to change the narrative of the disease while championing disability representation. The blog helps reduce misperceptions around MS and promote a culture of acceptance for mobility aids, she explains. "Rather than seeing them as limiting devices that make your world smaller; they actually make your world bigger."

Asked to try Aby in its beta test phase

and offer recommendations for improvement, the Toronto resident was honoured to have had the opportunity to bring added value to an app that already impressed her so much.

"Aby is unique to the MS toolkit. There's no other product like it," she says.

Shephard is especially fond of the articles and patient stories, which can

> **The information can be included in a report and e-mailed directly to one's doctor or nurse.**

prove invaluable for the newly diagnosed. And for someone who's been on the MS journey a long time, being able to track moods and symptoms and be reminded of appointments and medications are the features that inspire Sheppard to keep the app close by.

The information can be included in a report and e-mailed directly to one's

doctor, an especially convenient feature that many users appreciate.

It's a feature that can prove particularly helpful for Janet Brown. A registered nurse for 39 years, (13 as the multiple sclerosis coordinator), Brown works at the neurology clinic of the HSC-General Hospital in St. John's, Newfoundland and Labrador.

"As you can imagine, my time is increasingly in demand," she says, adding that many patients don't even have access to a local chapter of the MS Society or a general practitioner.

To fill some of those gaps – and for supplementary care – Brown has been promoting Aby to all her patients. And she's received positive feedback, especially with regards to the content, exercise and tracker features.

"Technology has been a big advantage to my patients," says Brown. With MS symptoms so diverse, Aby "helps them live with their disease and have more control," she shares. "It doesn't take the place of face-to-face visits, but it helps."

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# Boosting healthcare performance: A.I. converging with ophthalmology

**This could greatly reduce screening costs, increase patient access and ultimately improve outcomes.**

BY DR. SUNNY MALHOTRA

Artificial intelligence has made a significant impact on many modalities of healthcare. It has improved operational workflows, diagnostics, and clinical care outcomes, but has only scratched the surface in terms of frontline care implementation.

Ophthalmology and optometry are featured as some of the specialties that AI has potential applicable solutions. Artificial intelligence defines algorithmic learning from data to create trained outputs by mirroring human thought processes and learning techniques.

There are multiple fields of artificial intelligence that are pertinent to frontline healthcare including computer vision, natural language processing and augmented reality while providing supportive decision-making solutions.

Ophthalmology is enriched with big data that can be utilized with convolutional neural networks to potentially interpret a multitude of topography and retinal studies.

There have been multiple studies where images have been labeled for supervised learning and use gradient descent via feed-forward neural networks to identify the likely output, such as in the context of disease screening in high-risk patient populations.

For example, Verily has done extensive research on thousands of retinal images to classify diabetic retinopathy.

Diabetic retinopathy (DR) is one of the most common diagnoses for patients presenting to ocular healthcare professionals. The use of Optical Coherence Tomography (OCT) and retinal imaging are used in screening and diagnosis of various ocular conditions, including DR.

Typically these scans and images are assessed by a primary eye-care provider or ophthalmologist and the diagnosis, stage of disease and treatment is determined. AI can be integrated into this workflow by utilizing convolutional neural networks and analyzing supervised labeled datasets to flag the presence of retinal disease on imaging sequences.

This can be extrapolated to other retinal diseases using the same framework. Using machine learning

> **Artificial intelligence has the ability to identify ocular diseases, create treatment strategies and cut down wait times for patients.**

and gradient descent, patterns in macular degeneration can be identified and treatment strategies can be optimized based on therapy response.

This can represent a new form of precision medicine with improved treatment regimens based on objective data. The implications of this could greatly reduce screening costs, increase patient access and ultimately improve patient outcomes.

Corneal topography is an imaging modality whereby parameters are mapped out to profile the cornea as well

**Dr. Sunny Malhotra is a US trained sports cardiologist working in New York. He is an entrepreneur and health technology investor. He is the winner of the national Governor General's Caring Canadian Award 2015, NY Superdoctors Rising Stars 2018 and 2019.**
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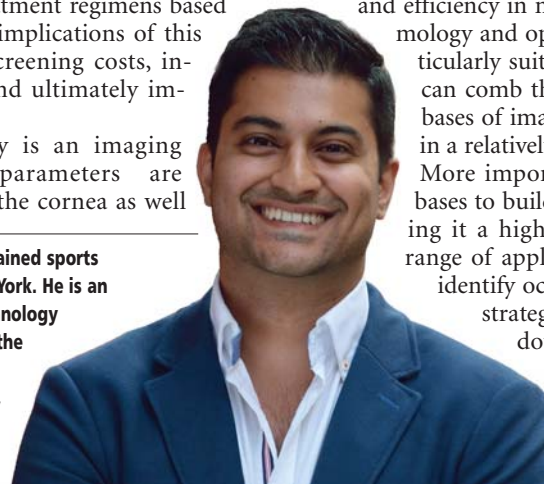
as to determine an initial 'sizing' for contact lenses.

Contact lens fitting could greatly be streamlined via machine learning. Automation can be used to build a patient profile prior to the patient's arrival and this information can be relayed to the optometrist using email automation and medical record integration.

During the clinic visit, the patient's corneal parameters can be measured using the topographer and automatically cross-referenced with contact lens manufacturer fitting guidelines, offering an immediate fitting recommendation.

Once the fit has been subjectively approved, the lens parameters are sent to the technicians through automated messaging. The inclusion of intelligent automation can improve efficiency, yield accurate first fits in more difficult lens modalities and reduce the turnaround time for patients to receive contact lenses.

Artificial intelligence has improved patient care and efficiency in many fields including ophthalmology and optometry. These fields are particularly suited to the strengths of AI as it can comb through and analyze vast databases of images, scans and patient metrics in a relatively short amount of time.

More importantly, it can use these databases to build its accuracy over time, making it a highly effective tool in a diverse range of applications. AI has the ability to identify ocular diseases, create treatment strategies, improve efficiency and cut down wait times. This trend of AI implementation in our clinical workflows is a development toward the future of healthcare and will inevitably be embraced.

# Artificial intelligence will be needed to alleviate hallway medicine

BY DAVID STOLLER

By now it should come as no surprise that Canada is facing a very difficult challenge: an aging population that is going to require economic, social, and infrastructure support which, as of today, is not properly in place.

As the population ages the economic pressure on the healthcare system will continue to mount, as more people will require healthcare support either in home or in hospitals. This increase in volume will most certainly put pressure on the government to increase funding and ensure older adults are properly cared for.

Moreover, the social implications are considerable, as family members and friends will be called into the role of caregiver to support a loved one through the aging process – a role many people are not formally trained or prepared for.

Finally, hospital beds and long-term care vacancies will be at a premium. This means that the Canadian infrastructure in place to support this vulnerable population segment will need to be upgraded quickly. Otherwise, people will be forced to deal with hallway medicine, long wait times at hospitals, or simply age in place hoping to get the support they need at home.

As mentioned, this population growth presents unique challenges from an economic, social, and infrastructure perspective. These challenges need solutions, and the technology community in Canada, and around the world, are working feverishly to develop solutions that will confront this challenge head on. While there are many new and innovative uses of technology out there, one of the most interesting and intriguing, not to mention fastest growing, is artificial intelligence (AI).

AI has many definitions, but for this article, it makes sense to use one of the more general explanations: The theory and development of computer systems able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

**David Stoller**

AI can support an aging population, either directly or indirectly, by performing tasks that are typically done by humans, but in less time and with significantly reduced cost. Today, computers can perform tasks and calculations faster than ever before. When that is combined with the vast amounts of data collected every day, there is a massive opportunity for this technology to help speed up diagnosis, improve efficiencies within hospitals, and make significant improvements to the healthcare sector.

In many cases, AI is not going to do anything humans can't do themselves. Rather, AI will simply do things faster. For example, recent years have seen a significant increase in the volume of data collected within a hospital, data that would take humans days, if not weeks, to properly analyze and understand. With AI, data can be analyzed and evaluated to produce actionable insights in a fraction of the time humans would need.

Consider the ability to predict a heart attack, identify overcrowding

# In-home technological supports can reduce hospital over-crowding

**BY ARSLAN IDREES**

In 2014, one in seven Canadians was over the age of 65. By 2036, Statistics Canada predicts that life expectancy for women will be 86.2 years (84.2 today), while for men it will be 82.9 years (80 today). Much of this increase can be attributed to advances in healthcare. Canadians are living longer because we have better health treatments and better access to care.

However, these demographic changes pose unprecedented challenges for our already strained health system. Wait-lists for long-term care will continue to grow and hospitals will be even more overcrowded. Those are just two of the casualties on a system that is fighting to keep up with the increasing needs of patients as resources are stretched ever tighter.

This is not an easy problem to solve, but it must be a priority. It affects individual Canadians, their extended families, health service providers, organizations, policymakers and the health system as a whole.

**Arslan Idrees**

There is no one solution that can fix it all, but just as technology has transformed many other aspects of modern life, it does have the potential to do the same for healthcare by increasing efficiency, convenience and quality.

With technology, new service models can be designed to enable healthcare providers to do many of the things that have been conventionally done in a hospital or clinic setting in an individual's home.

We believe this "feeling of home when it comes to care" is a growing desire among older-adult patients and their families.

SE Health has been a proponent of this movement for more than 110 years and understands the critical role technology plays in realizing it. Technologies support new care models in many ways, such as remote monitoring of biometrics with wearables, virtual care delivery, use of sensors to monitor changes in daily activities, voice-enabled digital assistants to do wellness checks or medication reminders, and shared care plans enabling personalized and interactive care.

When we use digital tools across the continuum of care, multi-disciplined teams can share information and seamlessly work together. Patients are truly at the centre of their healthcare. This is at the heart of the ACCESS 2022 movement, Canada Health Infoway's bold movement to promote a future where all Canadians have access to their personal health information and to digitally enabled health services anytime, anywhere, from the device of their choice.

This access will empower patients, maximize the use of scarce health human resources and improve health outcomes.

When it comes to technology another key area is connecting different systems. At SE Health, the concept we use is "frictionless integration." It means reducing digital friction by streamlining data access methods and focusing on open-data solutions that make integration with partners easier, while retaining high levels of security. These aren't new technologies per se, but they have been refined to have the high level of humanity that patients need.

Another often overlooked advantage to incorporating more technology is its effect on the experience of care providers. They can be more efficient once we equip them with the right information at the right time to better support informed decisions, and ultimately provide better quality care to patients. The key to success is to think holistically across the whole ecosystem and ultimately offer a streamlined experience for patients, families and health service providers.

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# Online therapy is taking off, using virtual visits, email and texts

## A variety of illnesses can be treated this way, and wait-times for help can be dramatically shortened.

**BY DIANNE DANIEL**

After two decades of administering mental health services, Toronto psychotherapist Jennifer Heintzman is discovering a new way to listen, attend and respond to clients – deepening her active listening skills and challenging herself to clearly communicate her empathy, understanding and concern. At the same time she's accessing more people, including a new generation of 20- and 30-somethings.

And it's all due to her enthusiasm to embrace a new form of e-therapy for those struggling with mental health and substance abuse issues.

"I love what it's given me as a therapist," said Heintzman, who joined Hasu Behavioural Health Inc.'s network of online therapists in 2017. "It's required me to grow in ways I didn't even know were possible. It's like learning a new language and suddenly becoming proficient at it – realizing this feels really good and that I needed these words all along."

Hasu eCounselling™ is a PHIPA- and PIPEDA-compliant online healthcare platform and mobile app that provides therapeutic services through secure video, phone and text. Launched in 2015, the company started out as a business-to-consumer (B2C) service. Recently, it is finding a new avenue of growth by providing a business-to-business (B2B) model for employers who are looking to include mental health services as part of their employee benefit programs.

As a member of the Hasu team of online therapists, Heintzman augments her face-to-face practice at a busy Toronto office – where she's available three days a week for in-person counselling sessions – by providing online therapy from the convenience of her own home. The majority of her online clients have been with her for more than a year. Many access her services from different time zones across North America and Asia; some travel a lot for work, some are housebound due to chronic illness and others are pregnant mothers on bed rest. All of them are benefitting from the flexibility that the online platform provides.

"I have clients who find an office at lunch time, shut the door and do therapy," said Heintzman, who primarily works with people who are dealing with issues resulting from trauma, stress, anxiety, chronic illness or loneliness. "I've also worked with clients in remote areas where they don't have access to the right services," she added.

Most of Heintzman's therapy is conversation-based. When she prescribes a cognitive behavioural therapy (CBT) exercise, she generally works through it with the client during their scheduled online session, whether they choose video, phone or text. She also blocks time in her calendar for real-time texting. "You meet your clients where they're at," she said, noting that when she makes herself available, they show up.

Over the last year, Hasu has been expanding its reach by working with employers who want to add online therapy to their existing employee assistance programs, or create new benefit programs to address mental health. According to Hasu COO Marion Adams, a range of businesses are interested, including first responder agencies where the need is obvious,

due to the nature of the work. Other employers at the forefront of addressing employee mental health issues are newer, smaller start-ups led by millennials.

"If you want to be in the business of supporting people, you have to meet them on their terms and that's exactly why our text therapy business is our largest source of revenue at this point," said Adams. "People who are using these services are already on their phone anyway, so it's like texting a friend."

Unlimited text therapy starts at $29 a week, plus HST. Video and phone counselling starts at $95 for one hour, plus HST. Hasu therapists are registered and carefully vetted by Hasu CEO and founder Greg Rennie, who also serves as clinical director. To start the intake process, clients can call a toll-free number, chat online or be referred by a physician. Because Hasu therapists work in a tightly knit online community, they often refer clients among themselves as well, depending on their areas of expertise.

"It's common that there is an underlying issue that can be discovered in the initial session," said Rennie. "If there's a need for additional work or treatment, the therapist works on a referral or steers them in the direction to seek additional help."

Under the new B2B model, clients are enrolled through their employer and then use an employer-specific booking page to access services. Businesses are then invoiced monthly for services rendered by Hasu e-therapists.

The technology supporting Hasu eCounselling is supplied by OnCall Health Inc. of Toronto, a company founded by Nicholas Chepesiuk in 2016 to bring virtual healthcare services to Canada's existing healthcare system. Early on, the company found that mental health was "arguably the best fit" for virtual care and went on to engineer a platform from the ground up that could deliver a high level of encryption and security, yet require low bandwidth, he said.

"There are a lot of really big mental health clinics

and organizations across Canada that are doing amazing work and they have really thoughtful workflow and treatment programs," said Chepesiuk. "We're not trying to replace those. We're trying to help them bring their existing team and address their existing patient base in a more accessible, convenient way when appropriate."

OnCall Health licenses its technology as a software-as-a-service to both clinics and clinicians who are looking to augment in-person therapy with virtual appointments. Chepesiuk estimates there are 1,000 mental health clinicians currently using the platform across Canada, mostly for video and texting.

The technology is designed to automate day-to-day administrative tasks like scheduling, and can also be used by clinicians to track patient progress using clinically validated assessments like the Patient Health Questionnaire-9 (PHQ-9), a self-reported instrument that scores nine criteria on a scale from "0" (not at all) to "3" (nearly every day).

"Our system makes it really easy for clinicians to assign and digitize those forms, which are traditionally done on paper, through a secure online portal," he explained. "Patients fill them out on their phone or computer, and we can score them and track their progress over time."

Chepesiuk claims there is evidence to show that video counselling can be as effective as in-person counselling, and in some cases more effective. Patients often feel more comfortable opening up about issues when they're in the comfort of their own home. There's also a growing number of younger people who prefer to communicate online, he said.

"It's pretty cool knowing that right now in Canada about 15,000 patients are doing video appointments on this system every month," said Chepesiuk. "We like to think we're helping to accelerate the adoption of virtual healthcare in Canada."

The advancement of e-therapy in Canada is also being fuelled by a growing need to meet demand for mental health services. The Canadian Mental Health Association estimates that one in five people in Canada will personally experience a mental health problem or illness in any given year, and that by age 40, about half of the population will have or have had a mental illness.

At the same time, nearly one-half of those who feel they've suffered from depression or anxiety have never gone to see a doctor. Proponents of online therapy believe the ability to connect with people over the Internet is starting to change that. At Hasu, for example, Adams said she is encouraged by the large percentage of men who are now signing on for e-therapy through the company's new B2B model.

"It's a fascinating and exciting finding for us because typically men are much less likely to reach out," she said.

Dr. Philip Klassen, VP Medical Services at the Ontario Shores Centre for Mental Health Services in Whitby, Ontario, said his organization has seen a doubling of requests for services in the last two years,

ILLUSTRATION: LINDA WEISS

resulting in long wait lists for treatment. Online therapy is seen as one way to effectively deal with that demand.

"The dual imperative is first, we need to improve access to psychological therapies and second, we need to improve access to evidence-based therapies, which means we need to minimize variability and try to control the product so that the product itself has a strong evidence base," said Dr. Klassen. "One of the possible solutions is Internet-based psychotherapy."

In May of this year, Ontario Shores introduced SilverCloud, an evidence-based platform for delivering online mental health services. Headquartered in the U.K., SilverCloud is an industry leader in Internet-delivered CBT (e-CBT) solutions, a form of psychotherapy that Health Quality Ontario recommended for public funding in February. The company's growing online library includes programs to treat anxiety, depression, phobias, stress and OCD among others.

Clinicians in Ontario Shore's Anxiety and Mood Disorder Clinic are currently using SilverCloud to treat outpatients, people living independently in their communities who are suffering from a variety of anxiety-related or depressive disorders. After an initial assessment to determine that e-CBT is an appropriate course of treatment, patients are scheduled for a brief intake meeting to establish a baseline of their symptoms in person. After that, everything related to their treatment happens online.

Patients are emailed an invitation to join SilverCloud and establish a secure login to access their online program materials. The Anxiety and Depression program, for example, has eight modules which patients work through at their own pace, typically completing one per week, with each module estimated to take 40 minutes. Online learning incorporates reading materials, audio and video clips, and a variety of tools such as an activity scheduler, a mood tracker and a "thinking, feeling, behaving cycle tool" that promotes emotional awareness.

"As they move through the course, every time they're introduced to a new tool, there's some opportunity within the module to do some practice with it right then and there. There's also an option to add it to their home page so that the next time they log in, it's right there in front of them," explained Ontario Shores clinician Kristen Moore, a registered nurse who works within the Anxiety and Mood Disorder Clinic. One of the advantages, she added, is that patients who might be feeling overwhelmed with anxiety in a public place can quickly access the tools they need to work through their anxiety right from their phone.

Patients who qualify for e-CBT are also scheduled for a series of 10 30-minute meetings with a clinician who serves as their personal coach. The majority of meetings are conducted using the Ontario Telemedicine Network (OTN) videoconference platform, but in-person meetings can also be scheduled if required.

As a coach, Moore logs in to SilverCloud to manage her e-CBT clients and monitor their online activity. She sees how many pages they've read, what tools they've used and any messages they've left for her. Clients may also choose to share entries from their online journals. Once she's reviewed their weekly progress, she writes a response.

"We're only interacting with clients and reviewing their work on the day they're scheduled, so it needs to be a very focused 30 minutes," added Moore, noting that she typically holds a video conversation for half of the allotted time and spends the other half on review. "Having that coach connection is motivating, it holds them accountable each week."

Moore estimates she is able to treat an additional 10 to 12 patients over and above her normal workflow because of SilverCloud. The online platform is also helping to reduce wait times since patients referred to e-CBT typically begin treatment within 30 to 60 days whereas the wait time for individual face-to-face therapy is typically a year or longer.

Dr. Klassen called online psychotherapy the "choice of the service future." SilverCloud embeds measurements like the PHQ-9 and Generalized Anxiety Disorder (GAD) seven-item scale directly into its platform. "One of the huge gaps in mental healthcare in many places is that it's not measurement-based," said Dr. Klassen. "But with SilverCloud, measurement is built in, so clinicians can look both at individual and group data to see what their outcomes are like."

# A look at innovations in care delivery at e-Health 2019 Conference

TORONTO – Call it virtual care or virtual health, remote care or telehealth – it's a revolution in care delivery innovation and it's happening across the country. One of the best places for a wide-ranging overview of projects in regions across Canada is the annual e-Health Conference and Tradeshow, presented by Canadian Institute for Health Information (CIHI), Canada Health Infoway and Digital Health Canada.

Now in its 20th year, e-Health remains a vital epicenter of digital health discussion and debate, with interactive panels, presentations, and posters from the top minds and talent from the Canadian digital health community.

Listed here are just some of the exciting telehealth projects discussed at e-Health 2019 in Toronto.

### Unlocking the Possibilities: Telehealth in Corrections
*Lead presenter: Linda Bridges,*
*Horizon Health Network, Saint John, NB*

In 2010 the federal offender population in the Atlantic region demonstrated a significant increase, resulting in a corresponding rise in the number of offenders visiting community specialists at Horizon Health facilities. During an 11-month period, 880 federal medical escorts were performed (an average of 80 escorts per month). Analysis of these escorts determined that as many as one third could have been completed using telehealth processes and technology.

That year, Horizon Health Network and Correctional Service of Canada (CSC) entered into a Memorandum of Understanding (MOU), resulting in a Telecorrections Partnership Project. Telecorrections has increased both staff and patient safety by reducing or eliminating the need for inmate transfers to receive specialty care.

Security costs and potential opportunity for elopement associated with escorts have been reduced. One tremendous advantage has been the ongoing knowledge transfer which occurs during these assessments for those CSC clinicians involved. Having these same clinicians present during sessions has been pivotal to maintain an open dialogue and general facilitation.

This initiative provided the confidence and experience within Horizon to begin the recent provision of services to provincial correctional facilities as well.

### Telenephrology and the Elimination of Geography for Hemodialysis Patients
*Lead presenter: Krisan Palmer,*
*Horizon Health Network, Saint John, NB*

Telehealth promotes access to those scarce clinical resources most often located in more urban settings to which patients must travel large distances to receive treatment. Prior to the establishment of Horizon Health Network's first satellite hemodialysis unit, patients requiring this life sustaining care had to do just that – three times every week.

The goal in establishing satellite hemodialysis units is to ensure safe, comprehensive and evidence-based local care for this vulnerable patient population by eliminating the geographical barrier between them and their nephrologists by using telehealth processes and technology.

For a satellite unit to be established, the physical, technical and clinical environment must be replicated to match those of the main dialysis center. The same clinical standards of care that are adhered to by the Nephrology Program clinicians in the main dialysis unit must be operationalized and maintained in the satellite unit.

This includes the weekly patient rounds conducted by the nephrologist in conjunction with the nurses at the patient's chairside or treatment station while undergoing dialysis.

For this to occur at a distance, Telehealth must be employed. The nephrologist at the main unit connects to the satellite unit via a real-time interactive audio and video and is able to discuss the patient's treatment plan with both the patient and the nurse, just as it would occur if the patient was being treated in person by the nephrologist. This is what has become known as telenephrology. Four satellite units currently treat 94 patients per week, eliminating 158 round trips per patient per year.

### Virtual Palliative Care: Supporting Patients in Their Home
*Lead presenter: Sandra Mierdel,*
*Ontario Telemedicine Network*

The Ontario Telemedicine Network (OTN) worked with partners in the Champlain LHIN to co-design a virtual palliative care model that would enable a regional system with capacity for the delivery of in-home palliative care. Patients responded to a series of self-assessment surveys on tablet computers from their homes. Care providers received real-time feedback on the patients' information, which triggered specific events and corrective actions.

A total of 118 patients with an average Palliative Performance Scale score of 50% were enrolled in the project. In terms of patient satisfaction, 87% were satisfied with the experience; 85% were satisfied with the coordination of resources, use of technology, and information received; 75% were satisfied with the progress made towards care goals including location of care preference; 74% would recommend the initiative to others; and 73% agreed that virtual care saved them time by not having to travel to see their provider.

Patient feedback showed the potential for emergency department usage to decrease from 68% to 27%. Family caregivers reported little to mild burden in caring for loved ones. Clinicians reported that the technology enhanced their ability to do their jobs, increased efficiency and allowed them to monitor the health conditions of their patients over time.

### Digital Health Enhances the Continuum of care for Oncology Patients
*Lead presenter: Krisan Palmer,*
*Horizon Health Network, Saint John, NB*

The overall driving factor for the provision of teleoncology in New Brunswick is the concentration of clinical oncology specialists in the southeastern and southwestern regions of the province. Patients not in these locales, with their families or caregivers, must travel to interact with their clinicians. The goal of teleoncology is to provide safe, evidence-based practice in the nearest community to where the patient resides.

For this study, oncology referral patterns were analyzed and, in conjunction with the established satellite chemotherapy clinic locations, oncologists were approached to explore the potential use of telehealth for patient follow-up appointments. It was determined during this exercise that teleoncology provides the ability to deploy a wide range of services, including clinical consultation, diagnostic services, knowledge exchange in the form of clinician and patient education, peer support and professional development.

Teleoncology enables patients to be seen by an oncologist or a general practitioner in oncology (GPO) prior to each cycle of chemotherapy – a national standard. This method of care delivery has greatly diminished the need for oncologists to visit outlying areas on a rotating basis. As well, it provides the opportunity for many patients to become engaged in clinical trials, whereas prior to telehealth, distance and access eliminated them as recruitment candidates. Currently, one group of oncologists at one urban center in New Brunswick visit over 30 sites virtually on a regular basis to deliver patient care.

### A Comprehensive Telestroke Solution for New Brunswick
*Lead Presenter: Jennifer Sheils,*
*Horizon Health Network, Saint John, NB*

The goal of the provincial Telestroke program is to provide a solution that allows every New Brunswick citizen experiencing an acute stroke the potential to receive leading-edge stroke care for this emergency event, as well as thrombolysis therapy, specifically a medication known as TPA. Telestroke NB, which is built upon NB's existing telehealth capacities, links every 24-hour emergency room with computed tomography (CT) access to an on-demand

> **Telestroke NB links every 24-hour emergency room with CT access to an on-demand stroke specialist, in real-time.**

stroke specialist in real-time, regardless of the location of the patient or specialist.

Neurologists connect to the hospital network using a virtual private network (VPN) from their homes or offices to review the CT images within seconds of the scans being completed.

Telestroke NB was developed cooperatively between two provincial health authorities (Horizon and Vitalite), Ambulance NB, and Heart and Stroke Foundation of NB with the support of the government of New Brunswick.

Each health authority supported the development of consistent guidelines and processes to ensure patients receive care in both official languages. Emergency room staffs were integral to the program success as they developed ways to support the remote specialist with performing needed clinical assessments and dialogue with patients and their families.

Telestroke NB is one step of a truly comprehensive stroke system; moving towards using Telehealth for primary and secondary stroke prevention.

### Explaining Longitudinal Patient Adherence in a Heart Failure Telemonitoring Program
*Lead Presenter: Patrick Ware, Toronto, ON*

Telemonitoring can improve heart failure outcomes by facilitating patient self-care and clinical decision support. However,

# Analyst insight: Battle lines drawn in North American telehealth market

BY ALEX GREEN

North America, in particular the United States, is advanced in terms of telehealth implementation, compared to other major international markets. It is also filled with vendors that have seen revenues ramp up rapidly over the last five years.

Changes to reimbursement in the next two years mean that many financial barriers for providers deploying telehealth will be lifted, driving further demand.

To date, most telehealth IT vendors and service providers have achieved success by typically focusing on one specific segment of the telehealth market and establishing a leadership position in that segment. However, this is rapidly changing.

**Point-solution leaders:** For example, American Well, Teladoc Health, MDLive and Doctor On Demand have established themselves as clear leaders in the U.S. payer-focused, on-demand video consultation market. However, until recently they were all very reliant on just this one market segment.

Conversely, companies such as InTouch Health, Avizia (now part of American Well), AMD Global Telemedicine and GlobalMed established leadership positions in the inpatient/emergent provider-focused market (both commercial and government), initially driven by sales of hardware (e.g. telehealth carts) and more recently, software and platforms.

However, most had little business outside of these segments. Philips had also seen success in this vertical, specifically the centralized tele-ICU sub-segment, a market it has largely made its own.

At the same time a plethora of specialist, provider-focused telehealth companies have also had success, again typically targeting one specific market segment. Examples include SOC Telemed, providing neurology capacity/specialist support services to health systems, and Advanced ICU Care, providing tele-ICU monitoring services to hospitals and hospital networks.

However, the last 12-to-18 months have seen this landscape start to change; specialization in one segment is no longer enough. This change is forecast to accelerate over the coming years, forcing suppliers to evolve. Two key factors are driving this change of focus: Low margins and high competition in the payer-focused on-demand telehealth market; and the demand for enterprise-scale telehealth platforms.

**Low Margins in the payer market:** The payer-focused, on-demand video consultation market has proved fruitful for American Well, Teladoc Health, MDLive and Doctor on Demand in terms of revenue growth.

For example, the market leader, Teladoc Health, has seen annual revenues increase from less than US$80 million in 2015 to over US$400 million in 2018, mostly driven by its payer business.

However, there are many service providers vying for a share of this market today, resulting in high levels of price competition and low margins or losses.

Using Teladoc Health again as an example, it had the highest volume of video consultations in 2018 (more than 2.6 million globally, up from 1.5 million in 2017) but was still not profitable.

Price pressure has consequently forced the "big four" in this segment to look elsewhere to drive a more profitable business model.

All have now decoupled their physician support service business from their platform business. (Although some much later than others. For example, Doctor on Demand only launched its provider-focused solution Synapse in early 2019).

This means they can now sell platform solutions to healthcare providers, without forcing the provider to use the telehealth company's physician support network. This was a key sticking point when targeting this market historically. Success has been relatively quick, with MDLive now

# The battle lines are drawn in the North American telehealth market

boasting more than 20 provider customers and American Well claiming more than 160 health system partners.

However, the move has taken these suppliers out of their original niche, resulting in them now competing with those vendors that had traditionally served the provider market.

Via acquisition some have also started to target higher-acuity market segments where margins are higher.

Teladoc Health recently acquired second opinion service provider Best Doctors, whereas American Well acquired inpatient/emergent vendor Avizia.

International expansion has also been another strategy. Teladoc Health acquired Advance Medical in May 2018 and MédecinDirect in March 2019. It then followed this with the organic expansion of its direct-to-consumer services to Canada earlier this year. This has transformed the firm from a U.S. only service provider to a company with a global footprint in less than 24 months. American Well's acquisition of Avizia had a similar result in terms of its international expansion.

The key takeaway from the last two years is that these service providers have ambitions well beyond low-cost domestic video consultation services, meaning they're now encroaching on market segments dominated by other players.

**Enterprise scale telehealth:** The demand for enterprise-scale telehealth is the product of the market maturing. Until recently, most healthcare providers were still at the pilot, or early deployment stages in terms of their use of telehealth.

Pilots and early deployments are small scale, but they are also typically focused on one specific use-case, care setting, or address one specific problem.

For example, better triage of stroke victims as they arrive in the ED, reducing readmission rates for congestive heart failure patients or addressing the primary care needs of sufferers of musculoskeletal disorders (MSDs).

Early deployments were often limited to one department in terms of scale and the IT solutions used were often point-solutions designed to address a single use-case or problem in question. This has been an ideal environment for many of the specialist leaders mentioned earlier to win business.

However, as providers' understanding of telehealth has evolved, deployments have

> As providers' understanding of telehealth has evolved, deployments have started to become more connected.

started to be more connected and a more strategic enterprise-wide vision developed.

This has resulted in demand shifting from point solutions targeted at specific functions, to enterprise solutions that can be leveraged across organizations. It has also resulted in healthcare providers no longer looking for just a telehealth IT vendor, or just a telehealth physician support service provider. Often, they want both from the same supplier, or at least the flexibility to employ either where and when they see fit.

Several trends in relation to the supply base have resulted from this change:

• Telehealth IT providers have started to bring physician support services in house, usually via acquisition. For those that have not made acquisitions, partnerships have been established.

• Physician support service providers have decoupled their platforms from their physician support services and expanded the range of specialties serviced. For example, SOC Telemed decoupled its platform from its services earlier in 2019 and acquired behavioural health specialist JSA Health in 2018, expanding the range of specialties it addresses.

• Vendors have made strategic acquisitions in order to fill gaps in their portfolios, particularly in relation to care settings served. For example, InTouch Health recently launched its new platform Solo, the product of solution integration from its legacy portfolio and those of Reach Health and TruClinic, which it acquired in 2018. Solo supports telehealth in both inpatient and virtual care applications.

*Alex Green is the Director and Principal Analyst at Signify Research, a UK-based market research firm focusing on health IT, digital health, and medical imaging. For further information on its new telehealth report, please contact Signify Research at enquiries@signifyresearch.net.*

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# Virtual care revs up in British Columbia

the eVisits Primary Care pilot demonstrated that when we partner with clinical partners to adapt our technology to their practice, we can provide comparable workflow, benefits, and experiences to a traditional in-person appointment," says Aggarwal. "As the virtual care market in primary care matures to enterprise levels, we envi-

> "We envision running hundreds of workflows within the app while giving physicians customized support lines."

sion running hundreds of workflows within the app while giving physicians and healthcare providers customized technical support lines and branding opportunities."

Patient feedback confirms the pilot's success in mitigating the strain on other access points for the health care system. In a recent program review, 10 percent of the patients who participated in a virtual visit said that if the service had not been available, they would have sought care at a walk-in clinic. Four percent would have gone to an emergency room.

Aggarwal sees flexibility and clinical partnership as the keys to the VirtualCare platform's success. "Our experience building networks across geographies and clinical settings has given us unique insight into introducing, embedding and scaling technological solutions.

While the benefits are broadly applicable, our most successful deployments feature virtual visits that complement, rather than replace, in-person visits; build on pre-existing patient-physician relationships; and occur regularly or with advance notice."

*Michael-Jane Levitan is director of client services at Think Research. With special thanks to our project collaborators, the Office of Virtual Health at the Provincial Health Services Authority, eHealth Centre of Excellence and Ontario Telemedicine Network.*

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# A.I will be needed

in an emergency room before it happens, or reach out to providers when medication is needed without the need of human interaction or responsibility. AI-based technology can not only tackle these tasks, but it can also allow clinicians and healthcare workers to focus attention where it is needed most – on the people receiving treatment.

There are several examples of how AI is already making an impact on healthcare today, and in this three-part series we will look into several key leaders in the sector.

Consider Qventus, a California based group that has developed technology that leverages artificial intelligence and machine learning to optimize patient flow within a hospital. This is an AI solution that is currently empowering teams to excel in real-time, and a good example of how AI is able to support some of the infrastructure challenges facing hospitals today. According to their website, Qventus has worked with hospitals in Canada and the United States, including SickKids in Toronto.

> With artificial intelligence, data can be analyzed and evaluated in a fraction of the time humans would need.

So, what do they do exactly? Qventus identifies operational challenges within a hospital before they present themselves, and can recommend immediate action and course corrections to help manage operational efficiency.

Focusing on key areas within the hospital such as system operations, the emergency department, inpatient, and operating rooms, this AI tech can react to real-time events to help hospitals avoid bottlenecks and improve overall patient flow.

Within the emergency department, Qventus can anticipate overcrowding and help identify patients likely to leave quickly, while at the same time identify where beds for patients are likely to be needed, notify doctors when assessments and diagnostics are complete, and ultimately help move patients towards discharge, or an inpatient transfer.

This AI driven tech is helping hospitals reduce costs and capital spending by reducing inefficiencies. Their "system of action" is optimizing patient flow by predicting overcrowding and delayed discharges – before they happen.

*David Stoller is Managing Director, MySense Canada Ltd.*

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# Reducing hospital over-crowding

nologies and methods that improve the delivery of home care, it's also an innovator. This year, SE Health and AMS Healthcare announced their collaboration on a four-year project to implement an innovative model of home and community care. The Hope Initiative will create a Living Lab where the H.O.P.E. Model® and emerging technologies will be piloted with approximately 1,000 clients, their families and neighbourhoods, and a team of nurses. The H.O.P.E. Model® was created by SE Health based on international best practices and more than a century of community nursing expertise.

> Care providers can be more efficient once we equip them with the right information at the right time.

Inspired by the Netherland's Buurtzorg neighbourhood care model, the H.O.P.E. Model® has been adapted for and pilot tested within the Canadian healthcare system, and is now poised to become a major transformation and system change.

The H.O.P.E. Model® is aligned with a global movement that is transforming community nursing from a transactional model, to a more empowered, efficient and person/family centered model. A number of innovations and digital tools will help create seamless communications and coordination across the circle of care for clients and their families. Over the next four years AMS and SE Health will partner to further evaluate and refine the H.O.P.E Model® and position it for spread and scale in Ontario.

Our approach to healthcare must evolve to serve the rapidly changing Canadian population. So much is possible when we look at solving problems with different thinking and creative solutions instead of more and more of the same. Digital can be the catalyst that ushers in a new age of healthcare for the aging population; let's get started for a better future for Canadians.

*Arslan Idrees is Digital Transformation Officer at SE Health, a national social enterprise bringing excellence and innovation to home care, seniors' lifestyle and family caregiving to forever impact how people live and age at home.*

## Conference overview

these outcomes are only possible if patients take the expected physiological readings. While the literature is rich with studies exploring barriers and facilitators to patient uptake, few have studied longitudinal patient adherence to telemonitoring programs existing outside the context of clinical trials.

The objective of this study was to quantify and explain longitudinal patient adherence in a heart failure telemonitoring program offered as part of the standard of care in a Toronto-based specialty heart function clinic.

A mixed-method explanatory sequential design was used to first quantify patient adherence rates over a 12-month period and subsequently explain adherence using semi-structured interviews. As patients are instructed to take readings daily before noon, monthly adherence rates were defined as the percentage of completed morning readings (weight, blood pressure, and symptoms) over each 30-day period.

Characteristics of interviewed patients included a range of ages (22-83), sex (70% male), time since onboarding (0-12 months), and overall adherence rates (30-96%).

Key themes explaining patients' motivation to adhere include: (1) perceived benefits of the program (self-management support, peace of mind, and improvement in clinical care); (2) ease of use; (3) a positive opinion of the program from family and friends; and (4) supporting services (training and technical support).

Themes explaining low and imperfect adherence include: (1) technical issues that periodically prevented the transfer of readings and/or which led to patient frustration; (2) life events or circumstances that interfered with the ability to take readings; and (3) the perception that the benefits of the program were suboptimal, due to the system's inability to adequately capture additional context related to the readings.

Despite a 15% drop in adherence after one year, an overall mean adherence of 70% is considered high given our strict definition of adherence and because the pragmatic nature of this study meant that we could not account for periods when patients were unable to take readings (e.g., travelling, inpatient stay, etc.).

This limitation meant that true adherence was likely underestimated. This study found that longitudinal adherence is not so much predicted by patients' demographic or health characteristics but rather their perception of a telemonitoring program's benefits, its ease of use, and the presence of supportive individuals and supporting program components.

**Intra-institutional Teledermatology: Results of a mixed methods case study**
*Lead presenter: Trevor Champagne, Women's College Hospital, Toronto, ON*

Historically, teledermatology's benefits have been mostly realized through improved access to rural or underserviced areas. This study examines the benefits and the overall impact of teledermatology in an urban, intra-institutional environment. A store-and-forward teledermatology service was created between family medicine practitioners and a consultant dermatologist in the same urban ambulatory intra-institutional hospital.

Mixed methods analysis was then applied to chart reviews, electronic surveys to clinicians and patients, and semi-structured interviews with referring providers and dermatologists within a framework developed from the Canada Health Infoway Benefits Evaluation.

Survey questions were designed to assess benefits quantitatively and interviews were subjected to qualitative thematic analysis. 84.2% of the 76 consultations reviewed over 18 months of service were manageable solely with teledermatology.

Subgroup analysis revealed that skin lesions had a much lower success rate with 40.9% requiring transition to an in-person consult, as opposed to skin rashes, of which 94.3% were manageable through teledermatology. All patients agreed they would use the service again. Cited benefits included savings in time, money, and missed work.

*The e-Health 2020 Annual Conference and Tradeshow takes place at the Parq Vancouver from Sunday, May 31 to Wednesday, June 3, 2020.*
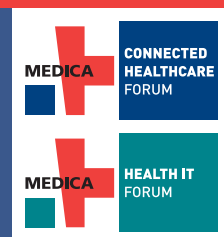
68
bpm
heart rate

CHOLESTEROL
TOTAL: 160
HDL: 44
LDL: 100

25    50    75    100    125    150    175    200

steps
stairs
exercise

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