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PHOTO: COURTESY NOVA SCOTIA HEALTH

The QE II Health Sciences Centre in Halifax has been building expertise and acquiring equipment for robotic surgeries, to improve patient outcomes and to attract talented clinicians. Pictured above (left to right) are orthopedic surgeon Dr. Glen Richardson, biomedical engineer Dr. Janie Wilson and orthopedic surgeon Dr. Michael Dunbar in the OR with the Mako SmartRobotics system. **SEE STORY BELOW.**

Halifax, a centre of excellence for robot-assisted surgeries

BY NORM TOLLINSKY

Already acknowledged as a Canadian leader in the adoption of surgical robots, the Queen Elizabeth II Health Sciences Centre (QEII) in Halifax recently added a new robotic device for knee replacement surgeries. Acquired in September 2021, Stryker's Mako SmartRobotics system has been used to perform eight knee replacement surgeries as of the end of February, said orthopedic surgeon Dr. Michael Dunbar.

Only the second robot of its kind in Canada, the Mako SmartRobotics system offers unprecedented precision for the placement of joint implants. However, according to Dr. Dunbar, it is in use in more than 1,000 locations in the United States alone and has been used to perform more than 600,000 procedures worldwide.

QEII Health Sciences Centre began the transition to robotic surgery with the acquisition of a da Vinci robot from Intuitive Surgical in 2019 and followed up the following year with the purchase of a Stealth Autoguide from Medtronic. The da Vinci system is used to perform gynecology, urology and ear, nose and throat surgeries, while the Stealth Autoguide is used by QEII neurosurgeons to perform cranial surgeries.

Dr. Gail Tomblin Murphy, vice-president of research, innovation and discovery at Nova Scotia Health, credits the combination of world-renowned surgeons, the generosity of donors to the QEII Foundation's fundraising campaigns, engagement with industry partners and a supportive provincial government for Nova Scotia's leadership in robotic surgery.

> **Surgeons in Halifax have recognized the importance of robots and the role they will play.**

Dr. David Clarke, head of Neurosurgery, who led the team who brought the Stealth Autoguide into clinical use, credits "surgeons at QEII who recognize the importance of robotics and the role it will play. Of equal importance," he adds, "are our relations with industry and the institutional support that enables us to do things a little more quickly and nimbly than might happen in some other centres."

"Knee replacement surgeries performed with the Mako SmartRobotics system result in less soft tissue damage, less blood loss, less pain, less swelling, shorter lengths of stay and quicker recoveries," said Dr. Dunbar. "We think we can also provide patients with a more natural gait, longer survivorship and less need for revision at a later date. It takes years to prove, but the research is underway."

The Mako SmartRobotics system personalizes the procedure based on a patient's individual anatomy by using a CT scan of the knee to precisely plan the surgery. "Working

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Halifax emerges as Canadian centre of excellence for robot-assisted surgeries

CONTINUED FROM PAGE 1

off a 3D CT scan as opposed to a 2D image on plain film is a major step forward," said Dr. Dunbar. "It would be analogous to designing your house in AutoCAD and being able to actually walk through the space and check it out before you build it as opposed to designing it in the conventional way on a sheet of paper."

"We can take the computer-generated model of the knee implant, put it in virtual space on the 3D CT scan and then virtually change its position and size until we optimize what we want to do at the time of surgery. Once the plan is fed into the robot, it knows where the bone is in space and where the surgeon has planned the cut. It only allows us to cut in the planes we've decided before surgery," explained Dr. Dunbar. "If we're outside the plane, the robot turns off."

The procedure takes the same amount of time in the OR as conventional knee replacement surgery and "it's almost a wash in terms of cost," but shorter lengths of stay, less need for time-consuming revision operations, and improved patient outcomes are cited as some of the benefits of using the Mako SmartRobotics system.

"We're also able to do partial knee replacement surgeries more often," said Dr. Dunbar. "They're harder to do, but if you do them well, there's a more natural outcome with a lower complication rate. You really need advanced technology to do them."

Hip replacements will also be performed using the Mako robot once everyone is comfortable with the technology.

Neurosurgery: QEII was one of three centres worldwide and the first hospital in Canada to perform biopsies of brain tumors using the Medtronic Stealth Autoguide robot; in the last year and a half, the technology has been acquired by several other hospitals across the country.

Having partnered with Medtronic to perform a preclinical evaluation of the technology, QEII was able to negotiate a favourable price for the robot and bring the technology into clinical use.

Dr. Clarke cites a 50 percent reduction in OR time using the Stealth Autoguide, a much smaller incision – one centimetre versus an incision of four or five centimetres for a traditional biopsy – a same day or next day discharge for the patient and less usage of disposable items. A calculation of the savings predicted the robot would pay for itself in two years.

Jen Hoyt, Medtronic of Canada; Dr. David Clarke, Head of Neurosurgery; Murray Hong, Technical Specialist.

"The most important benefit is the elimination of human error," he said. "Using conventional methods, you could end up with an unexpected hemorrhage or stroke if you're off target, or you may end up with tissue that doesn't give you the answer you wanted, in which case the patient may have to return for a second procedure. These are all things you want to avoid."

Pre-operative MRI and CT imaging of the brain is fed into a Stealth Image Guidance system to plan the trajectory for the biopsy. The robot then integrates with the plan in the operating room to assist the surgeon in the surgery.

"It's a system that is designed to quickly and accurately plan the trajectory for getting to a target," explained Dr. Clarke. "That means taking into consideration the bony anatomy of the skull and the vascular anatomy of the brain to avoid injuring a blood vessel on the way in. It helps us take the most efficient and safest route to get to the target."

Aside from performing biopsies, the Stealth Autoguide can be used to place electrodes in the brain in patients with epilepsy and Dr. Clarke's team has used the robot to deliver radioactive material to treat brain tumors.

Dr. Clarke estimates that the Stealth Autoguide is used for between 40 and 50 procedures per year.

While Nova Scotia Health and QEII are leading the adoption of robotic technology, Dr. Dunbar laments the less than rapid adoption of the technology elsewhere in Canada. He attributes the much more extensive use of the technology in the United States to the latter's competitive healthcare business model and the purchase of robots by surgeons themselves.

"We don't have that business model in Canada because we're a publicly funded system," he said. The downside, though, is that "we're becoming less relevant as training centres and we're not keeping our surgeons up to speed on advanced technology."

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Made For life

Toronto's UHN connects systems in a complex healthcare environment

Toronto-based University Health Network (UHN) is the largest hospital-based research centre in Canada. To securely and efficiently integrate more than 170 platforms and systems across its programs and facilities, UHN sought to adopt a highly available, scalable integration solution. With Red Hat Fuse, the organization has improved data collection, delivery, and scalability, with less server downtime and integration management effort needed.

In healthcare organizations, IT tasks can be especially complex: staff work with many different departments and facilities and securing patient information and other sensitive data is critical.

Toronto's University Health Network (UHN) is a healthcare and medical research organization with a mission to transform lives and communities through excellence in care, discovery, and learning. UHN operates the largest hospital-based research program in Canada. When its legacy IT systems neared end of life, UHN saw an opportunity to improve integration and data accessibility across its five major facilities for example, by ensuring that when a patient moved across departments or facilities, their relevant medical data was available to authorized care providers, without exposing that data to unapproved employees or staff.

"The systems managing aspects of our work like admissions, health records, and research aren't designed to interact with each other, so we had to maintain a team to manually handle that interfacing," said Leon Goonaratne, senior director of IT at UHN. "We wanted to mitigate that work with a modern, efficient integration solution that would help us serve UHN's clinicians, researchers, and ultimately patients by managing the data coming from various departments and facilities quickly and accurately."

Adopting a universal integration platform from Red Hat: UHN sought an integration platform that was supported by an active open-source community to benefit from the latest technology innovation. The organization also wanted a solution that offered high availability and automation capabilities to avoid manual redeployment in the case of server outages. Additionally, as its back-end systems use the Java programming language, UHN preferred a Java-compatible solution.

After evaluating several options, UHN decided to adopt Red Hat Fuse, a distributed integration platform that connects everything from legacy systems and application programming interfaces (APIs) to Internet of Things (IoT) devices and more.

"Red Hat Fuse offers the high availability and open-source innovation we need to support our critical research and healthcare operations," said Marco Pagura, technical specialist, UHN.

Improving data access at scale to support critical healthcare services: With a centralized, container-based integration solution, UHN's application developers and business users can independently develop connected solutions in the environment of their choosing. Red Hat Fuse integrates the disparate environments and systems to consolidate, protect, and transport data to support critical healthcare and research needs.

"In many cases an important diagnosis is reliant on our work of moving data smoothly within or between systems," said Goonaratne. "With Red Hat Fuse, we're confident data is going where it needs to go. It handles all of these moving parts effortlessly."

Reduced server downtime: UHN has used Red Hat Fuse's self-management capabilities to reduce downtime compared to its previous integration approach, helping ensure that critical data can be delivered to support time-sensitive patient care and health research.

Leon Goonaratne, Senior Director, IT, at UHN.

"If one of our servers goes down, Red Hat Fuse will pick up all of the processes that failed on the down server and shift them to the functional server," said Pagura. "That failover capability gives us more confidence that we can keep operational when there's a crisis."

Improved scalability: Responding quickly to changing demand is critical to healthcare operations. With Red Hat Fuse, UHN can customize its platform to match the scope of work – an especially important capability during the COVID-19 pandemic, where the team had to quickly increase capacity and make adjustments for department clients that were creating lower amounts of data than normal.

"We had just two servers, which limited our ability to scale as needed with our old system," said Pagura. "Now, we have high availability and can respond to urgent capacity needs."

Reduced integration management time: Adopting Red Hat Fuse also helps UHN's IT team work more efficiently, with fewer staff hours needed to manage the platform than its previous integration approach. For example, the team can create new integrations between its Apache Maven Archetypes templates and Red Hat Fuse in a day, rather than a week.

Looking to a hybrid future: After enhancing its integration approach with Red Hat Fuse, UHN is now considering adopting Red Hat OpenShift to support virtual server creation. Due to strict security requirements for patient information, UHN has maintained on-premise servers, but the increasing reliability and security of cloud computing may create new opportunities for a hybrid approach.

The organization is also considering future adoption of artificial intelligence (AI) tools to further optimize and speed its work.

"So far, the success of our digital transformation efforts with Red Hat has made us very optimistic about our work ahead," said Goonaratne. "We can now better serve our clients and continue to focus on our long-term goals."

About UHN: University Health Network is a public research and teaching hospital network in Toronto, Ontario, Canada. It is also the largest health research organization in North America and ranks first in Canada for total research funding. https://www.uhn.ca/

Chatbots can reduce administrative tasks, improve wait times

BY NEIL ZEIDENBERG

Many of us use technology to pay our bills online, book a vacation, and order concert tickets without ever talking to another person. Most often, we can do these things in a matter of minutes and with relative ease. But for people working in healthcare, that same level of efficiency hasn't been available.

"Currently, this same level of service isn't available to clinicians. In many cases, a clinician might email the customer service desk in a specific department and get a 24-hour resolution time," said Stephanie LeBlanc, clinical technology manager, Nova Scotia Health.

One solution to the problem might be the use of a chatbot.

"With AI chatbot technology, we can reduce that interaction time to about five minutes," she added.

Chatbots can significantly reduce wait times and automate repetitive tasks far more quickly than a person. Beyond solving administrative problems, such as service desk requests, they can also learn to identify disease or make a diagnosis and assist with speech recognition and note taking.

They're also efficient at taking stock of medication in a pharmacy; locating the cost of specific drugs and determining who's on call in a department. Chatbots can do all these tasks very quickly, greatly reducing administrative responsibilities for clinicians and leaving them more time to spend with patients.

"We design the chatbot to interact with customers using scripted conversation and pre-defined answers," said Sree Roy, AI and automation lead, Nova Scotia Health.

Nova Scotia Health is taking a Proof of Concept (PoC) approach to the use of chatbots, taking their time in determining where they're most useful.

"To determine which chatbots we build, we asked ourselves, in what areas can we improve the customer experience; and where do we get the most cost savings to the organization," LeBlanc explained.

Currently, Nova Scotia Health is testing chatbots in situations where a customer is checking the lease end date of their device, which device to purchase or answer frequently asked finance and supply chain questions such as 'what is my cost centre?' These are just a few of many examples.

The cost saving in implementing a chatbot is said to be about $20,000 per year, based on a manual process for 1000 request at 30 mins/request and $40/hour. Nova Scotia Health is testing five chatbots at a time, determining which ones are used most, provide the most value and relieve staff and clinicians of repetitive tasks.

> **Chatbots are helping to improve the customer experience and to obtain cost savings for the system.**

From start to finish, there are three phases:

- Proof of concept
- Standardize tools and centralize bot building
- In 5 years, de-centralize – departments can build their own chatbots based on what is valuable to them.

The chatbots can be installed using a Messenger platform; SharePoint web pages; mobile applications, or interface with Robotic Process Automation. Nova Scotia Health is using the Azure cloud platform and Power Virtual Agent, part of the Office 365 Power Apps Platform, to run the chatbots.

During a demonstration of the chatbots in action, they appear on screen welcoming the customer:

Hi, I'm Nova Scotia chatbot, how may I help you? I can assist with:

- Finance inquiries
- Supply chain inquiries
- Check computer lease date
- Device Persona

The QA chatbot is designed to ask basic questions, identify key words and phrases and reply using a pre-written and pre-determined answer.

Later, the chatbot will ask if the user's question was answered – yes or no, and if they wish to continue. Based on the answers provided, analytics will determine its actual performance. The more information and detail you provide the chatbot the better it can perform. And if there are questions that couldn't be answered the chatbot can be trained to answer more thoroughly the next time. It's all based on positive and negative results.

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Mount Sinai Hospital acquires surgical robot with advanced abilities

TORONTO – With its four arms and "wristing" action, the latest addition to Surgical Services at Mount Sinai Hospital is meticulous and precise and is allowing for minimally invasive surgeries to be extended to more groups of patients.

The new team member is a fourth generation da Vinci Xi surgical robot. It is the most advanced surgical robot in Toronto, and one of few in Ontario.

Unveiled as part of the innovative Robotics Suite on the hospital's new Operating Rooms and Surgical Services Floor, the state-of-the-art robot is part of the da Vinci Xi surgical system, and it enables complex laparoscopic operations on patients with complicated health concerns.

During robotic-assisted surgery a surgeon is seated at a console with 3D high-definition vision and hand controls that translate their hand movements in real-time.

This enables them to manipulate wristed instruments with more precision, flexibility and control than possible with conventional surgical techniques. The system is designed for multi-quadrant access, which enables surgical teams to perform a variety of complex procedures.

Its analytic capabilities provide programmatic insights that can help improve patient outcomes.

Integrated into the system is Table Motion technology that enables the surgical team to optimally adjust a patient's position without undocking the system, allowing dynamic access and exposure for a safer and more efficient workflow.

Dr. Jonathon Solnik, Head of Gynaecology, prepares a robot for use in surgery at Mount Sinai Hospital.

Mount Sinai is the first hospital in Canada with this integration.

One of the first Mount Sinai surgeons to use the robot is Dr. Jonathon Solnik, head of Gynaecology and Minimally Invasive Surgery at the Hospital, and a world leader in his field.

"Laparoscopy surgery affords patients specific benefits – shorter recovery, less pain, an earlier return to normal activities and quality of life," he said. "Using a surgical robot enables an extremely precise type of laparoscopic surgery."

He added, "Traditional laparoscopic instruments twist and open. But the robot gives you wrists – wristing motions enabling seven degrees of rotation that traditional laparoscopic instruments don't. So, it allows you to more safely reconstruct organs, which can be quite difficult with traditional laparoscopic surgery."

The system is also instrumental in bringing surgical teams together. Latest-generation da Vinci Surgical Robot Systems – like the da Vinci Xi – were designed for multi-specialty use and technologies such as the dual-surgeon console enable surgical teams to provide collaborative care and facilitate training of the surgeons of the future.

As a teaching hospital, Mount Sinai's surgical residents and fellows will be provided education, exposure and experience with robotics, training its learners to become the super-surgeons of Canada.

Currently available to urology and gynaecology patients, robotic-assisted surgeries are one of many improvements made possible as part of Renew Sinai, the largest and most ambitious redevelopment in the history of Mount Sinai Hospital.

Dr. Solnik is excited about what the future holds for surgical care at Mount Sinai. "We have superbly trained surgeons who already perform minimally invasive surgery on patients with really complicated medical problems. Along with new ORs and a new surgical floor, we now also have the ultimate tool to conduct cutting-edge surgery. This is the innovative technology we need to continue to be world-class."

Canada's hospitals must monitor cyber-threats to avoid attacks

BY JERRY ZEIDENBERG

Canadian hospitals continue to be targeted by hackers, and in some cases, their systems have been disabled for days – recent examples include Eastern Health in Newfoundland and Labrador, and Humber River Hospital in Toronto.

Yet, despite the warning signs, many hospitals have yet to invest in the technologies and procedures that could stop these intrusions.

In a recent webinar on cybersecurity that was sponsored by Calian, an Ottawa-based company with a presence in both healthcare I.T. solutions and security, a quick poll of the 140 online participants found that only 13% were confident in their I.T. security. Moreover, 30% were worried, saying they needed to rethink their I.T. security strategy.

Not only can cyber-crooks steal data, but they can also infect hospital systems with ransomware that freezes the system until the organization pays a ransom – sometimes in the millions of dollars.

A key problem faced by hospitals today is the pressure to share data with patients, clinical partners, research partners and companies. While this can lead to better healthcare outcomes for patients, and to productivity gains for partners, it also opens up the system to many more points of attack.

"As the system moves forward to share the patient record, and to share data in the cloud and in labs, your threats and exposure increase," said Raheel Qureshi, partner, Cybersecurity Risk and Advisory Services with iSecurity, a Calian company.

Qureshi asserted that cyber-criminals have become more sophisticated in recent years. "Sometimes the attackers know your network better than you do, they know what is exposed."

What's needed to combat the growing sophistication of cyber-criminals is a pro-active strategy that uses technology to monitor an entire hospital network – meaning all of its devices and endpoints. And the surveillance has to be done quickly to be effective, observed Drex DeFord, executive health care strategist with Crowdstrike.

In addition to working with technology companies, DeFord was also a CIO with the Scripps chain of hospitals in the United States, and with the Seattle Children's Hospital.

DeFord described how attacks typically start – and the best way of stopping them.

Often, the attackers will search for an unprotected device where they can gain entry to the whole system. "The point where they get into the network and move on to the next device is really crucial – at Crowdstrike, we call that the 'breakout time'."

He continued, "Once the adversary breaks out of the first machine and makes a lateral move, containment of that cyber-event becomes way more complicated."

He compared this event to a stroke, in which there is a "golden hour" for optimal treatment. "Our research shows that it takes about an hour-and-a-half for an adversary to break out of that first device and move laterally," said DeFord. For this reason, monitoring systems that can detect intrusions and respond within an hour are crucial.

"Cyber-security teams should think about a standard response time for endpoint break-ins that we call 1:10:60 – where you can detect an attack on an endpoint within a minute, triage it within 10 minutes, and eradicate or contain the attack within 60 minutes."

Crowdstrike has its own solution for monitoring of this sort called Falcon Complete. (Other leading I.T. security companies have their own solutions.)

> **What's needed to combat cyber-criminals is a proactive network that monitors an entire hospital network.**

DeFord asserted that Falcon Complete is much faster than standard anti-virus systems, which tend to require extensive software at each endpoint. This resource-heavy solution often slows down the system, as the software constantly compares a database of viruses with every file that crosses its path.

By contrast, Falcon Complete is cloud-based and makes use of very small pieces of software that are embedded into the endpoints. "We built a super-tiny sensor that goes to the end-point. That sensor is listening to everything and it's pulling it into the cloud."

Moreover, he said the solution is monitoring systems worldwide, and using the knowledge gained in various sites to help all others.

Erin Leonard, senior sales engineering manager at Proofpoint, explained further how breaches often happen.

"The weakest links are people," she said, "and email is the number one vector for how the threats are getting in. They take advantage of how easily people fall for certain things."

She cited a HIMSS survey on security that found 89% of compromises started with email.

Some systems, like Proofpoint, can filter out suspicious emails before they even hit the in-box of staff and clinicians. Techniques like "browser isolation" can also be used. "So, if an end-user does click on a link that is malicious, they're taken into a browser where nothing can be uploaded or downloaded."

Of course, not every malicious message can be eliminated 100 percent of the time – which means that people must be on guard. "The best strategy is a multi-factor approach of training and trying to ensure that your end-users are as aware as possible, so they know what to look for," said Leonard.

Damian Chung, business information security officer with Netskope, a cloud security company, observed that most

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Hamilton's largest hospital system responded to demands for PPE

HAMILTON, ONT. – It was a mission never experienced before in the history of Hamilton Health Sciences (HHS).

"Early in the pandemic, I remember being on a phone call at 11 o'clock on a Friday night trying to negotiate one million N95 masks," recalled Robin Simons, HHS' procurement and supply chain director.

"This quickly became a normal way of life – late night and weekend calls with vendors, sharing information with our hospital peers, and leveraging every contact we ever made in our careers. We quickly realized the supply chain was breaking and we needed to look to non-traditional vendors to support our needs."

> **Prior to the pandemic, few people thought much about supply chains and the flow of goods and services.**

Personal protective equipment (PPE) such as masks, gloves, gowns, face shields, caps and shoe covers were critically important in fighting the COVID-19 virus. There were so many unknowns about the virus at the time, but keeping healthcare workers and staff safe was the number-one priority.

However, the pandemic created another global crisis: it broke the supply chain world-wide and made sourcing PPE and other critical supplies a serious challenge.

Supply, what? Prior to the pandemic, few people thought much about supply chains and how the flow of goods and services impacted their daily lives. It's one of those things that's taken for granted until a once-in-a-lifetime event like COVID comes along and disrupts the world.

Remember the 'great toilet paper shortage of 2020'? That happened because people began panic-buying and hoarding, and the supply chain simply couldn't keep up with the increased demand.

The same was true for PPE, except a shortage would have more severe consequences than toilet paper. And people weren't hoarding it. The issue was far more complex.

So what happened? When the pandemic hit, HHS – like other organizations – experienced challenges accessing the large volumes of supplies needed to meet emerging guidelines for protecting front-line workers with the highest-quality equipment. The virus was new and information was scarce. At that point, the most protective equipment was considered the safest.

Workplaces everywhere were trying to get supplies from manufacturers, who were either working as quickly as they could to keep up with demand or didn't have the raw materials they needed from other areas of the world to make their product. In many cases, border and travel restrictions prevented products from coming into the country.

To complicate matters further, manufacturers of these products were experiencing COVID outbreaks within their own workforces and were short staff.

With all of these factors at play, HHS continued to carefully manage its existing stock while also aggressively sourcing new supplies to ensure the hospital didn't run out.

Next steps: In the spring of 2020, PPE suppliers faced shortages of raw materials

and challenges with normal supply chain distribution systems. The central organization that would supply PPE to hospitals in our area was no exception. So, HHS had to get it themselves.

"Supply was unpredictable and allocations across hospitals were based on historic use vs. pandemic-influenced demand," said manager of HHS supply chain logistics, Annette LaCivita. "We saw a decline in the fill rates on orders and like all hospitals, began PPE conservation and sourcing strategies."

With only some supplies in the pandemic storage repository, the procurement and supply chain team had to pivot very quickly to stock up on what was needed. This included finding supplies that were made locally, or that could be made locally.

By summer 2020, HHS and other hospital systems began sourcing alternate N95s (a type of respirator with a close facial fit and efficient filtration of airborne particles) but there was another problem – money.

Prices soared: What happens when supply goes down and demand goes up? Prices soar.

"Prices were enormous and in some cases over 120 percent higher than we were previously paying," says Simons. "Not only were we dealing with supply constraints where we simply couldn't get anything, prices were enormously high. We also had to ensure none of the products we were considering were counterfeit and we needed to validate that they were coming from legitimate suppliers."

The procurement and supply chain team had thousands of suppliers, distributors and resellers reaching out to them, plus they received numerous donation offers.

"It was great that people in the community were so generous and came forward with these opportunities," says Simons, "but the products had to be vetted to ensure they met healthcare and HHS standards. This was another way our teams worked together to get supplies where they were needed most.

Partnerships bloomed: HHS was contacted by a number of local companies who decided to retool – or adapt – their manufacturing operations to make PPE for hospital use. It was a win-win. The decision to create PPE provided businesses with the opportunity to keep workers employed and their plants operating, while helping their local hospital care for patients.

It also gave hospitals an opportunity to collaborate with local partners.

The biggest opportunity to pivot to locally made goods was for N95 masks. HHS' original supplier was based in the United States and unable to ship masks here due to border closures.

Several Ontario-based manufacturing companies shifted their models to respond to the needs of the healthcare sector. More recently, with assistance from the provincial government, one of the companies, 3M, is producing a N95 model mask locally in Brockville, Ontario. These new universal-fit N95 masks are providing a sustainable supply that will help relieve some of the pressures experienced by HHS.

Peer to peer collaboration: Throughout the pandemic, hospitals came together to share strategies, vendor and

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Siemens announces availability of easy-to-site MRI

OAKVILLE, ONT. – Siemens Healthineers announced that Health Canada has licensed the MAGNETOM Free.Max, a new class of magnetic resonance imaging (MRI) scanner with High-V, delivering value beyond barriers. The scanner's unique combination of digital technologies and the new field strength of 0.55 Tesla broadens the range of clinical applications for MRI systems, while radically simplifying siting requirements.

At less than 3,200 kg and under 2m high, the MAGNETOM Free.Max is the most lightweight, compact whole-body MRI scanner ever offered by Siemens Healthineers.

Its reduced size permits installation with minimal structural modifications, making installation easier, faster, and less costly. While MRI scanners typically require several hundred litres of helium and a quench pipe for cooling purposes, the new MAGNETOM Free.Max uses less than 700ml of helium, reducing lifecycle and infrastructure costs. As a result, the MAGNETOM Free.Max can be installed in locations previously not suitable for MRI.

Developed from the ground-up to be sited and operated in very remote locations, the MAGNETOM Free.Max benefits from the latest technologies for automatic patient positioning and one-click exams and offers new MR services

in remote and under-serviced regions and communities in Canada.

With the world's very first and only 80 cm patient bore, MAGNETOM Free.Max breaks barriers in patient comfort and accessibility. In addition, the scanner also offers a load capacity of 320kg, all of which makes MRI a realistic option for claustrophobic, anxious, and bariatric patients.

The MAGNETOM Free.Max leverages the latest artificial intelligence innovations for image processing and workflow from Siemens Healthineers. Deep Resolve is a set of image reconstruction algorithms that performs targeted denoising and uses deep learning to deliver sharper, higher-resolution images. myExam Companion is a comprehensive workflow solution that helps the user navigate the examination to efficiently achieve consistent, high-quality results, regardless of user experience level or the condition of the patient.

"The greatly reduced siting and operational requirements of the Free.Max open the door to putting an MRI system in locations that were previously not feasible – for example in small remote communities, or directly in hospital emergency rooms or intensive care units," said Sebastien Deval, business manager, MRI, Siemens Healthineers. "With its innovative digital solutions, such as the new Deep Resolve, MAGNETOM Free.Max can deliver image quality that used to be possible only at higher magnetic field strengths."

Assessing healthcare benefits, harms: The vital role of informatics experts

BY DR. DAVID ZITNER AND DOMINIC COVVEY

Who would expect an enterprise to be successful if it did not know how it worked, what its costs were and if its efforts and expenditures resulted in worthwhile products or services? Who would believe that today this would be possible absent effective IT and analyzable data?

Let's start by recognizing that the purpose of health care is to maintain and improve health and remedy illness. Given that, if we are to appreciate the value of our healthcare system, we must assess its performance by determining if patients are better or worse off after interventions. We can only do this if we document how we intervene and then measure patients' health before, during and after treatment.

Health informaticians are vital because they have the knowledge, skills, and talent to develop embedded health record systems to capture, analyze, and produce the health information by clinicians at each encounter. Clinicians must be the source of health status information that guides diagnosis and treatment and enables the evaluation of patients' health status throughout.

When health record systems routinely capture assessments of patients' health, they can enable the linkage of patient characteristics, test results and treatments to health outcomes. These systems can also provide timely feedback to support clinical and administrative choices and to enable researchers to learn which interventions are helpful, harmful or just a waste of time and money.

In Canada, despite spending billions on health IT, we cannot tell how a patient's health is changing over the course of a hospital stay, nor how many people were better or worse off after care.

Nor can we tell if an organization's results are better or worse than other organizations treating similar patients. The Canadian Institute for Health Information purports to measure hospital performance by linking diagnostic labels to costs, but not to formal measures of health outcomes. Reality is that this does not provide the information we need!

Most people intuitively realize that a diagnostic label is information about the cause of a problem but not disease severity. For example, someone with pneumonia may be able to walk or jog, while another person with pneumonia requires intensive care. Measures like blood oxygen levels, blood pressure, respiratory and pulse rate give information about disease severity. People admitted to hospitals with low blood oxygen, extremely high or low pulse rate, or abnormal respiratory rates are sicker than people with pneumonia with lesser symptoms. We would expect that, in general, people who are healthier when admitted are likely to be healthier when discharged and to have better survival compared with people who have severe illness.

Some claim that it is difficult to measure health, but almost everyone realizes if they are healthier or sicker after treatment. People see doctors in order to feel better, function better or do more, and live longer healthier lives. Actually, it is easy to measure each of these dimensions of health. An excellent book "Measuring Health" gives detailed information on the scales clinicians use.

Ironically, at every health visit, clinicians formally or informally assess and record information about patients' comfort, function, and overall health. They need this during care to decide whether to perform, continue or discontinue treatment or try a new strategy. They need it later to assess if interventions worked and the patients got better.

Informaticians need to know a few important ideas about outcome assessment: Measuring health requires an assessment of patients' comfort, how they function, and their overall health, including their likely longevity, as well as the severity of problems.

Clinicians use rating scales to measure comfort. They learn about comfort by asking questions like "how much pain do you have in your knee?" or "how do you feel?" Similarly, for function, the clinician might check the range of motion of the knee and assess how well the person can perform activities of daily living.

Dr. David Zitner

Dominic Covvey

Clinicians and health informaticians develop formal estimates of illness severity by using information about comfort and function along with the results of a clinician's physical examination and laboratory investigations. The APACHE score in ICU's or the APGAR score for neonates are examples of the information collected to develop measures of illness severity.

It is vital to collect both problem-specific and overall information because it is not helpful if a procedure increases knee mobility but leads to a stroke or incapacitating pain. Performance measurement requires tracking not only the beneficial and harmful effects of an intervention on the limb or organ, but also its overall effect.

Taking drugs to reduce the pain of a minor headache is not useful if debilitating gastrointestinal bleeding results. Few interventions are only helpful, so it is important to track their overall effects.

Several years ago, Dr. Z. was on the implementation committee as one Province tried to implement a modern health information system. Promoters suggested the system would enable health services administrators to link healthcare activities to the health results. Unfortunately, they did not insist on capturing formalized measures of health status.

The consequence, of course, is that they cannot easily link overall healthcare activities to the results that follow. Oddly, CIHI does capture before-and-after health status information for rehabilitation medicine. There have also been Cardiologist and Cardiac Surgical groups that have linked patient characteristics, interventions, and health outcomes to evaluate care and organize waiting lists, proving that it can be done.

This allows them to award priority for scarce surgical resources to patients most likely to be harmed by a prolonged wait.

The message: Health Informatics experts, dedicated to measuring healthcare results, must include formal ways of applying measures of health and using these to link interventions to patient health status before and after treatment. Doing this is much less difficult now than it was before given the availability of sophisticated AI tools.

David Zitner is a retired family doctor, a full professor at Dalhousie University and the founding director of the graduate program in Health Informatics there. Dominic Covvey is the founder and President of NIHI Canada. David and Dominic are in the process of publishing a book exploring the essential ideas that all of us, including informaticians, must know to collaborate in healthcare.

McGill University to develop online dementia education program

BY DIANE LYNN WEIDNER

MONTREAL – Tamara Carver, PhD, director of the Office of Education Technology and E-learning Collaboration for Health (Ed-TECH) at McGill University's Faculty of Medicine and Health Sciences (FMHS), is working with her team to develop an engaging and user-friendly online educational curriculum that will support people living with dementia and their care partners.

The new TOTAL eLearning program, Ten Online Modules over Ten Weeks for Adult Learners, will adapt and enhance McGill's existing bilingual Dementia Education Program workshop content to the current COVID-19 context by using a virtual learning platform. The program has received funding in the amount of $758,430 from the Public Health Agency of Canada as part of the Dementia Community Investment initiative to promote dementia-inclusive communities.

Bringing the McGill Dementia Education Program online: The McGill Dementia Education Program (DEP) was created five years ago when Claire Webster approached the FMHS because she wanted to make a change to the health care system through community engagement.

A former caregiver who had faced the challenges of dementia as she witnessed her mother's decline, she understood the importance of providing education and resources to support people living with dementia (PLWD) as well as the family, friends and partners who care for them.

Webster now works with her academic co-leads at McGill, neurologist Serge Gauthier, MDCM, and geriatrician Jose A. Morais, MDCM, along with a team of multidisciplinary experts to educate and empower PLWD and their care partners. They have attracted international attention and created a wide range of bilingual resources, including video capsules, care guides and activity booklets, that are freely available on their website.

Prior to the COVID-19 pandemic, the DEP also offered in-person workshops to educate informal caregivers through experiential learning at McGill's Steinberg Centre for Simulation and Interactive Learning. The lockdown and confinement measures that were put in place to limit community transmission of the virus temporarily halted these workshops. Unfortunately, these necessary measures also increased social isolation and exacerbated the issues faced by care partners of PLWD across the country.

Tamara Carver, PhD

The DEP team, passionate about finding innovative ways to continue to offer vital support, reached out to Professor Carver to set the wheels in motion and create a virtual training program that would provide online education for PLWD and their care partners. They sought to develop an educational curriculum that would offer culturally relevant learning opportunities in an engaging and user-friendly online format.

Building an inclusive platform: "We are conducting extensive research and consulting with dementia patients and their care partners, along with the broader health and social services community, to gain a comprehensive perspective and ensure that the objectives and content of this curriculum will meet their needs and be representative of diverse populations," said Professor Carver.

The Office of Ed-TECH brings together instructional designers, course developers, and multimedia content creators who are partnering with healthcare professionals to design 10 modules that are relevant, user-friendly, and delivered in an engaging format. Using a storytelling lens, the content will focus on narratives that are based on real patient experiences and diverse cultural personalities to engage the participants.

University of Florida presents at U of T AI conference, shows progress

Various hospitals in Canada and around the world have deployed Early Warning Systems – solutions that track the health of critical care patients and seriously ill patient, and sound an alert when patients are in danger of crashing. It's a way of identifying and treating patients before it's too late.

However, most of the systems in use only collect data every few hours, while the health of a patient can change in minutes.

That's why an AI research unit at the University of Florida has devised a system called DeepSOFA that collects data continuously. It also analyzes the data using artificial intelligence and machine learning, to better predict which patients are in danger.

Using the data, the team has not only been able to flag patients in immediate danger, but the AI-based system can also predict outcomes for patients in the future.

"We can predict 30-day, 60-day, 90-day and even a year later mortality," said Dr. Parisa Rashidi, an associate professor of biomedical engineering at the University of Florida, in Gainsville, and director of the school's Intelligent Health Lab.

Dr. Rashidi was a speaker at the University of Toronto AI Conference, an online event held in February. She said one of the most popular Early Warning Systems in use today is SOFA – short for Sequential Organ Failure Assessment. However, it typically makes assessments of a patient's health by gathering data about six different systems – respiration, coagulation of platelets, liver health, cardiovascular hypotension, central nervous system data, and renal creatinine levels – every few hours.

Dr. Rashidi's group improved on the predictive abilities of SOFA through continuous monitoring and by building an AI database of over 36,000 ICU encounters. Moreover, it compared its data with another database of 48,000 encounters.

With the AI model and monitoring, the system is able to provide an opportunity for interventions.

On another front, the Intelligent Health Lab created an AI-based system that can predict possible problems for post-surgical patients, such as sepsis, delirium and ventilation issues.

The team has also created a solution that makes use of video monitoring to help spot problems being experienced by ICU patients, some of whom are intubated and can't express themselves very readily.

The solution makes use of video-based continuous monitoring to pick up changes in the patients' facial expressions, posture, and other variables, such as the noise levels in the ICU and whether or not the lights are too bright. Something that's also being tracked are the number of visits that a patient gets – the stimulation can improve the health of patients.

"Noise in some ICUs can be as loud as street traffic," said Dr. Rashidi, who noted

Parisa Rashidi, Director of the Intelligent Health Lab

that it can affect patient outcomes and contribute to the onset of delirium.

The system is designed to help ICU nurses, who are often overburdened and able to visit patients only once every four hours. But by using a continuous monitoring system that tracks visual cues, nurses can be notified when a patient is in trouble.

This project is still ramping up, with 190 patients enrolled. Dr. Rashidi said more will be enlisted.

She also described a project to assess patients for dementia using AI analysis of pictures drawn by the patients. In particular, patients are being asked to draw a clock face.

"It's such a simple test, but you'd be surprised at how much it can tell you about fine motor skills and memory," she said.

The University of Florida team's system is analyzing 23,000 clock images drawn by patients. It can make inferences based on the size of clock face and its shape (many patients with cognitive issues will draw the circular clock face as an oval or avocado shape), the numbers on the clock face, and the angle between the hands.

Dr. Rashidi said that obtaining large data sets is a problem in AI research, and that there is a challenge in getting data sets that are ethnically and regionally diverse. Only when such wide-ranging data sets are used can bias in the data be offset.

One of the barriers to creating large and diverse data pools are patient privacy laws, which prevent the data from leaving the encounter site.

A solution, said Dr. Rashidi, is federated learning, in which the data remains at its original site but is connected to a central repository. Even in this case, strong privacy protection must be built into the system.

Dr. Rashidi noted that diagnostic AI systems have made a lot of progress. However, the next step will be especially useful to clinicians. "At some point, we must move to models that recommend actions," she said.

While systems can be built to make autonomous diagnoses and to suggest therapies, Dr. Rashidi said clinicians will always have the final word. "The critical decisions will still be made by the doctors."

Research identifies roadblocks to realizing the full value of imaging

BY JEFF VACHON

Healthcare organizations of all sizes across Canada and the United States are increasingly adopting workflow solutions to support business growth strategies, more effectively manage patients, and boost radiologist productivity.

However many of these solutions have failed to deliver the anticipated cost and quality benefits. An independent research initiative launched by Reaction Data and sponsored by Bialogics Analytics, Inc., sought to uncover why.

To do so, we polled clinical and technical radiology department leaders at leading healthcare organizations about their current data initiatives, as well as the challenges and barriers to achieving meaningful data use.

Fragmented data silos: Nearly all survey respondents acknowledged that there is significant value in their medical data, however half believed that they were achieving little to moderate value from it.

One of the primary reasons being that most organizations use several disparate IT systems (e.g. the EMR, RIS, PACS, etc.) and applications across the continuum of care.

Therefore, it has become crucial to adopt a comprehensive business and clinical intelligence platform that can consolidate all available data into one place and make better sense of the information generated across imaging systems.

Lack of budget and resources: 90% of respondents noted that they do not currently use a dedicated business intelligence solution in their radiology practices, citing lack of financial resources and internal expertise as a major barrier.

Most respondents noted that they are limited to ad-hoc manual (25%) reporting of technical operations and clinical analysis by single keyword (44%) searches in individual systems, requiring data to be manually collected and compared.

Not only does this require significant time and effort, but it can be limited in scope and accuracy. Furthermore, it was reported that approximately five to 10 full-time equivalent (FTE) resources are required to manage data analytics initiatives under this model, costing healthcare organizations between $500,000 to $1 million annually.

A solution that further leverages natural language processing (NLP), and augmented by machine learning algorithms, has the ability to automatically extract relevant and actionable insights from within the unstructured, narrative text of radiology orders and reports.

Such a solution is significantly less expensive than the aforementioned FTEs, and can yield deeper, more accurate, more complete insights much faster than manual or keyword searches.

How to unlock buried insights: Healthcare organizations that invest in data analytics are proven to be more efficient and deliver higher quality care.

A data platform that supports business intelligence, AI, and machine learning applications as outlined below can uncover clinical, operational, and financial insights from across disparate workflows and systems, allowing medical imaging practices to transform the way they do business:

Jeff Vachon

• Vendor agnostic interoperable data platform: Look for a platform that can aggregate multiple data sources (EMR, RIS/PACS, Scheduling, Finance, Dose Monitoring, etc.) and protocols (DICOM, HL7, FHIR, XML, JSON, etc.) into a common, standardized database.

• Flexibility and ease of use: Combine multiple sources of data into a cross-functional analysis utilizing user-configurable dashboards and self-serving analysis

• Efficiency optimization: Standardize and optimize patient, procedure, and workflows across organizations to improve efficiency and better manage resource and modality asset utilization

• Performance Productivity: Optimize radiology reporting performance to improve service delivery and patient satisfaction. For example, monitor and compare Radiologist individual and aggregate TATs, RVUs by shift or slot times, etc.

• Follow-up exam management: Close the loop on follow-up exams by creating daily monitoring, with patient management and scheduling of repeat exams.*

• Critical findings reporting: Monitor call-back reports for all critical findings to ensure attending physician follow-up and patients are notified of immediate care needs.

• Integration of unstructured data: Access countless data points from medical imaging orders, images, and reports that, when combined, can lead to meaningful information for improving care quality and outcomes and supporting quality assurance and clinical research.*

• AI performance: Enable AI strategy to accelerate adoption and performance through concordance/discordance reporting based on physician, procedure and AI algorithm.

• Image de-identification: facilitate Medical Imaging research by creating a dedicated imaging dataset for clinical analysis and AI development with anonymized and de-identified reports and images. Also, support Artificial Intelligence algorithm development using clinical search criteria to create accurate patient cohorts.

Jeff Vachon is CEO of Bialogics Analytics.

Integration of XERO® with Teams enables clinicians and specialists to share images

New solution streamlines communication among radiologists and other providers, improving clinical collaboration

The integration of Agfa HealthCare's XERO® diagnostic imaging viewer with Microsoft Teams allows for easy sharing of images among groups of healthcare professionals. Save time tracking down colleagues in the hospital when a review of images is needed—instead, images can be sent quickly and securely in a way that is already used by many physicians and allied professionals.

Physicians requesting a consult can tag specific members of the channel to review an image. If they fail to respond, the request can be escalated via email and repeated notifications.

Physicians participating in a consult can view the images and communicate with each other using audio, video and chat. Also available is a markup tool allowing clinicians to interact with the images using their cursor and to share the markups in real-time.

The solution can be customized to meet the needs of specific hospitals or clinicians. For example, a COVID button can be added to the navigation bar in the XERO viewer and programmed to transmit images to a 'channel' of predetermined specialists, including pulmonologists and infectious disease experts. Channels can be added for critical care and cardiology specialists, ophthalmology, dermatology, and others.

The XERO/Microsoft Teams app can save valuable time over the course of a week, month or year. Agfa HealthCare estimates that with a time saving of 10 minutes per consult, an average hospital could save 75

days of productive time per year. The app can also be life-saving, if a patient has COVID-19 and needs to be placed in quarantine before infecting someone else.

Installation is via a simple plug-in with no downtime or interruption to viewer use. Following successful implementations in the UK, the companies are now offering the solution to North American customers.

AGFA HealthCare

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VIEWPOINT

Non-fungibile tokens in healthcare: a new technology that may benefit patients

NFTs could give patients the ability to better control and monetize their data.

BY DR. SUNNY MALHOTRA

Many healthcare stakeholders are wondering what non-fungible tokens (NFTs) are and how they may be used in healthcare. NFTs are a form of digital certificate that authenticates an asset as being one-of-a-kind. There are those that believe that it is a new approach to assets and there are those that believe that it has hazardous outcomes if is bought/sold by uninformed buyers.

An NFT is "a unique digital certificate, registered in a blockchain, that is used to record ownership of an asset such as an artwork or a collectible." Creating or "mining" NFT transactions leverage blockchain technology.

Using decentralized computer networks and advanced cryptography to verify transaction validity, healthcare and pharma can also utilize this to prevent counterfeit drug penetration. I will go into the use cases for some context.

I normally comment about artificial intelligence and robotic process automation but cryptocurrency, blockchain, and the NFT craze have piqued my interest. Here's what I learned after researching the potential implications of NFTs in the digital health age and the backend technology.

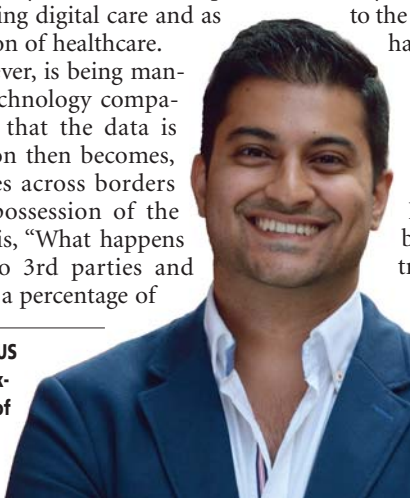
NFTs can represent our ownership of a patient's digital healthcare data. The ability to leverage and monetize their data is important, including their lab work, imaging and their DNA.

Think about the potential implications of creating an NFT as a digital footprint of your DNA and combine that with the power of the 23andMe engine. Patients can deliver their data and monetize it to companies who have profited off this already. I have had thoughts about making my own healthcare NFT to understand the process in more detail.

Use cases: We have been expanding our repertoire of biometric sensor data abstraction to include heart rate blood pressure, ECG, hydration and temperature as a means to providing digital care and as part of the consumerization of healthcare.

> **Minting their own NFTs would allow patients and consumers to monetize the transaction every time the NFT is shared, in perpetuity.**

Data governance, however, is being managed by the healthcare technology companies within the country that the data is domiciled in. The question then becomes, what if the patient moves across borders and who should be in possession of the data? The other obstacle is, "What happens when the data is sold to 3rd parties and should the patient receive a percentage of the revenue?" Is that ethical? Minting their own NFTs would allow patients and consumers to monetize every time that the NFT is shared, in perpetuity.



Dr Sunny Vikrum Malhotra is a US trained sports cardiologist working in New York. He is the CEO of Cardiac Registry Support. www.cardiacregistrysupport.com. Twitter: @drsunnymalhotra

As we dive into the digital health era, personal health sensors and apps equip patients with personalized data so that they can become more proactive in managing their health. Sensitive data is governed by the companies providing these services and they often profit out of it, oblivious to patients.

For example, the pregnancy-tracking app Ovia was found to sell aggregated data of its users to employers. Similarly, 23andMe intends to develop drugs based on the genetic database it created from customers who used its genetic testing kits.

Please do not misinterpret this as a negative commentary. 23andMe has also contributed enormously to the world with this central repository and still has much potential to realize.

Other significant players include the health monitoring app Go!, developed by Enjin and Health Hero, which can collect individual activity and wellness data from popular apps like Apple Health, Google Fit, and Fitbit. In doing so, it creates Well-being NFTs, or W-NFTs, that can even be traded on the open market.

NFTs are still in their nascent form and use case, and the technology may evolve in the future. Because of the potential impact on patients and the healthcare system, it's important to keep abreast of developments in this area.

Toolkit streamlines the procurement of digital health solutions

BY MICHAEL GREEN

This won't be news to most of you – it's a very complex task to procure digital health solutions in Canada. It takes a long time, costs a lot of money, and causes a lot of frustration. For everyone.

If you work for a healthcare organization or a provincial or territorial government, you know how long it takes to gather the requirements, make sure they fit your needs, issue the request for proposal (RFP) or request for vendor pre-qualification (RFPQ), assess the proposals and select the qualified vendors.

If you are one of these vendors, eager to get your solution into a new market, you find the procurement process very time consuming and complicated. You might go through many of them before you get the good news that you've been selected. Meanwhile, you've spent lots of time, effort and money, and your competitors might be gaining ground.

If you are a healthcare provider, eager to use new digital solutions to improve your workflow and better serve your patients, you might wonder if the solutions will still be relevant by the time they are implemented and you've had the proper training to use them effectively.

So how can we streamline the process to save everyone time, money and frustration?

Canada Health Infoway has developed a Procurement Toolkit that includes curated mandatory requirements, rated clinical requirements and privacy and security requirements for remote patient monitoring and virtual visit solutions. Any organization can access the toolkit on our website at www.infoway-inforoute.ca and use it to get its procurement process done more quickly.

We have done the heavy lifting to gather and validate the requirements for you. And we are confident that they will meet your needs.

How can we be so confident? Because we have already tested the requirements. Over the past year, we worked with participating jurisdictions to gather the requirements to support multi-jurisdictional RFPQs for virtual visit and remote patient monitoring solutions.

The jurisdictions validated that the requirements met their core needs as well as those of various organizations within their jurisdictions. The RFPQ process established a pool of pre-qualified vendors for each type of solution, and the participating jurisdictions can access the pools when they are ready to purchase. Feedback from the jurisdictions has been overwhelmingly positive.

Michael Green

This excellent collaboration with the jurisdictions has proven that we can work together successfully to make the procurement of digital health solutions in Canada more efficient. Everyone benefits from a standardized approach to gathering and validating requirements. Users of the Procurement Toolkit will save time and money and can enjoy more efficient procurement processes. Solution providers will be supported to get their products into target markets much faster. And most importantly, these solutions will get into the hands of clinicians and patients to improve healthcare delivery and outcomes.

Infoway is proud to lead this important initiative. We hope our Procurement Toolkit will be of great assistance whether you are a procurement lead, a vendor, a clinician or you work in another supportive capacity. We are confident this toolkit will spark a movement to build a digital health procurement community that can come together to share best practices, address common issues and collaborate to overcome challenges.

Michael Green is President and CEO of Canada Health Infoway

Grant awarded for the optimization of EHR systems in nursing practice

BY JESSICA KEMP

Dr. Gillian Strudwick, chief clinical informatics officer and independent scientist at the Centre for Addiction and Mental Health (CAMH) is partnering with a team at Sinai Health to reduce the burden associated with electronic records for nurses.

The multi-site study was one of the Canadian Institutes of Health Research (CIHR) Project Grants awarded for Spring 2022; the grant will provide the research team with nearly $200,000 over the 2.5-year study period.

Members of the CAMH Team include Dr. Gillian Strudwick as principal investigator, Brian Lo, Dr. Lydia Sequeira, Dr. Nelson Shen, and Dr. Wei Wang as co-investigators and Dr. Damian Jankowicz and Dr. Tania Tajirian as collaborators.

Members of the Sinai Health Team include Dr. Lianne Jeffs as co-investigator, Lily Yang, Kara Ronald, and Petroiya Paterson as collaborators, and Jane Merkley as executive sponsor.

The project will play an important role as nurses represent the largest group of healthcare providers in Canada and are reported to be the primary users of EHR systems.

Nurses document in more areas, and at times in a greater volume, than other healthcare providers; although the EHR system serves as the backbone of documentation for all clinical activities, these systems require improvements to better support nursing staff.

To address this, many Canadian healthcare organizations are entering an 'optimization' phase in their EHR implementation journeys to enact strategies that support improved use of the systems by clinicians.

This study comes at a critical time as Canada is currently in the midst of the COVID-19 pandemic and the healthcare system is experiencing an extreme shortage in the nursing workforce, an exodus of nurses, and increasing complexity in the clinical environment.

All of this further contributes to increased documentation requirements.

The heavy documentation requirements of EHRs can dramatically add to the cognitive load of providers. The burden in time and resources associated with using the EHR has been recognized as one of the many contributors of burnout among providers.

It is therefore not surprising that recent recommendations put forth by the Ontario Medical Association for addressing burnout among physicians are aimed at documentation burden and the use of digital tools like EHRs.

Dr. Gillian Strudwick

In surveying physicians at one of the study sites, 74.5% of respondents who were burned out identified the EHR as a contributor to their exhaustion.

Just prior to the pandemic, burnout among nurses at one of the study sites was higher than physicians (34%). In addition to these local findings, numerous opinions, viewpoints, and editorial pieces discussing this topic have identified the need to understand how the burden of EHR use may contribute to the multifactorial issue of burnout, which may lead to career dissatisfaction, absenteeism and job turnover, reduced quality of care and medical errors.

The growing documentation burden and experiences of burnout in nursing populations have highlighted a need to address the inefficiencies and challenges that nurses face when using EHRs.

Using human-centred design approaches, the objective of this project is to engage nurses in generating ideas on how to support and optimize their experiences with the EHR system, thereby improving efficiency and reducing the EHR-related burden.

This work will ensure that the identified solutions are grounded in nurses' perspectives and experiences and will address their EHR-related needs specific to their workflows and delivery of care.

The team of researchers and collaborators from CAMH and Sinai Health aim to evaluate the utility of the EHR systems analytics platform to accurately capture the utilization patterns of nurses. Using the results of this evaluation, the teams will work to understand the utilization patterns and user experiences of nurses in the EHR through numerous focus groups. These groups will also be used to identify areas for improvement in the utilization of the EHR for documentation.

Findings will be used to generate potential interventions to improve the efficiency of nurses' EHR use and through a second round of focus groups, will be used to rank and reduce intervention options through nurses' assessment of the relevance, feasibility, and perceived impact.

This work will create a direction forward on how nurses' EHR-related burden and burnout can be addressed and support greater utility of EHR systems for nursing professional practice. The project findings will also inform the co-design and implementation of interventions.

Jessica Kemp BSc, MHI, is a Research Analyst in the Digital Mental Health Research Lab at CAMH.

Hospitals must monitor cyber-threats

CONTINUED FROM PAGE 6

organizations have been migrating applications to the cloud – or they're planning to do so. With cloud-based apps and data, employees and clinicians can work anywhere, accessing the information they need remotely.

"COVID pushed people out of the workplace and into their homes, into coffee shops and hotels," said Chung. "We've been seeing this trend for a while, COVID just pushed it forward faster than expected."

However, that means users are taking the data far outside the walls of the hospital or clinic. Further, they're often contractors or research partners who are bringing their own devices and sending the data into their own clouds.

Chung said solutions like Netskope can determine where an organization's data is going – and whether that destination is acceptable or not.

"Hopefully you don't get into the situation where your data is already exfiltrated to an attacker. But if you do, knowing where your data is, and where your sensitive data is, is key."

Panelists also discussed the growing importance of multi-factor authentication (MFA) to gain access to applications and data. MFA requires the user to enter more than one password, enter a fingerprint, or to respond to a code sent to his or her cellphone.

While MFA greatly improves the security of systems, in the past it has irritated clinicians because it slows down their access to data.

Adam Crown, group product marketing manager, Healthcare Solutions, with Okta, asserted that today, MFA is a lot easier to use than it used to be, but many users don't yet understand that.

Moreover, MFA requirements are starting to show up in the cyber-insurance policies of organizations. For this reason, "MFA is no longer a 'nice to have' technology, it's a necessity," said Crown.

Virtual technologies are being used to reach underserved patients

Better care is being provided to palliative care patients and those undergoing gender-affirming surgeries.

BY DIANNE DANIEL

Two Ontario mobile health programs are aiming to bridge the equity gap in health services by bringing virtual care to two distinct patient populations typically under-served in the province: people receiving palliative care and those undergoing gender-affirming surgeries.

One is using an innovative e-health app developed by Toronto-based social enterprise uCarenet Technologies Inc. The other is leveraging functionality provided by MyChart, the patient-facing portal offered as part of the Epic health information system. Both are reducing emergency room visits, alleviating concerns and improving quality of care through remote patient monitoring and virtual connection to a care team.

"I always thought palliative was your last X-number of months that you have for life and what I began to understand is that it's not," said uCarenet co-founder and CEO Nectari Charitakis. "It could be a long journey and that journey is obviously very fatiguing for the patients as well as for their families."

In 2018, uCarenet partnered with Brampton, Ontario's William Osler Health System to develop a remote self-monitoring app for people in palliative care, appropriately called Relief.

Led by Dr. Martin Chasen, medical director of the Supportive Palliative Care Program at William Osler and funded by the Centre for Aging and Brain Health Innovation (CABHI), the initial pilot study sought to provide the right palliative care to the right individual at the right time and in the right place by giving patients a mobile tool to report their symptoms from home each day.

In this way, a palliative care team at the hospital could monitor them and intervene as necessary.

Using their computer or mobile device, the 20 patients enrolled in the study completed standard self-assessment questionnaires designed to monitor symptoms such as pain, tiredness, nausea, lack of appetite, shortness of breath, depression or anxiety.

If a parameter reached a specified threshold – increasing by more than two points, for example – an alert was sent to a dashboard monitored by a palliative care nurse. In turn, the nurse then checked in with the patient, determining whether they required an in-person nursing visit, consultation with a palliative care physician, or needed to visit emergency.

"We found that a lot of those patients were adequately treated at home because we recognized the symptoms early and they were treated early," said Dr. Chasen. "The patients loved it. The families loved it. The testimonial said that these patients felt they were always connected. It gave them security."

At the same time, clinicians involved in the pilot reported that their patients had an improved experience and a higher quality of care. No emergency visits were required over the two-month study period, resulting in an estimated $62,000 in savings, and doctors said the app increased their confidence in providing palliative care.

"It changes the focus into what I call equity because you are giving the patient what they need at the right time," said Dr. Chasen. "You're not giving everybody equality; you're not giving everybody exactly the same. You're giving A what A needs, B what B needs and C what C needs."

Now the goal is to take the app out into the community to increase the number of patients who can benefit. Backed by $1.4 million in funding from Health Canada, announced in the spring of 2021, researchers from William Osler, Humber River Hospital and the Bruyère Research Institute are actively working to expand the Relief app's reach. They have already partnered with the North East, North West and Champlain LHINs in Ontario as well as with Lakeshore General Hospital in Quebec.

One of the goals is to reach marginalized patient groups who require palliative care, including the homeless, rural and remote communities, Indigenous communities, Anglophones in Quebec, and Francophones outside of Quebec.

The federal funding covers the app, the hardware and a research assistant at each site to help facilitate the technology's rollout, but each region will decide the best way to apply it to their current community nursing model, explained Dr. Chasen.

After a slow start due to the pandemic, researchers are expecting to sign on additional partners this year. Charitakis said increased adoption is supported by the fact that the app is designed to limit operational disruption.

"Dr. Chasen brought forward standard practices that are being used right now and what we've done is digitize them," he said. "This way, we're hoping to reduce the learning curve and reduce the adoption hurdles."

According to a 2018 report by the Canadian Institute for Health Information (CIHI), 75 percent of Canadians would prefer to die at home but only 15 percent have access to palliative home care services.

The report also found that three out of five Canadian primary care doctors say they don't feel well prepared to help people in need of palliative care. The Relief app aims to close that gap, and at the same time promote a deeper understanding of what palliative means.

People tend to associate palliative care with cancer treatment, but generally speaking, patients receiving palliative care "can have any life-limiting disease, whether it's cardiac failure, renal failure or metastatic cancer," said Dr. Chasen.

"Palliative doesn't mean no treatment," he added. "You're actively treating the patient, but you're not focused on cure; you're focused on care."

"What I'm beginning to realize is that helping someone live longer, happier and healthier in their home during the end of their life is not just a technology solution. There's also a huge human element," said Charitakis. "We're taking advantage of having a technology, but we're also building this whole network of care providers."

Transition-Related Surgery and virtual supports: Women's College Hospital (WCH) in Toronto is another Ontario facility using mobile technology to address a significant gap in healthcare access. The hospital's publicly funded Transition-Related Surgery (TRS) program is focused on providing safe and timely access to gender-affirming surgeries such as mastectomy with chest contouring, breast augmentation, hysterectomy, orchiectomy, scrotectomy, vulvaplasty and vaginoplasty.

ILLUSTRATION: LINDA WEISS

Virtual care is a critical support component of the program, particularly for patients undergoing vaginoplasty, the construction of a vaginal cavity.

Prior to the 2019 launch of TRS, the vast majority of Ontario patients were referred to Montreal for vaginoplasty. As WCH nurse practitioner, surgical services, Emery Potter explained, vaginoplasty not only requires stringent after care for the first-year post-op, including daily dilating of the vaginal canal to prevent stenosis, but it is also a procedure that can be onerous on patients because they are often left to sort through information on their own.

"We were really looking at the gaps that were present and trying to build a program where we are filling in those gaps ... and trying to address a high de-

gree of complication rates," said Potter, adding that one of the biggest disadvantages is lack of knowledge about vaginoplasty in general among primary care providers.

"This is a surgery where there's also some discrimination, transphobia and stigma around it, so providers are already apprehensive about providing the care, but there's also quite a significant knowledge gap," they said.

To bridge the gap, WCH is leveraging Epic MyChart – which the hospital brands as its myHealthRecord online patient medical record – to build a virtual care pathway. The initial patient intake visit is conducted over Zoom within myHealthRecord, enabling Potter to share educational resources, document a patient's history, send consent forms and capture baseline information about a patient's genital urinary tract, gastrointestinal tract and sexual function, information which is automatically populated in their online chart.

The virtual support continues after the procedure when a patient is enrolled in the Digital Care Coach program, which uses myHealthRecord to deliver medication reminders, further educational resources and medical questionnaires, and enables remote monitoring.

As an ambulatory centre, WCH doesn't keep inpatients over the weekend. That means the average seven- to 10-day hospital stay typically required for vaginoplasty patients is reduced to just three nights. Patients arrive on a Monday and are discharged on Thursday with a Foley catheter and vaginal packing in place and must return the following Monday to have both removed.

"From that Thursday until the Monday, we're connected through the Digital Care Coach," explained Potter, noting that local patients will go home but out-of-town patients will stay at a nearby hotel, Airbnb or respite facility.

"Basically, it's like direct messaging. They can send pictures about any concerns, we can have a video call, we can text back and forth about any issues," they said. "Even though they are discharged from hospital on post-op day three, they really are a virtual inpatient throughout their one-week post-operative period."

Once the catheter and packing are removed, a patient receives in-person instruction about their aftercare and virtual support then continues for one year post surgery. Patient questionnaires are routinely sent out and based on their responses, Potter is alerted when patients are experiencing trouble with dilation or struggling with their mental health and intervenes as necessary.

"The dilation itself is only 15 minutes to full depth, but sometimes just setting it up or getting to full depth can take 30 minutes to an hour depending on the person. It can be very disruptive to peoples' routines," they said, noting that patients have to dilate three times a day for the first three months post-op, then twice a day until nine months and once a day until a year.

"If they stop dilating, the vaginal canal can close. So, it's really important that folks are supported and guided through this crucial perioperative period," they said.

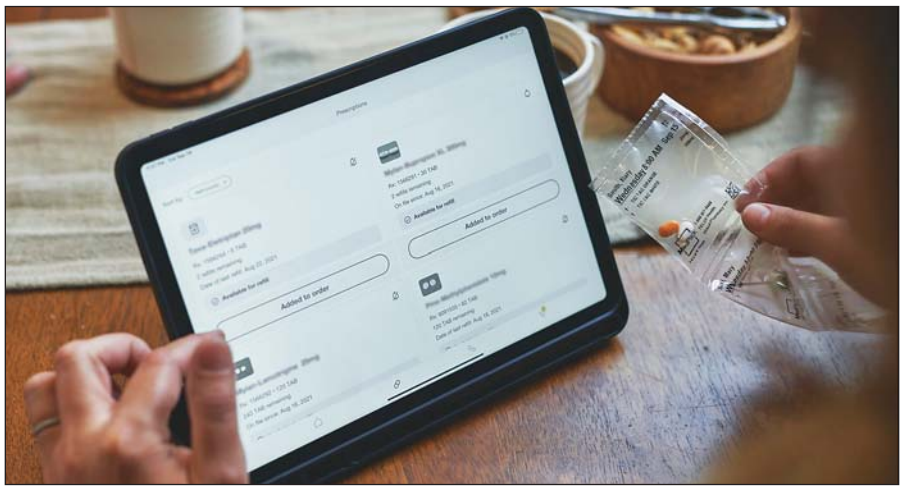
Virtual support is also important when a patient encounters a minor post-op issue. Potter recalls one patient whose Foley catheter fell out after discharge from hospital and when they visited their local emergency, clinicians were having difficulty inserting it because they couldn't find the urethral meatus. Potter stepped in to direct clinicians using the patient's Digital Care Coach app on their smartphone.

"This is a surgery that's so onerous on patients and a lot of our folks have unmet social needs, unmet mental health needs and many patients have nobody in the waiting room to pick them up," said Potter. "This isn't a surgery that you can be very successful at alone, so we really do try to make sure we have those supports around them."

When WCH started performing vaginoplasty in 2019, the centre was averaging one surgery a month. In 2020 that number grew to two a month, and by 2021 it was performing one per week. This year the target is two per week to accommodate the estimated 150 to 200 patients in Ontario currently assigned for the surgery. To date, there have been no cases of post-op complications. "Usually it's about a 15 to 20 percent complication rate and we've had no incidents," they said. "This is such a unique surgery, I do feel you need high volumes and the right supports around it in order to have high quality care."

The rise of virtual pharmacies: a natural evolution of digital healthcare

BY JASON KENNEDY



The COVID-19 pandemic has been a challenge for many people across Canada, but one benefit we've seen over the past two years is the rapid adoption of digital health services. At the start of the pandemic, most people in Canada quickly shifted many aspects of their lives online, accelerating a digital transformation that had already been underway for decades. By late 2020, already 56 percent of Canadians had transitioned to receiving some form of their healthcare virtually.

Rapid advancements over the past two years are making digital healthcare services more accessible and easier to work into one's everyday life. Virtual medical appointments are now a staple for people in Canada, as are other digital health services such as apps that allow people to track different aspects of their lives: cardiovascular, diet, sleep, stress, etc.

But as virtual healthcare quickly evolved in Canada, one area that proved to be slow in offering an optimal digital experience was pharmacy services.

This has now changed as TELUS Health just launched Virtual Pharmacy, a comprehensive digital service that can support people with their various medications and broader pharmacy needs. This is a natural evolution of Canada's digital healthcare continuum.

Digital medication management: TELUS Health's new Virtual Pharmacy makes filling prescriptions online easy, allows users to set up automated refills and have prescriptions delivered directly to any location, saving them time from going into a neighbourhood pharmacy to access their medications.

For those who value speaking directly with a pharmacist, this new service allows users to set up private virtual "face-to-face" video meetings with registered pharmacists when and where it's convenient for them.

Virtual Pharmacy is free and can be used from any device, computer, tablet or smartphone. People can simply enter their drug coverage information, if any, and transfer new or existing medications to their account.

The process is fast and the service helps ensure prescriptions are up to date, that refills are not missed, and that users have access to the most current information about their medications. Those who take multiple medications can also benefit from a customized pill dispenser (MedPack) that makes it easier to accurately take one's medications. It's also very practical for travel.

Regular medications are a vital aspect of one's health routine, and services offered by Virtual Pharmacy can help people in Canada stay on top of it so they can focus on other priorities in their day.

The app-based service can also help in decreasing stress associated with remembering to both refill and pick up medications, physically traveling to a pharmacy, and waiting to speak with a pharmacist.

Improved medication adherence and access: Medication adherence is proving to be a growing issue in Canada. In a recent survey, one-third of Canadian respondents said they often missed picking up their prescriptions, which translates into a lot of missed medications and an increased risk of compromised health.

Sixty percent of these respondents said they simply forgot to pick up their prescriptions, with 50 percent citing they were too busy with work or personal activities to do so. This can be an even bigger challenge for older people, those with mobility issues, and those who take multiple medications refilled on different dates.

Research has also shown that those in rural and remote parts of Canada experience challenges in accessing health services. Almost one-fifth of Canadians (18 percent) live in rural communities, but they are served by only 8 percent of physicians practicing in Canada.

Virtual pharmacies directly address the challenges experienced by all of these groups as the service streamlines the process of managing all prescriptions in one place, sends reminders when refills are required, and has medication delivered directly to people without them needing to walk, or drive, to the pharmacy.

Better integrated services: Digital health technology holds great potential for people across Canada looking for ways to better manage their health and wellness without the need to commit to time-consuming appointments and waiting rooms.

App-based pharmacy services such as TELUS Health's new Virtual Pharmacy can provide those across Canada with more freedom and control over their medication management, along with helping them access other pharmacy services from the comfort of their home.

Above all else, these technologies can allow people to focus on other aspects of their health and spend time with those who mean the most to them. Pharmacy services should be made easy, and now they are.

Jason Kennedy, RPh, is General Manager, Virtual Pharmacy at TELUS Health.

$2 million donation funds AI hub at The Ottawa Hospital

OTTAWA – Through a $2-million donation from TD Bank Group (TD), The Ottawa Hospital will create the new TD Artificial Intelligence in Medicine (AIM) Hub that will accelerate the development and use of artificial intelligence (AI) in healthcare.

AI has the potential to transform the prevention, diagnosis, and treatment of chronic diseases such as diabetes, kidney disease, cancer, heart disease, and brain conditions. It could be a game-changer for patients not only in Ottawa but also across Canada and around the globe.

Dr. Doug Manuel, senior scientist at The Ottawa Hospital and distinguished professor at the University of Ottawa, will lead this innovative project. Dr. Manuel explained the TD AIM Hub will build on their world-leading experience developing mathematics models or algorithms to not only improve diagnosis and treatment but also predict potential issues and outcomes.

"From a simple technology perspective, complex data and algorithms currently take nine months to three years to develop and implement," said Dr. Manuel. "We are proposing an aligned model in which this cycle will take only days."

Traditionally, this has been a huge gap, with the vast majority of AI innovations never progressing beyond the earliest stages of research. Dr. Alan Forster, executive vice-president, chief innovation and quality officer, and senior scientist at The Ottawa Hospital explained how this platform would help bridge this gap.

"The TD AIM Hub will engage patients and their loved ones directly in the development of AI tools from the earliest stages to ensure the patient experience is front and centre. It would be a collaborative effort between patients, physicians, scientists, and programmers. Importantly, we will evaluate the impact of the AI tools to improve outcomes that matter most to patients."

"At TD, we are thrilled to provide funding to The Ottawa Hospital to help extend innovative AI technology capabilities and advance quality healthcare in the region," said Tara-Lynn Hughes, senior vice president, TD Bank Group. "Through the TD Ready Commitment, the Bank's corporate citizenship platform, this important initiative will help patients living with cardiac conditions, cancer, and other chronic diseases access equitable and personalized care."

The TD AIM Hub will ensure that our hospital is ideally positioned to take advantage of the incredible potential of artificial intelligence, according to Dr. Duncan Stewart, executive vice-president, Research and senior scientist at The Ottawa Hospital.

"In the past, it has been a challenge to implement increasingly complex algorithms into practice. This new virtual Hub will revolutionize our ability to use AI to transform the practice of medicine. I am thrilled that TD has had the foresight and generosity of spirit to support this innovative initiative to harness complex data to improve healthcare."

The TD AIM Hub will seek to reduce the time needed to develop algorithms from months down to just days.

The TD AIM Hub will have three capstone chronic disease projects, including multiple chronic disease prevention, end-stage renal disease, and degenerative neurologic conditions.

This platform will build on our hospital's track record of world-firsts, including the first and largest hospital data warehouse in Canada, the first hospital-wide "synthetic" data program in Canada, and one of the most comprehensive sets of health calculators and predictive algorithms in the world, with more than 2 million users in 200 countries.

The Ottawa Hospital is one of Canada's top learning and research hospitals, where excellent care is inspired by research and driven by compassion. As the third-largest employer in Ottawa, our support staff, researchers, nurses, physicians, and volunteers never stop seeking solutions to the most complex healthcare challenges.

Our multi-campus hospital, affiliated with the University of Ottawa, attracts some of the most influential scientific minds from around the world. Our focus on learning and research leads to new techniques and discoveries that are adopted globally to improve patient care.

We are the Regional Trauma Centre for eastern Ontario and have been accredited with Exemplary Standing for healthcare delivery – the highest rating from Accreditation Canada. We are also home to world-leading research programs focused on cancer therapeutics, neuroscience, regenerative medicine, chronic disease, and practice-changing research.

VHA improves access to data for staff and home-care clients using cloud

BY NORM TOLLINSKY

The transition to cloud-based information management software couldn't come soon enough for Alistair Forsyth, chief information officer for VHA HomeHealthCare, an Ontario-based service provider caring for hundreds of thousands of clients in the Toronto, London and Ottawa regions.

VHA's transition from GoldCare's on-premise solution to its new CloudCare 2.0 version is an integral part of the organization's digital transformation journey that will improve performance and security, facilitate integrations with third party systems, and allow easier access to the software by VHA's 2,700 mobile healthcare staff.

It will also provide a client portal for clients and their family members.

A provider of healthcare information management software for home and community care, children's services and long-term care organizations, Waterloo, Ontario-based GoldCare, introduced Cloud-

GoldCare has invited service providers like VHA, clients and family members, to help shape the functionality of the portal.

Care 2.0 in 2020 and plans to have all of its customers in Canada, Australia and New Zealand upgraded by the end of this year.

"Previously, when we had our on-premise solution, we had to make sure our server infrastructure could scale to the demand," said Forsyth. "During peak times, things would slow down, so it was less reliable. We have better security now, as well, because we're able to take advantage of all of the safeguards available through the Microsoft Azurecloud service."

Personal support workers, nurses and allied healthcare providers had some mobile access to GoldCare's on-premise solution, but now that they're able to access the system on a browser, it's "much faster and easier," said Forsyth.

The browser-based access made possible by CloudCare 2.0 offers PSWs, nurses and allied healthcare professionals all the information they need for a home care visit, including any past notes and who's coming next to a client's home.

"They'll be better informed and can be more proactive and personal," said Paula Hucko, president of GoldCare. "And the role-based dashboards built into our software display only the information relevant to a care provider because if I'm a PSW, the information that's relevant to me is quite different than if I'm a nurse or the CEO of a service provider.

Integrations with other information systems are now much simpler with the fully API-enabled CloudCare 2.0, allowing VHA to connect with a broad range of systems both internally and externally. Forsyth cites the example of an integration with one of its Ontario Health Team (OHT) partners that identifies clients the two organizations share and rosters them to the OHT.

"We also have an integrated care program with the University Health Network that allows their providers to log into our system," said Forsyth. "Because GoldCare is now web-based, we can provision access to other providers so they can go in and look at a client's care plan."

Internally, VHA was able to integrate CloudCare 2.0 with its phone system. When a client or family member calls, GoldCare recognizes the phone number and opens the client file, so call centre agents know who's calling and have all the information they require in front of them.

One of the most exciting additions to CloudCare 2.0 is a new client portal that will provide clients and family members with access to home care schedules and online tools for communicating with VHA care co-ordinators.

"One of the biggest challenges we have," said Forsyth, "is the volume of calls coming into our call centre either inquiring about a family member's service or requesting a change in the schedule." Instead of calling VHA, clients and family members will be able log on to the client portal. They'll also be able to message their care co-ordinator if they have a question or provide feedback on the quality of service.

GoldCare has invited service providers like VHA, and even clients and family members to help shape the functionality of the portal. "By 2040, a quarter of Canadians will be over 65," said Hucko. That's a smart, tech-savvy demographic that is going to want information at their fingertips."

The client portal will streamline the onboarding process for new clients by doing away with hard copy forms that family members have to fill out. "That's all done manually now," said Forsyth. "We provide clients with documents to fill out and they need to either give them to the provider when they come to the home or mail them in. Using the client portal, they'll be able to do it online."

Paula Hucko, President of GoldCare.

Forsyth is also lobbying to "uberize" the portal to, for example, transmit phone alerts to a client or family member when a PSW or nurse is 10 minutes away. "That's important to a client because their day can sometimes revolve around when their provider is going to show up," he said. Other notifications can inform clients and family members about cancellations and plans to send a different provider.

An integration with the EMR that VHA nurses and allied healthcare providers use for clinical documentation is planned, that will populate the client portal with information about a client's health status.

"It's just a matter of understanding what information family members want to see," said Forsyth. Health status updates will continue to be available by calling a client's care co-ordinator, but an integration with the EMR has the potential to share the latest nursing report, a client's pain score or other information through the client portal.

"Another nice thing about CloudCare 2.0 is that – like the on-premise version – we're able to tailor it to our workflow," said Forsyth. "That's hugely important to us."

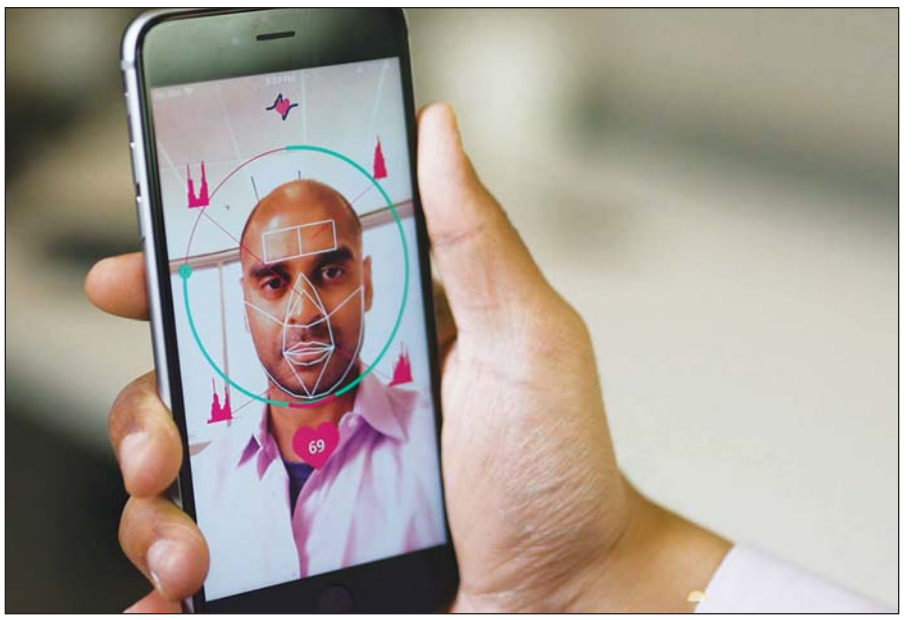
"With a lot of cloud-based software, you get what you get," agreed Hucko. "That's not the case with CloudCare 2.0 and it's important because one size doesn't fit all for many of the large providers.

"Technology," she conceded, "will never replace the importance of the human touch but it can assist organizations, care workers, families and clients with a much more comfortable and safer environment for aging at home."

About GoldCare: *GoldCare is a leading healthcare technology software provider for community, home, and residential care sectors. An integrated approach to care management and support, and dedication to industry-advancing solutions are just some of the reasons why GoldCare is used by hundreds of organizations across Canada, Australia, and New Zealand. To learn more, please visit www.mygoldcare.com.*

New technology enables patients to collect their vital signs using video

BY JERRY ZEIDENBERG



Taking vital signs is an important part of medicine, but it's also unwieldy for the patient – it requires a blood pressure cuff around the arm, an ECG to capture Heart Rate Variability, and a scale to measure weight and calculate one's body mass index. Moreover, clinic staff or physicians require time to capture and interpret the readings.

Now, however, a Toronto-based company called Nuralogix (www.nuralogix.ai) has devised an AI-powered software system that runs on smartphones and enables patients to capture and display all these vital signs – as well as respiration rates and readings for mental stress – by taking a 30-second video of the face.

It's called contactless health assessment, and it could become widely accepted soon, especially by consumers.

"People's phones are the future," said Dr. Keith Thompson, a London, Ont. family physician who is chief medical officer at Nuralogix. "You don't have to go and buy a blood-pressure cuff or other wearable devices."

A free version of the app, called Anura Lite, is available for download on Apple iPhone and Android phones. More fully featured versions are supplied to corporate partners who are paying for the solution.

Tracking one's vital signs is becoming increasingly important in an era when patients are being encouraged to take charge of their own health. Hospitals and clinics are sharing their electronic health records with patients, on the premise that empowered consumers will become healthier patients.

And easy-to-collect vital signs also empower the patient to have up-to-the minute snapshots of their health, which they can share with their doctors.

Dr. Thompson emphasizes that the app from Nuralogix, called Anura, isn't yet a medical device providing medical-grade diagnostic information. Instead, the company says the app "is intended to improve your awareness of general wellness." If a patient is given a suspicious reading by the app, he or she is encouraged to follow up with a doctor.

However, Nuralogix is currently seeking approval for Anura's ability to assess blood pressure from the U.S. Food and Drug Administration (FDA) and will soon be running clinical trials.

"We're intending to validate Anura as a Class 2 medical device," said Dr. Thompson.

While the app is being assessed by the FDA, the company has removed the blood pressure tool from the system. However, Dr. Thompson said it has already been shown to have a high degree of accuracy.

Anura makes use of transdermal light technology, and measures and assesses the blood flow through the face of a person using the app.

It sends the data to the cloud, where an AI-system called DeepAffex processes the information.

Dr. Thompson said that no facial images are stored in the cloud; instead, the blood flow data is collected, helping to further refine the database and to provide the patient with an ongoing record.

He observed that Nuralogix built the AI database with a cohort of 30,000 participants in China, where the company has a research office. The initial research took over five years of data collection and analysis in collaboration with local hospitals.

By contrast, "Enrolling and assessing 30,000 patients in North America would have taken 10 years," said Dr. Thompson.

While most of the participants in Nuralogix's database are of Chinese origin, that hasn't affected the accuracy of results for persons of other ethnic backgrounds. "The physiology is agnostic of race or skin tone," he said.

Obtaining accurate results for persons with darker skin, such as Black users, does require better lighting for the video. "It does need a stronger light source," said Dr. Thompson.

The company is refining its algorithms for darker skin tones and is conducting further research and development in Africa for this purpose.

Using the data collected, Anura can make assessments of a person's heart health and can predict the possibility of both heart disease and stroke. It can also assess a person's anxiety levels and mental stress.

"We can also predict your weight and age very accurately from the geometry of your face," said Dr. Thompson.

It's all somewhat astounding and may amount to a sea-change in the way that vital signs and other medical information is collected in the future.

Already, Nuralogix is working with more than 100 organizations around the world to incorporate Anura into various applications. They include insurance firms like Bupa, of Spain, and telehealth companies.

And while Nuralogix is a start-up that launched in 2015, Dr. Thompson said it has already attracted investment capital and has started to generate a healthy revenue stream from customers.

Nuralogix was created by Toronto-based academic Dr. Kang Lee, a professor at the University of Toronto. Dr. Lee teamed up with Marzio Pozzuoli, an entrepreneur who is now CEO of Nuralogix.

There are other companies using smartphones and video to assess vital signs, such as Binah, of Israel. However, Dr. Thompson said Binah's app doesn't assess metabolics, which Anura does.

In future, Anura is planning to combine its transdermal light technology and algorithm with questionnaires, which could help identify issues in patients like depression – a major problem in population health.

Once it passes FDA assessment in the United States, what Dr. Thompson calls "the holy grail", the company will also apply for Health Canada approvals. That will open it up to greater usage in Canada.

Dr. Thompson sees the app as having great potential for improving healthcare in Canada.

"In our region alone, in the London area, there are 109,000 patients without primary care physicians," he said.

He asserted that with the Anura app, for self-assessment and screening, these people could take better care of their health. Using the system, they would be more likely to seek out medical help if they were given signs of high blood pressure or the possibility of heart disease or stroke.

Demands for PPE

CONTINUED FROM PAGE 8

product information, and their own experiences like never before," says Simons. "We reached out to hospitals across the province to see how they were conserving PPE, what suppliers they were using, and how much supply they were keeping on hand." This collaboration among hospitals has been crucial in creating a strong support network across the GTA and the province.

Conserving PPE: HHS worked with its employee health services and infection prevention and control team to employ conservation methods supporting sound use of PPE supplies until more arrived. At the same time, it was important for healthcare workers to know they were not at risk using existing supplies. Communication and education were key elements in ensuring staff felt safe and had confidence in their protective equipment.

Some conservation methods included creating guidelines around roles that required N95 masks versus rated disposable masks for lower risk areas and practicing extended use for N95s.

At one point, HHS and many other hospitals looked into the possibility of cleaning and reusing N95s, as recommended in some provincial directives. In the end, this strategy was never needed because HHS was able to meet its supply demands.

Temporary warehouse: Typically, HHS managed its own inventory, placing orders directly with suppliers and receiving those orders as needed.

To accommodate extra pandemic supplies, LaCivita and her team set up a temporary warehouse to store PPE and hired new staff to manage shipments. Because storage space was so limited at the sites, products were shipped every day from the warehouse to the hospitals in need. This warehouse closed in March 2021. Pandemic inventory has since been moved to a permanent location.

Lessons learned: Everything is 20/20 in hindsight – except for 2020 itself. That is still a bit blurry.

> **Collaboration among hospitals has been crucial in creating a strong support network throughout the province.**

Moving forward, Simons and her team are making a plan should something like this happen again.

"We had all of our eggs in one basket with a central supplier of PPE," says Simons. "Understanding now the many factors that can adversely affect our supply chain, we've determined we have to keep our own separate pandemic warehouse to store PPE as well as respiratory therapy items."

Throughout the pandemic, HHS was continuously introducing new product because it had to take what it could get. "Now we have the luxury of hindsight," says Simons. "Having that easily-accessible pandemic supply in storage will provide confidence for our staff, knowing they are using high-quality, standardized products."

The team also pledges to leverage locally manufactured products where possible, as well as ensuring that stock is rotated and products haven't expired.

"It's true inventory management," says Simons "We're not out of the woods yet and it will be quite some time before we have confidence in our supply chains, but we are beginning to see glimmers of hope."

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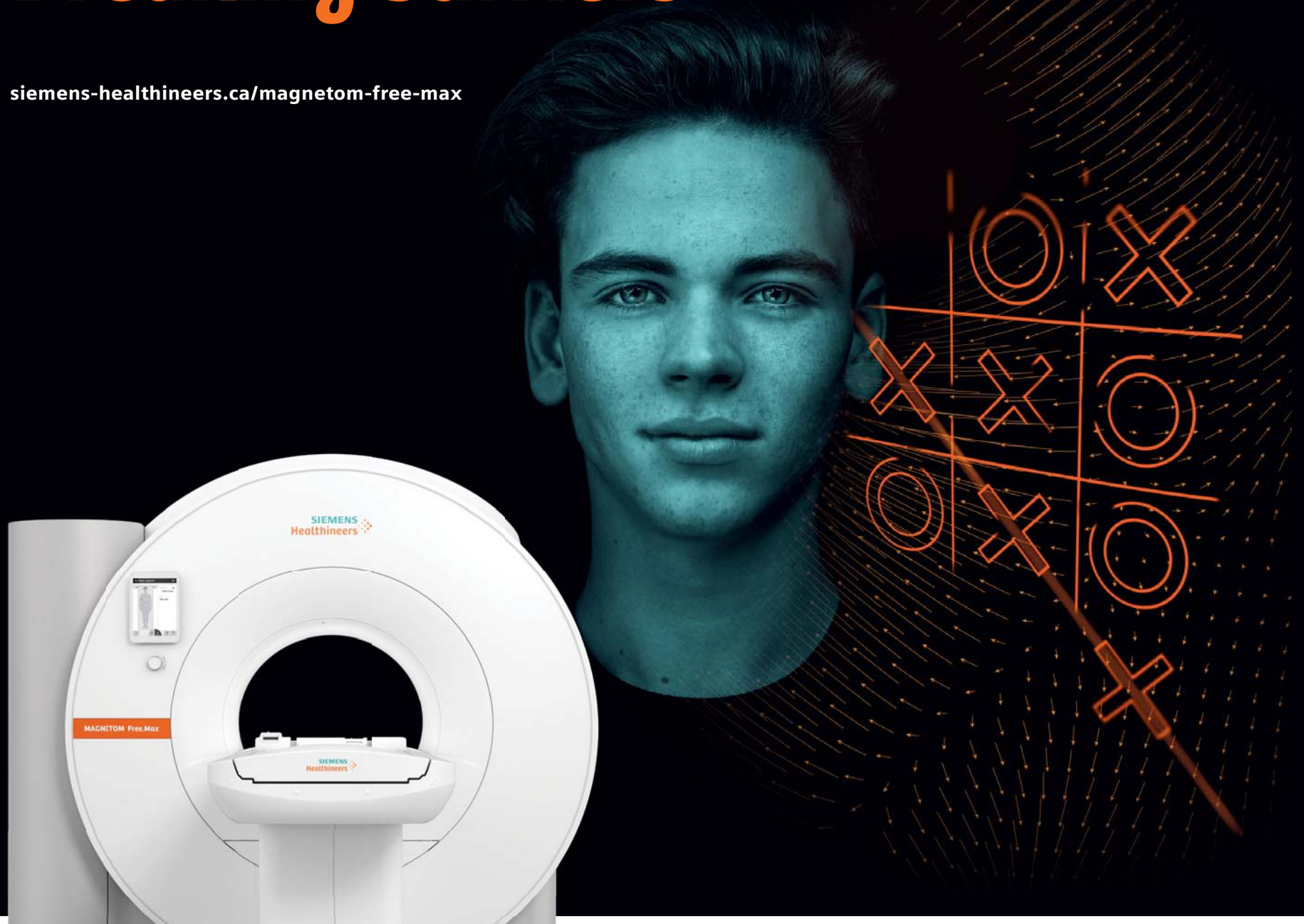

MAGNETOM Free.Max breaks barriers to expand the reach of MRI. Where patients have felt discomfort, the world's first 80 cm bore sets a new paradigm in patient comfort. Where infrastructure was an obstacle to MRI, MAGNETOM Free.Max slots into an existing helium-free infrastructure. Where access to MRI was not viable, MAGNETOM Free.Max makes access affordable. And where conventions have limited our thinking, MAGNETOM Free.Max breaks out of conventions to explore new clinical opportunities in MRI.

Find out more - get in touch with us today: **customeradvocate.ca@siemens-healthineers.com**

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