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INSIDE:

British Columbia has become a Canadian leader with its Hospital at Home project, one of the first in Canada to treat a wide-range of acute-care patients in the comfort of their own homes. There are many advantages, such as taking pressure off traditional hospital facilities. Pictured are Dr. Shauna Tierney, Medical Lead and Dr. Sean Spina, Research Lead and Evaluation Co-Lead. **SEE STORY BELOW.**

PHOTO: ISLAND HEALTH

BC project manages acute-care patients in their own homes

BY JERRY ZEIDENBERG

VICTORIA, BC – British Columbia has rolled out its Hospital at Home pilot in three different communities – two at Island Health and one with Northern Health. The project is already demonstrating that acute-care patients can often be managed as effectively in their own homes as in hospitals.

The project was announced last fall by the BC government with an investment of $42 million. The plan is to test the concept to see if it can be expanded throughout the province as a way of reducing pressure on "brick-and-mortar" hospital facilities.

Under the Hospital at Home program, patients with a variety of ailments such as pneumonia, heart failure, and COPD are managed at home with daily visits from a nurse, physician, and/or clinical pharmacist. They're also outfitted with instruments for taking vital signs and medical equipment for treating their illnesses; the equipment includes oxygen and IV-pump-delivered and balloon-driven medication systems.

Participation in the program is voluntary, and patients are only enrolled if they're keen to try it. Patients are checked into a particular hospital – the Victoria General or Royal Jubilee, both of which are on Vancouver Island, or the University Hospital of Northern

> The program is open to all acute care patients who can be safely cared for in their own dwellings.

British Columbia, in Prince George. They are cared for, however, in their own homes.

Since last fall, clinicians at the Victoria General Hospital and the Royal Jubilee Hospital, each of which has nine "virtual beds", have together cared for over 175 patients.

Each of the nine-bed units is staffed by one physician, three nurses and a clinical pharmacist during the day. Both a nurse and a physician are scheduled to be available to patients at any time of the day or night.

"We're not limited to a certain patient population or disease state," said Dr. Sean Spina, the research leader of the project. "We're open to all patients who can be safely cared for in their homes."

Dr. Spina, PharmD, is also the Coordinator of Clinical Pharmacy Services at Royal Jubilee Hospital.

Quite unusually, and to its credit, the BC Hospital at Home pilot has already achieved a 100 percent approval rating from patients who have received treatment at home through the program.

"100 percent of the patients we've interviewed have told us that if the opportunity to go through the program came up again, they would do it," said Dr. Spina. "They loved the independence of being at home and in their own beds. They also benefited from the help and presence of their loved ones, something

British Columbia pilot project manages patients in their own homes

they don't always have at the hospital, especially during the pandemic."

Each patient is admitted to hospital, but their "beds" remain in their own homes.

Dr. Spina noted that based on early evaluation results, the bed turnover, or length-of-stay, for patients at home is similar to that of hospitals, with an average stay of about five days.

In addition to taking pressure off hospitals, there are other advantages to caring for patients in their own homes.

Of course, during the pandemic, it has promoted infection control for both the patients and hospital staff, as it's important to reduce patient traffic through large institutions.

Even when the pandemic is over, it's believed that home-based care can reduce infection rates, as patients are less exposed to hospital-borne pathogens, such as MRSA and C. difficile.

Moreover, many patients prefer staying in their own homes, when possible, rather than going to a hospital.

Dr. Spina commented that patients in hospital tend to stay in bed and do less each day. In contrast, "At home, people get up in the morning, they get dressed and go on with their day. They're much more mobilized."

That mobility can lead to better mental and physical health, and results in a person who is still productive, even though he or she is technically in a "hospital bed".

The BC Hospital at Home project was launched in conjunction with a public engagement strategy led by Dr. Spina's team. The engagement included interviews with a variety of key stakeholders, a survey open to patients, family caregivers, clinicians, and health system decision makers. It was feedback from the patients who suggested an important component of the technological platform, the "virtual call bell".

"The call bell hadn't been on our radar," said Dr. Spina. "It was only because of patient involvement that we discovered it."

When asked whether they would participate, patients answered that in order to have confidence in the project, and to feel safe while being cared for at home, they'd like to have a device that could alert a clinician if immediate attention was needed.

Dr. Spina explained that this is much like the bedside call-bell that a hospital patient uses to alert a nurse.

The project found a wireless device that can be used at home; when the button is pressed by the patient, a clinician is imme-

> **The BC Hospital at Home pilot has already achieved a 100 percent approval rating from patients receiving treatment.**

diately alerted by an operator and the two parties are connected.

"Now, even if the patient is in the garden or the shower, they can contact someone for help," he said.

Using this system, patient and clinician can be quickly connected by voice. If the patient needs an ambulance, the operator can immediately connect to 911.

The device also has the capability to detect falls, but the teams haven't activated that feature yet.

Since the start of the project last fall, the Hospital at Home program has developed a whole technological platform that is used to connect caregivers and patients.

The backbone is the Vocera network, which provides a secure and private communication system linking clinicians to one another. It can be used by nurses visiting patients at home, where it connects to the cell-phone system. When used in hospital, it connects to the local Wi-Fi network.

The Vocera system can be used by clinicians to send quick messages to each other, or to groups of peers. Each of the participating clinicians is using an iPhone, which has been integrated into the technology platform.

In the home, patients are outfitted with a tablet computer and several devices that are used for taking vital signs, such as blood pressure, heart rate, temperature, blood oxygen levels, and weight.

In many cases, it's the visiting nurse who helps take these measurements and loads them into the tablet, where they can be transmitted back to the central server. Some patients, however, are able to take their own vital signs and send them in.

The program is using video-visits between the patients and care team, and integrated video is part of the IT platform. There are also electronic records for the patients, just as in the hospital.

Dr. Spina noted that the program is still in the early stages, and that its organizers want to refine it further. In particular, they'd like the equipment to become even more "patient friendly", so that it's more intuitive for the patients and nurses to use.

For example, he said, one of the goals is to further integrate the vital signs equipment so that it loads automatically into the tablet computer and into the central server.

The team is also looking into better ways of alerting patients that their doctor, nurse, or pharmacist wants to talk to them by video. This could be done first by a phone call, but Dr. Spina believes there might be more streamlined methods, where a patient sees a flashing red light on the tablet, for example. Just by pushing a button, he or she would then be online with a clinician.

Something being bandied about, as well, is the idea of continuous monitoring of vital signs. A patient might only need to wear a patch or bracelet that automatically takes measurements and feeds them into the system.

Dr. Spina said it would also be useful to know if patients were taking their medications as directed. A device might be introduced that lets clinicians know if daily medications were dispensed.

Overall, however, he asserted that "tech-

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North Montreal deploys SHREWD solution to monitor patient flow

BY NORM TOLLINSKY

One of the five Montreal's integrated university health and social services networks has partnered with VitalHub Corp. to pilot an operational visibility solution that will streamline patient flow across the network's 26 healthcare services.

This network, the Centre intégré universitaire de santé et services sociaux du nord-de-l'île-de-Montreal (CIUSSS-NIM), will be the first integrated health-care network in Canada to deploy the SHREWD Resilience and Action modules from Vital-Hub's recently acquired UK subsidiary, Transforming Systems.

The CIUSSS includes three acute care hospitals, two mental health hospitals and 11 long-term care and rehab institutions, with a total of approximately 3,000 beds. It's also responsible for six primary care centres for a population of 450,000 people and provides home care to 9,000 people every week.

Established in 2015 as a result of a major healthcare reorganization in Quebec, the CIUSSS currently has no network-wide visibility of patient flow and bed occupancy, depriving it of an opportunity to anticipate bottlenecks and make adjustments in a timely manner.

Frédéric Abergel, CEO of the North Island Montreal CIUSSS, had been thinking about the need for an operational visibility solution for several years, but it was COVID-19 that motivated him to take action.

"At the beginning of the pandemic we had major problems managing what was happening in our long-term care institutions," he said. "The COVID-19 virus hit us very hard and we had trouble knowing what was happening with our beds in real-time. The manager of each site knew, but on a CIUSSS level, it was really difficult."

At the same time, Abergel learned that VitalHub had acquired Transforming Systems, whose SHREWD solution is deployed in 30 percent of the National Health Services's Integrated Care Systems in the UK.

"I knew that if there was one healthcare system close to ours in Quebec, it was the UK system," said Abergel.

VitalHub, a Toronto-based software company that focuses on patient flow, with customers in Canada, the UK, the Middle East and Australia, supported a demo and a decision was made to pilot SHREWD.

"We are working in silos now," noted Abergel. "Every hospital has its own visibility, but we want patients to flow through the system. If someone comes to one of our ERs and we have no beds in that hospital, but we have beds in our other two acute care hospitals, we would like to redirect the patient. Today, it's really cumbersome and most of the process is manual."

Abergel also offers the example of an elderly hospital patient who has no social support at home and is about to be discharged. "We know this patient will have to be discharged to a long-term care bed, but right now, it takes many people talking to each other from the hospital and long-term care, back and forth.

"We waste hours, if not days, co-ordinating the transfer of patients. It's the same thing for rehab beds. It takes a long time to have a grasp of everything going on. With SHREWD, we'll know right away if a bed is available."

The SHREWD Resilience module presents users with an overview of patient flow through a pie-shaped, colour-coded graphical user interface conveying capacity utilization for every health service in the network, including ERs, hospitals, long-term care and rehab.

Clicking on a pie segment allows the user to drill down to see the number of patients in an ER and the number of hospital and long-term care beds available. Colour coding from green to amber, red and black based on pre-set user-defined thresholds reveals pressure points and allows healthcare staff to anticipate the impact on other services.

Abergel, for example, notes that "every January in Canada, we have an increase in demand for rehab because seniors fall during the winter. They break their bones, go to surgery and then to rehab. SHREWD will provide exact number of patients requiring rehabilitation, in real-time, giving

Frédéric Abergel, CEO of the North Montreal CIUSSS

us advanced notice of who's coming in," giving CIUSSS staff time to free up the required number of beds.

The SHREWD Action module will go one step further and automate the necessary communication and co-ordination required when a pre-determined threshold is reached.

"Let's say we have 10 patients waiting more than two days for a rehab bed," said Abergel. "Based on that threshold, we could have an alert go out automatically to designated staff to do something to admit those patients without delay so they don't pile up in the hospital.

"This module will allow us to define the rules and actions required. Today, when we get to this threshold, we convene a meeting of 10 or 15 people. They sit around and gather information on occupancy of rehab beds. Then we'll make a decision. We want to automate this process."

He added that, "Every time a patient spends a day in hospital, the patient has more chances of getting an infection. It's also blocking a bed for someone in ER who needs it. There are a lot of impacts of having patients waiting for no reason."

Abergel isn't sold on the need for a single command centre with key staff monitoring network-wide metrics on overhead monitors. In fact, Niels Tofting, VitalHub's executive vice-president of business development and marketing, claims SHREWD is designed to support a decentralized model.

"You don't have to invest in a dedicated space," he said. "SHREWD sources key analytical information from existing databases and brings it together in a way that it can be consumed by front line staff, managers and executives in an organization, so everyone is on the same page with regard to what is happening across the system."

Implementing SHREWD in an integrated healthcare network isn't as difficult as some may think, said Lisa Riley, Vital-Hub's vice-president of strategy.

"People overestimate how much effort it takes to do this. We simply take data from existing systems and bring it into the SHREWD data lake. It's a very straightforward process. In the UK, we've implemented it in as little as four weeks. It doesn't have to be onerous.

"Some people in Canada have said it's too advanced, that they're not ready for it, but it's not advanced at all. It's simple. You don't need to worry about how complex your data is. We simplify it for you."

VitalHub is also talking to potential customers in Ontario and sees opportunity for additional interest in SHREWD given the trend toward integrated healthcare networks across Canada.

First Nations in Saskatchewan using app to improve mental healthcare

BY JERRY ZEIDENBERG

SASKATOON – Several indigenous groups in Saskatchewan are deploying an app that tethers people with mental health and addictions issues to healthcare professionals, so they are in constant communication with a caregiver. In this way, patients are at less risk of self-harm and are connected to resources that can help improve their quality of life.

"First Nations communities are historically and disproportionately affected by trauma, depression, suicide and substance abuse and our families are no longer prepared to wait," said Big River First Nation Chief Jack Rayne in a prepared statement.

"Through this First Nations-owned app, we hope to make a positive and sustainable impact today and for future generations. Our health team felt that distance was sometimes a problem in accessing health support. This app will remove those barriers and fill those gaps."

At a Zoom press conference in May, Chief Rayne announced the partnership with TryCycle Data Systems Inc., of Ottawa, which has developed the app over the past 12 years. In an innovative stroke, the Big River First Nation and several partners are offering the app to their people in both English and Cree.

Additionally, the TryCycle platform is adding the Dene, Soto and Dakota Sioux languages, to increase its ease-of-use for First Nations peoples.

In this way, the solution is a co-development project with a good deal of input from the First Nations of Saskatchewan. "Our own people are helping our own people," said Chief Rayne at the press conference.

The TryCycle app is already being used in 15 First Nations communities to connect patients with caregivers. Other partners include the Federation of Sovereign Indigenous nations (FSIN), the Saskatchewan First Nations Veterans Association (SFNVA) and Indigenous Services Canada.

The partners are financing the project on their own, and they are co-developing the technology and the Cree/English interface with TryCycle. The system will

> **"Our own people are helping our own people," commented Big River First Nation Chief Jack Rayne.**

incorporate traditional medicine and healing practices, along with existing medical services and supports.

By offering the app in Cree and other First Nations languages, the system adds a large measure of cultural sensitivity and privacy. Many of the patients feel more comfortable discussing their issues in

their native languages; doing so also creates a stronger bond with their caregivers.

As FSIN Chief Bobby Cameron explained, "This app … is much needed for our Elders or those who only speak their language. It removes some of the barriers that our First Nations people face when they access the healthcare system."

Grand Chief Steven Ross, of the Saskatchewan First Nations Veterans Association, commented that, "Our veterans are often residential school survivors who are under great stress and in need of crisis intervention."

Additionally, they can be suffering from PTSD, which only adds to their burden. Chief Ross said the TryCycle app will improve the engagement that indigenous vets have with healthcare professionals.

TryCycle is currently being used in five Canadian provinces, three territories and in four U.S. states. It was initially developed to help with the opioid crisis

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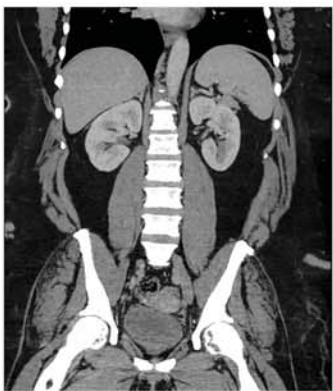
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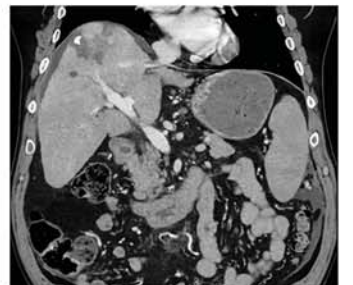
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Tickit Health uses emotional intelligence and trust to uncover problems

BY DIANNE DANIEL

What started as a passion project to create a safe space for youth to share sensitive information has led to an incredible journey for former ER physician and specialist in adolescent medicine Dr. Sandy Whitehouse. Now, nine years after launching her Vancouver-based startup – Tickit Health Ltd. – to advance the idea of using digital empathy to collect personal data, she's on a mission to take the technology mainstream.

"Collecting information is often at the front door of any organization," said Dr. Whitehouse, Tickit Health founder and chief medical officer. "What I would like to see is that people feel safe and comfortable interacting with organizations because their digital front door is welcoming."

The idea was born from Dr. Whitehouse's clinical experience. Often working in chaotic scenarios where decisions were made quickly based on the information at hand, she realized she was missing out on critical, sensitive data that had a direct impact on care.

What sets Tickit Health's data collection platform apart from other online assessment or survey tools is its ability to recognize and overcome communication barriers related to literacy or cultural and socioeconomic differences.

Four pillars of empathy – trust, confidence, empowerment and engagement – are embedded in every solution the company builds, regardless of the population being surveyed.

The goal is to close critical communication gaps in healthcare, particularly when it comes to questions about gender, racial inequality, social determinants of health and mental health.

Gaining truthful answers about delicate issues – such as drug use, sexuality, poverty and other concerns can sometimes be difficult to achieve. For its part, Tickit Health has found ways to do this, by gaining the trust of patients.

"It's important to think of people's contextual environment, either the way you're asking the questions, why you're asking them or how you're going to be using the information," she explained, noting that the company's digital empathy framework can be applied wherever healthcare intersects with community care, including social services and schools.

"People are sharing this personal information with you, and you need to think about what you can give back to them for the privilege of receiving it," she added. The greatest benefit, of course, is that clinicians can discreetly help solve the patient's problems, once they discover if there are emotional or physical issues that are troubling a person.

Tickit Health prides itself on a system that is more efficient in collecting information than general survey solutions and has demonstrated far better results in collecting critical data – out-performing others both in terms of quantity and quality of the information obtained.

The platform is built to gold standard encryption and security protocols and complies with leading privacy standards, including SOC2, HIPAA in the U.S. and PIPEDA in Canada. It also includes application programming interfaces (APIs) so that any data collected can be exported to other systems, such as electronic medical records, customer relationship management systems or learning management systems. At-a-glance analytics are provided through a dashboard interface.

The company's early success working with Boston Children's Hospital and Seattle Children's Hospital to develop youth risk assessment tools has led to steady growth.

Today, Tickit Health has 15 full-time employees and is partnering with more than 500 organizations in Ontario, B.C., the U.S. and Australia, helping them to improve workflow and data collection efficiency, increase response rates, improve data accuracy and reduce the risk of missing critical data.

King County, Washington, partnered with Tickit Health and Seattle Children's Research Institute in 2018 to launch a universal digital screening program in 50 middle schools. Referred to as the School-Based Screening, Brief Intervention and Referral To Services (SBIRT) program, it not only uses validated tools to detect symptoms of at-risk behaviours, but also includes carefully crafted indicators such as, "At school there is an adult who really cares about me," or "Others have said that I am good at …" to gather information about more protective factors such as strength and resiliency.

Other systems didn't have the same level of sensitivity or specificity as Tickit Health. "We looked at all of the validated screening tools, and they all looked for problems. Our kids are not just a set of problems and symptoms," said King County school-based SBIRT program manager Margaret Soukup, noting that Tickit Health enables the screening "to have a deeper reach."

The screening is presented as a health and wellness initiative and it's up to each school to select at which grade to administer it, ranging from grade 6 to grade 8. More than 8,000 students participated in the program in its second year and the county is on track to reach 5,000 students this year, despite the fact that most schools transitioned to online learning during the pandemic.

Using Tickit's dashboard, school counsellors monitor student responses in real time. A green flag means no intervention is required, a yellow flag indicates the need for a brief intervention of a non-urgent nature, and a red flag alerts to concerns that must be addressed immediately

> **Four pillars of empathy – trust, confidence, empowerment and engagement – are embedded in every solution the company builds.**

or within 24 hours. According to data from the 2019-20 school year, nearly half of participating students received brief intervention, and 15 percent were referred to services.

"This is the beautiful part of Tickit," said Soukup. "The students are taking the screener and in real time, the counsellors see the results at the backend … so they can triage and be really efficient."

Since introducing the program, counsellors have uncovered a vulnerable group who would normally be extremely difficult to identify: internalizers, those students who appear to be doing great on the surface but are actually harbouring unsafe thoughts.

"Counsellors are just unbelievably grateful for the screener because for whatever reason, some of these students will really say what's going on," said Soukup.

Bayshore Specialty Rx of Mississauga, Ont., is another Tickit Health user getting to know its customer base better. As the preferred pharmacy for the Manulife Specialty Drug Care Program, Bayshore needed a more efficient way to identify and monitor the health concerns and progress towards health goals of its patients.

Prior to implementing Tickit Health, information was primarily gathered over the phone as part of a regular check-in by nurses, and even though the intent was to revisit patients at six months, follow-up surveys were easily missed.

"It was very difficult for me to demonstrate that we actually did have an impact on health outcomes," said Vincent Ng, director of the Manulife Specialty Drug Care Program at Bayshore.

Working with Tickit Health, Bayshore created a digital health assessment survey that is sent to patients prior to their first phone call with a nurse, prompting them to answer questions about their condition and overall wellbeing.

"This enables our nurses to have a more productive conversation with the patient," said Ng. "Instead of spending 15 minutes going through the mechanics of filling out a survey, they spend that time talking about the implications of responses to the survey. It's a better use of their time."

Online responses are integrated directly into Bayshore's customer relationship management system, and follow-up surveys are automatically triggered six months later.

When he noticed that patients were dropping off at one point during the survey, Ng worked with the Tickit Health team to tweak the look and feel of the online survey so that it would encourage them to finish. The end result is better data, which in turn enables Ng and his team of data analysts to run detailed reports on patient outcomes.

"We're a team of nurses, pharmacists and clinical people, so being able to make a difference is meaningful to us," said Ng. "To have a tool that helps us to provide hard numbers – these are the facts, we are making a difference – really helps us as a team in terms of morale and being energetic about work."

Though she didn't imagine her idea would carry her this far, Dr. Whitehouse continues to be inspired by how people are choosing to apply the digital empathy framework, including the company's recent work with indigenous groups.

"Over the past 10 years our world thinking about historically under-served populations is evolving and changing, particularly around gender, inequities with BIPOC populations, with social determinants of health and also the huge recognition of the impact of mental health," she said. "The concept and issues around stigma, and discomfort around sharing sensitive information has been a real issue, and people are starting to realize how important it is to uncover it."

"Connexall's portering solution has not only decreased our turnaround time, it has created a new standard of excellence and changed the culture of our hospital."

- Markham Stouffville Hospital

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Hospital harnesses Connexall's solutions to re-imagine healthcare delivery

BY ROSALIND STEFANAC

Markham Stouffville Hospital (MSH) is showing that community hospitals can be as innovative as their larger peers when it comes to deploying electronic solutions. Its 'smart hospital' strategy, launched five years ago, demonstrates that investments in digital technologies lead to faster, more effective care and higher levels of patient satisfaction.

MSH provides care at three locations for over 435,000 patients each year. It has 526 physicians and 2,400 staff, and it is located in a fast-growing part of Ontario, just northeast of Toronto.

When the MSH team first started exploring technology opportunities, the hospital had just completed an expansion of its clinical in-patient units, recalls Elena Pacheco, Vice-President of Planning and Transformation at MSH.

"Our vision really came to life when we started doing rounds on the clinical units and hearing how much further nurses had to walk, and how they felt disconnected from some of the patients due to the larger footprint," she said. "We knew if we could connect them to a mobile device where they could check in with their patients, and get alerts, rather than going to a central station, it would be a win-win for patients and staff." This required a solution that would not only be mobile enabled but would also have extensive integrations across many hospital systems.

In 2016 MSH launched its Office of Innovation to build on these kinds of ideas and partnered with clinical communications solution provider Connexall to help put them into practice.

Connexall's end-to-end integration and communication platform, and its suite of digital transformation solutions, help hospitals around the world to improve quality of care, patient experience, and staff satisfaction. With a successful history of innovation, Connexall works closely with its enterprise customers to deliver the promise of a truly Connected Hospital.

"Connexall is helping us to optimize clinical feedback and improve our patient experience through system integration," said Ashif Kassam, the hospital's Senior Consultant, Transformation PMO. With the ability to transmit patient and resource information from a range of systems, old and new, to handheld devices, MSH staff and clinicians can acquire key and critical data while on the go.

Connecting nurses across the board: Kassam said that providing mobile tools to nurses on the floor, for example, enhances overall collaboration as it allows them to easily connect with patients, colleagues, other units in the hospital, along with clinical specialists and porters as needed (porters use the solution to speed up transport and improve patient flow). "If there is a lab result for a patient ready from another unit, that call can go directly to the attending nurse," he said. "Or calls from family members of admitted patients can be forwarded to the nurse to provide a quick update."

The fact that patients' requests go directly to the nurses caring for them also means less disruption via overhead paging
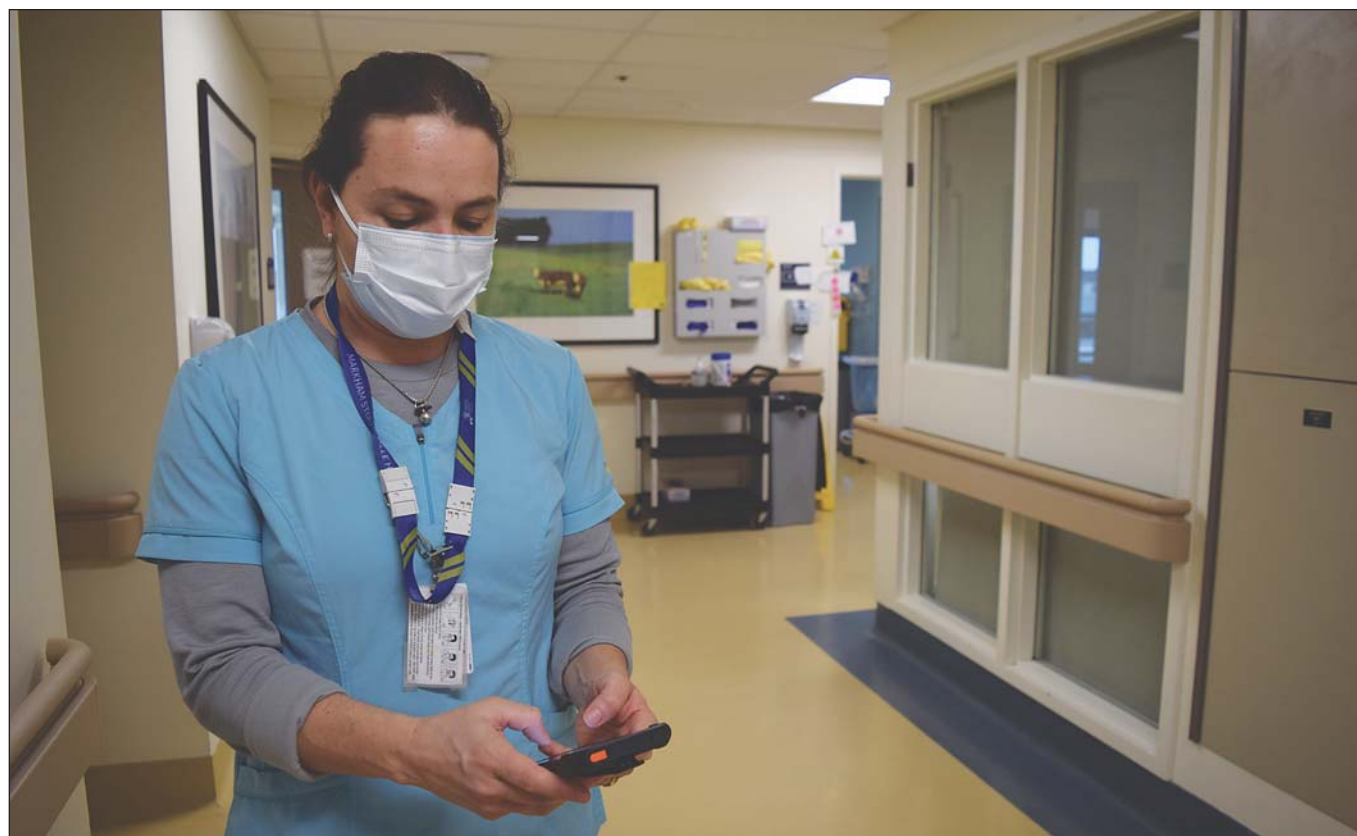
systems and faster response times. During the pilot period, Kassam said analysis showed a 45 percent reduction in response times. "Recent findings are also starting to show a trend down for [patient] falls on the units, which can be presumed to be due to quicker response times to patient needs and requests," he added.

"It's no longer about hovering over the nursing station as the busiest place in the hospital," said Yihan Zhang, Director of Solutions Innovation, Workflow and Design at Connexall.

"Everyone is mobile, and we're providing mobile devices and applications so they can receive requests from patients directly to their phones and communicate with other clinicians."

MSH's use of mobile registration is another example of 'smart' technology that is improving hospital processes, allowing patients to pre-register for hospital appointments from the comfort of home. "It's like an airline check-in where they come in and can go straight to their location," said Kassam. Not only has digitizing this process helped to reduce no-show rates for hospital visits, but it has eliminated the time needed to register in-person with a hospital clerk.

Real-time applications coming to MSH include the ability to silence alarm notifications from a patient monitor if a nurse is already in the room to minimize disruptions. As part of its Connected Hospital portfolio, Connexall has deployed this patented solution to hospitals. This has helped their clients reduce over 50 percent of secondary alarms to clinicians' devices, contributing to decreased alarm fatigue on staff and improved patient care.

Other projects include wireless bed-exit alerts and Code Blue notifications, along with mobile telemetry, including cardiac patient monitors.

Enhancing healthcare for the long-term: In looking at what's ahead for MSH, Chief Technology and Privacy Officer Michael

Cole points to the fact that theirs is a long-term strategy that will ultimately enable a continuum of care across the hospital's two sites and within the Eastern York Region North Durham Ontario Health Team.

"I think it's about finding a balance in your investments, both from a capital and operating perspective, to not only meet hospital needs but to put an emphasis on the patient," he said. "It should be a seamless experience all the way through from primary care to hospital discharge."

He said it's also important to recognize that when it comes to technology, what may be a gold standard today quickly be-

> **Providing mobile tools to nurses on the floor is enhancing overall collaboration, allowing them to easily connect with colleagues.**

comes just the standard, so ongoing innovation is key.

"We've built a team where we're ready to provide front-line care with tools and services required, but also have the ability to innovate, to be able to grow and find those successes," Cole said.

To that end, Connexall's Senior Vice-President of Innovation, Analytics and CIO, Sandy Saggar, said MSH is "doing the right thing" in implementing end-to-end connected digital solutions in the hospital that will take them into the future. Connexall's open vendor-neutral platform allows for hospital systems to gain immediate value today and in the future as they continue to evolve their clinical and technology-related systems and priorities.

"Our Connected Hospital strategy takes a holistic approach to advancing our customers' digital transformation roadmap. When you start to look at an organization's overall workflows and enabling systems and marry that with the Connexall solu-

tion suite, you can enable new and innovative practices" said Saggar, who was previously CIO at Halton Healthcare, a technologically advanced organization with three hospitals located west of Toronto. "They have the foundational pieces already in place that they can keep building upon."

He said MSH has another advantage in being an enterprise partner with Connexall, which gives them full access to the library of Connected Hospital solutions and integrations with nurse call systems, biomedical equipment, EMRs, RTLS systems, building, security systems and more. "This enables MSH to innovate more effectively, improving safety, quality, and staff and patient experiences," said Saggar.

Cole points to the fact that in the aftermath of pandemic living, patients want innovation now more than ever – whether that means more virtual care from home or more efficient in-hospital visits.

In fact, he said 30 percent of all out-patient hospital visits at MSH between March 2020 and March 2021 happened virtually. "There was previously the idea that aging communities don't want new tools and services."

Now, Cole noted, it has become an expectation that all demographics want these innovative and remote services. "If we don't meet that expectation, we're failing," he said. "Using technology, we can make people's lives easier."

"We are giving people options to interact with the hospital and their care in a way that they're satisfied with," added Kassam. "I think that technology will touch them in different ways as we evolve our smart hospital care."

According to Saggar and Zhang, Connexall understands that patients are looking for more innovation to support their healthcare needs. Saggar said, "Our solutions roadmap and collaboration with customers is where we will continue to bring innovation to the frontline of patient care."

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CABHI Summit 2021 highlights innovations for seniors, collaboration

BY NEIL ZEIDENBERG

The Centre for Aging + Brain Health Innovation (CABHI), powered by Baycrest, held its 3rd annual summit over two days in late March, focusing on the business of aging well and launching a global innovation platform for older adults, called Leap. Using Leap (https://www.cabhi.com/leap/) seniors can connect with developers, offer ideas, and test and co-develop new technologies.

The virtual CABHI conference brought together 800 attendees from around the globe – plus 90 speakers, 85 exhibitors and over 11 hours of dedicated programming – to learn, network and exchange ideas.

Speaking at the keynote session, author and Globe and Mail journalist, Andre Picard, discussed his new book, Neglected No More, a look at how seniors in long-term care have been forgotten, and offered potential solutions to the problem.

Picard stressed that Canada's nursing home population has been the hardest hit demographic in this pandemic. In fact, COVID has killed more than 15,000 seniors in Canada's long-term care centres. "They're seen as collateral damage," said Picard, and the way in which long-term care has responded to the pandemic "was predictable."

Picard believes long-term care centres are "like cruise ships on land" – ideal for the spread of disease. He also believes it will take time, attention and innovation to fix the problem.

Picard's recommendations include natural housing communities (NORCs) and community-based programs. Investment in elder care, he says, should be more about keeping people at home. "Make LTC the last resort and make care homes more like home."

He added, we should allow seniors in care facilities to interact with others by giving them safe access to the outdoors, so "they can live their best lives." Moreover, care must also be affordable, accessible and done in an equitable manner.

This year's CABHI event includes two pitch competitions with a total of $1.5 million in prizes. The combined pitch competition was made possible by an unprecedented collaborative partnership funded by CABHI, the Ontario Brain Institute (OBI) and Innovacorp, with lead sponsorship from the event's presenting sponsor, SOMPO Digital Lab Inc.

For its part, the Ontario Brain Institute through the ONtrepreneurs program, has helped bring over 20 products to market in the past 10 years.

Linggo (lingo.com), an application that helps individuals who are unable to speak, due to stroke or Alzheimer's, find their voice again – was selected winner of this year's People's Choice award.

Of the 10 companies competing in the ONtrepreneurs pitch competition, five winners were selected. They are:
• VRapeutic
• MINT Memory Clinic
• HelpWear
• Axonaly
• Xpan

Companies selected to the ONtrepreneurs program are provided with cash and in-kind prizes, training, an 11-month mentorship and other value-added opportunities as part of a network.

In the MC² Capital pitch competition, two companies tied for People's Choice: Steadiwear and Welbi.

• Steadiwear has developed a glove (Steadi-one), that when worn, can reduce

the tremors of Parkinson's patients, improving their quality of life allowing them to get back to doing things most of us take for granted.

• Welbi helps recreation teams in LTC homes build and deliver resident-tailored programs. It has shown to lower administrative tasks by 40 percent, leaving staff with more time to spend with residents.

Of the 20 companies competing in the MC² Capital pitch competition, 10 were selected as semi-finalists and advanced to the next phase of the program. If selected in the next round, they will join the MC² program later this spring. Semi-finalists are: ABLE Innovations; DAXsonics; GeneYouIn; Linggo; ManagingLife; NERv; NeuroCatch; Neurovine; Steadiwear; and Welbi.

Of the 85 companies exhibiting at this year's CABHI conference, there were some very interesting technologies on display, including:

• SingFit – helps patients with auditory challenges regain their speech back using a lyric coach, enabling patients to participate even if they have Parkinson's or other conditions that make it difficult to speak.

• MoviWear – remote vital signs monitoring to patients in their homes.

• Mindful Garden – an anxiety treatment solution that helps keep patients calm in stressful situations.

• Obie (Obieforseniors.com) – helps residents in decline to engage by getting them to interact. Using a virtual surface, it senses motion and gets people moving their hands and feet and communicating.

• Axonaly – a wearable anxiety management solution to help improve one's mental health. Symptom tracking capability detects anxiety and recommends treatment options via a timely alert.

Other innovations in the works from MC² competition include: Awake Labs, which developed a behaviour management solution by way of a smartphone app. It has been shown to improve emotions, lower agitation and lower staff injuries thereby keeping staff safe at work.

• GeneYouIn has developed Pillcheck software that uses a person's own genetics to determine if a medication will help a patient. This eliminates potential harm and unnecessary cost of the drug.

• NERv Technology, a post-op tool that helps identify leaks in bowel surgery; it lessens post-op injuries and complications.

With the population of older adults (65+) expected to make up a whopping 23-percent of all Canadians by 2030, demand for LTC is expected to increase significantly. The good news is between all the interesting technology supported by CABHI, solutions to many continuing-care problems are on the horizon.

Bots can help doctors improve clinic efficiency and reduce staff burnout

BY NEIL ZEIDENBERG

The drive towards "paperless" medical offices is a useful development, but it has some negative aspects, too. Going digital can help improve practice efficiency, but it can also lead to information overload, an increased load of mundane work at the keyboard, and high rates of staff burnout.

To combat these problems, clinicians are starting to make use of digital assistants or "bots." These invisible assistants work faster and far more efficiently than their human counterparts.

According to the eHealth Centre of Excellence, based in Kitchener, Ontario, digital assistants can work up to six times faster than people conducting manual labour and they can eliminate the duplication that often occurs when people are inputting data.

They can also generate reminders, alerting clinicians about patients who are overdue for a visit, need tests and screening.

"Some of the biggest challenges doctors face is in identifying patients with specific conditions, such as chronic kidney disease, congestive heart failure and diabetes," said Dr. Mohamed Alarakhia, managing director, eHealth Centre of Excellence. "Trying to identify all of these patients, standardize the data and then add coding to the record is very challenging and time consuming."

Dr. Alarakhia noted, "Another challenge is having smart reminders and tracking of lab tests ordered. 'Did I order the tests at the right frequency, and where are all the results?' Bots can more easily complete these tasks and can close loops, thereby improving clinic efficiency."

The eHealth Centre of Excellence is a not-for-profit organization run by approximately 50 staff, including clinical advisors. They have a central aim of supporting primary care practices with the sustainable adoption of digital health solutions that can enhance the quality and efficiency of patient care delivery.

Currently, the centre is at the forefront of medical bot development for the primary care sector in Canada.

"While we are in the early days of deployment and have seven clinics using our bundle of virtual assistants in multiple ways, interest is growing fast, and we expect adoption rates to increase considerably in the coming months," said Michelle Cousins, program manager at the eHealth Centre of Excellence.

Dr. Alarakhia and his team at the eHealth Centre of Excellence have been developing, testing and using the automated solutions – known as bots – to

> **Bots can code different conditions, share information with staff, and automate many rote functions.**

complete specific tasks. They've named them Cody, Sharon and Bernie.

• Cody "codes" conditions. He locates specific patient conditions and then codes them into the patient record. He cleans up and standardizes patient data helping users to manage patients with one or more conditions.

• Sharon "shares" information. She enables seamless sharing of care plans between EMRs and ensures everyone in a patient's integrated care team (Ontario Health Team) can access the

same information in real-time.

• Bernie "burns out" so staff don't have to. He automates tasks, actions and reminders. He also manages tracking and follow-up of patient tests. Bernie searches through data to improve patient outcomes and identify missed billing opportunities.

Bots can go beyond improving data quality. As one example, bots may also be helpful in cases where there's a language barrier. They can be designed to communicate with users or patients who speak French, Spanish, Italian, Farsi, and other languages. They can also support communication tasks and collect information in a standard way.

At the eHealth Centre of Excellence, team members are busy developing the bots, testing them to see how well they work, and if they're safe and secure to use.

Of course, bots don't work for everything, but they're certainly great for routine tasks. People will love using them because bots can do in seconds what it would take individuals minutes or hours to complete. "Their use has broken down barriers – it's really a game-changer," said Dr. Alarakhia.

Connected Health for Remote Patient Monitoring

For critically or chronically ill patients, daily remote monitoring can mean the difference between healthy at-home recovery or hospital re-admission.

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- Be automatically notified should symptoms change
- Schedule a telehealth video conference
- Trigger pre-approved 'action plans' to help patients and families proactively respond to changes in condition

*Cloud DX Connected Health is Health Canada licensed and FDA cleared.

> "*Remote automated monitoring of vital signs after discharge - post surgery - is the way of the future. This technology gives health care providers the ability to detect early signs of complications and optimize medical management, offering the potential to keep patients out of the hospital and in the process facilitate more elective and urgent surgeries and reduce the spread of COVID-19.*"
>
> *- **Dr. PJ Devereaux,** Professor, Director, Division of Cardiology and Scientific Leader of the Anesthesiology, Perioperative Medicine and Surgical Research Group at PHRI, McMaster Health Sciences.*

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CLOUD DX

SOPHIE gives life science start-ups access to expertise and funds

BY ANDREA JOHNSON

HAMILTON, ONT. – A recent federal investment in a Hamilton-based, life science cluster has increased access to expertise and funds for innovative healthcare technology companies – like VoxNeuro.

When VoxNeuro, the creator of a neurotechnology that helps doctors test cognitive functions and performance, was looking for investment from groups and individuals who are focused on life science, they reached out to the Synapse Life Science Consortium.

Synapse is a life science cluster that was launched by Hamilton's regional innovation centre, the Innovation Factory, along with the City of Hamilton, McMaster Innovation Park, Bay Area Health Trust, Hamilton Health Sciences, St. Joseph's Healthcare, McMaster University, and Mohawk College.

"Synapse was ready to make the introductions to help us build our network of investors," said Kimberly Elliott, VoxNeuro's chief operating officer. "Especially in healthcare, investors who are focused on driving positive social impact through technology are a great fit."

Access to specialized expertise and support can make or break a life science company. That's why a recent federal investment in Synapse – one that unlocks millions of dollars of funding for healthcare innovation for 40 Canadian companies – is welcome news for start-ups and scale-ups.

In March, FedDev Ontario announced the launch of SOPHIE, the Southern Ontario Pharmaceutical and Healthcare Innovation Ecosystem. The $6 million investment in Innovation Factory will allow Synapse to significantly increase its programming and ensure faster access to clin-

Alex Muggah of Synapse, and the Innovation Factory's David Carter are leading the SOPHIE ecosystem.

ical and technical support for eligible life science and health tech companies.

For David Carter, executive director of Innovation Factory, the establishment of SOPHIE is about supporting healthcare innovation with a focus on community. This can be done by increasing access to expertise and preventing companies from getting stuck behind red tape.

"Hamilton is home to world-class research institutions such as McMaster University, Hamilton Health Sciences, Mohawk College, and St. Joseph's Healthcare. We have over 120 research institutes," said Carter. "We have these great assets in our city that can now be used in a coordinated and consistent manner through SOPHIE.

"And it's not just about clinical research. Yes, we have an extensive hospital network for clinical research, but there is also support for technology development, for additive manufacturing. It's a powerful combination for companies to build, vali-

date and test products that not only survive but also thrive in the system."

SOPHIE offers a unique model for the future of healthcare innovation, with a multi-faceted approach to supporting companies.

The majority of the funding has been earmarked to help companies scale up with R&D support: $4.5 million will be available for companies that want to leverage their R&D budget to work with one of the research institutions affiliated with the consortium.

The remaining funds will be used to help support start-ups through the Synapse Life Science Competition and to run consortium programming and network events.

The targeted distribution of the funds was by design, according to Alex Muggah, director of Synapse. Access to research expertise to build and refine prototypes and projects has been a key pain point for companies since the launch of Synapse in 2016.

"The challenge that we have is that our anchor research institutions – St. Joe's, HHS, Mohawk, and McMaster – all lack dedicated funding instruments to be able to support innovative projects," explained Muggah.

"And the companies who want to work with them oftentimes don't have all the necessary funding to be able to support these projects themselves and move quickly to commercialize their idea," he added.

"With SOPHIE, a key benefit that we will be able to decrease the amount of time it takes for an innovative idea to emerge from the lab or someone's garage and get to market. Already 10 companies have signed up to partner with SOPHIE."

Doug Ward, general manager at Mohawk College's mHealth & eHealth Development and Innovation Centre (MEDIC), sees the launch of SOPHIE as welcome news for digital health companies looking to commercialize quickly. MEDIC has been working with companies for over a decade and is one of the research labs that companies can work with through SOPHIE.

"While government R&D funding is a welcome source of support, the funds are often tied to specific due dates or deadlines – if you miss one deadline, you have to wait another few months or even a year," said Ward.

"Companies work fast and SOPHIE helps us to respond to their needs quickly and accelerate their development. This can result in a big step forward for a company's product. We can make real change happen rapidly."

Plus, Ward said, the program delivers significant value to the private sector: "The funding advantage from this program is massive. Who wouldn't want to invest $1 and get $6 back?"

The launch of the SOPHIE comes as no

Semantic Health uses machine learning to perform more accurate coding

BY JERRY ZEIDENBERG

TORONTO – The Hospital for Sick Children (SickKids) recently conducted pilot tests of AI-based software for medical coding and auditing that allowed it to complete a year-end audit of complex patients three times faster than before. "It also saved us from hiring four part-time auditors," said Sandro Serino, the hospital's director of enterprise information management, who discussed the project during a webinar in April.

The software was developed by Toronto-based start-up Semantic Health (semantichealth.ai), which now has additional tests and deployments of the software underway at several other Ontario hospitals.

The auditing project at SickKids was a quick, four-week demonstration project, but showed improvements in several areas, including accuracy of coding and efficiency gains, and well as the speed of the audit. Using two years of clinical notes for complex patients, the system

demonstrated a 5 percent improvement in accuracy of coding and a 25 percent efficiency gain.

As Serino noted, "currently, coding is manual, expensive and error-prone." The goal of the pilot projects was to investigate how coding and auditing processes could be improved.

He also commented on the challenges, especially at SickKids, which cares for a wide range of patients. "At SickKids, we have many long-stay patients with large sets of records. One patient, for example, could have 3,000 records, and it could take as long as one to two business days to go through them."

As the process in the past has been largely manual, errors and omissions are sometimes made. Using the AI-based system, however, accuracy improved. "The audit and data quality were improved, and we found 200 additional HIGs," he said, referring to medical indicators. "These were missed in the original audits."

After demonstrating the ability of the technology in streamlining audits, Semantic Health and SickKids completed a sec-

ond pilot study around medical coding.

Dr. Karim Jessa, chief medical information officer at SickKids, observed that medical coding is a challenging area for hospitals. The first priority of medical teams is to care for patients in a timely fashion; queries or questions on coding sometimes take a backseat to the urgency of the medical mission. "It can be

> **A demonstration project at SickKids showed improvements in medical coding and auditing.**

two, three, even six months before the coding is done," he said.

If clarification on the procedures is done months later, the memories of physicians might be hazy.

One major benefit of the Semantic Health software is that coding can take place more quickly after the event, and coding and auditing – verification of the data – can occur simultaneously.

Dr. Nicola Sahar, a physician and co-founder of Semantic Health, observed that a great amount of data is generated about patients during their hospital stays, but the overwhelming majority of it is unstructured information.

As well, he said, "there's no one structured way to document, and one physician will document in a different way than another."

However, Semantic Health's software engine will look at the patient documentation, diagnosis and procedures to make sure that evidence exists for the correct coding and that nothing has been missed.

In this way, the software can help hospitals with more accurate reporting and reimbursement.

It does it faster than most Canadian hospitals, he said. In fact, Dr. Sahar said that most hospitals perform 80 percent of their coding and auditing after the patient has been discharged. In contrast, using Semantic, 80 percent of the work is done before discharge.

"It's Canada's first concurrent system

Stronger Together platform supports COVID survivors and long-haulers

BY ELLYN WINTERS-ROBINSON

One in three patients who contract COVID-19 can go on to develop persistent symptoms, with studies citing up to 100 sometimes baffling symptoms, including heart, lung and cognitive issues, as well as debilitating fatigue and pain.

These individuals are called COVID long-haulers, and based on these recent statistics, more than 200,000 Canadians are affected, with many continuing to experience effects nearly a year after contracting the virus.

Two Canadian healthtech companies – Curatio and Cloud DX – have joined forces to bring much needed peer support and answers to COVID long-haulers in this country.

The Stronger Together mobile app is bringing COVID-19 survivors and long-haulers and clinicians together in an online environment where they can learn from each other and share knowledge. Currently, over 400 people in Canada with continuing COVID-19 symptoms, and more than 10 clinicians, are using and managing the Stronger Together platform.

Dr. Sonny Kohli, a practicing critical care physician at Oakville Trafalgar Memorial Hospital and chief medical officer for Cloud DX is contributing much-needed medical insights to the app's growing community of users.

"The ability to connect with someone who is experiencing similar symptoms is very validating. People realize they're not crazy and not alone. Other people are having the same symptoms," says Dr. Kohli.

Stronger Together is helping to provide the support people need after they leave the doctor's office, and the information it provides is medically vetted by physicians like Dr. Kohli – unlike the internet which can be filled with misinformation.

CEO of Curatio, Lynda Ganzert, says Stronger Together provides the COVID-19 survivors and long-haulers community a secure and private online environment to connect with other survivors and access curated information from experts, evidence-based programs, coaching, virtual visits and daily tracking and monitoring tools.

"The programs in Stronger Together are designed specifically to help increase health literacy and empower patients in their own care, especially during a time when clinical access has been minimized. The peer-to-peer component of the program has contributed greatly to supporting the mental health of users; people can find groups, one-on-one chats, coaching and events related to their diagnosis. They can also make their own private circle and curate who might be part of that circle, for instance friends, family members or caregivers."

For his part, as a critical care physician, Dr. Kohli sees first-hand the most severe health effects caused by the virus. He also ac-

knowledges that for COVID long-haulers, the journey to full recovery is difficult.

"More and more people are coming out and expressing symptoms that are unusual. Doctors are still trying to understand," he commented.

Select patients in the Stronger Together program are equipped with Cloud DX's remote patient monitoring solution called Connected Health Kit, allowing them to self-monitor their critical vitals from home.

For the patient, the Cloud DX Connected Health app makes it easy to navigate Remote Patient Monitoring. "Often the care provider will create a schedule for taking vital sign readings, answering surveys, taking medication or having a video visit with a clinician," said Robert Kaul, president of Cloud DX. "Connected Health re-

minds the patient when they have an action scheduled with both visual and optional auditory reminders. For older users, our adherence support feature notifies the care team, Cloud DX Support and even family members (with patient consent) if an expected action is missed and follow up will then occur to make sure all is well."

Kaul added that Connected Health by Cloud DX is designed with pre-programmed tablet computers, already-paired Bluetooth medical devices and built-in internet connectivity so that the system "just works" right out of the box.

As a result, Cloud DX routinely enjoys

very high patient satisfaction and recommendation scores of 90 percent or more.

Ruth Castellanos is one COVID long-hauler who has benefitted from the Stronger Together COVID long-haul peer-to-peer program and the Connected Health Kit. After contracting COVID a year ago she has continued to struggle with a myriad of symptoms.

Says Ruth, "The Cloud DX Connected Health Kit has really changed my life. I needed to keep track of my health as this long haul of COVID is challenging to manage. I wanted to make sure that the readings I gave to my doctors are proper and accurate. Taking my vitals and tracking my health data on the tablet were easy to do, and I could convey all the information to my doctors while speaking with

them on the phone. I was impressed by the devices in the kit – they are reliable and straightforward to use. The Cloud DX support team has always been very caring and genuinely happy to be there for me. They always asked if there was anything else they could help with, which meant a lot to me and made me feel supported."

Presented with a complete history of her vitals collected using the Cloud DX kit, Ruth's specialist was able to see patterns and properly diagnose her, so she is receiving proper treatment.

The Stronger Together project was initiated in June 2020 with funding from the Digital Technology Supercluster (DTS), based in Vancouver. There was a tremendous response to the Supercluster's COVID-19 program, and following a rigorous and competitive selection process, Cloud DX was selected to be one of the companies leading the project.
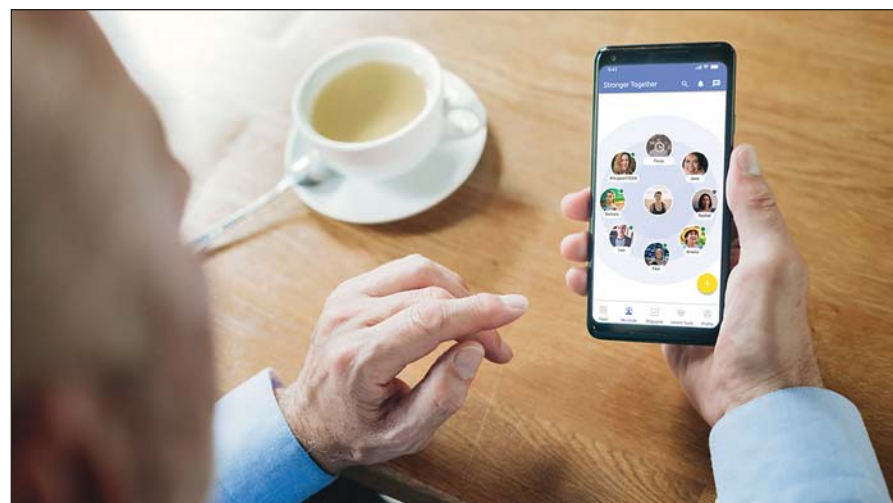
Extending the network of support beyond the long-hauler community to those still combating the virus is also part of the mission. Together with fellow Canadian healthtech company Maple, Curatio and Cloud DX recently launched the Virtual COVID-19 Outpatient Program (VCOP).

It offers healthcare providers across Canada a new, integrated COVID-19 virtual care program that includes key vital signs monitoring via Cloud DX's Connected Health Kit, clinical oversight from Canadian-licensed physicians on the Maple virtual care platform, and coaching and support through Curatio's Stronger Together app.

"COVID-19 is a completely new territory within the healthcare space, meaning patient and survivor resources are still extremely limited. And we all acknowledge that Canadian healthcare providers are strained to the max supporting the urgent and ongoing needs of these patients," says Curatio's Lynda Ganzert. "It was important to all of us to do our part to make a difference during this healthcare crisis and get people the support they need."

The Stronger Together app is (available on iOS and Android)

Ellyn Winters-Robinson is a lover of words and the President and Chief Marketing Officer of Ignition Communications. www.ignition.ca

Tiny, magnetic tools could improve minimally invasive neurosurgery

TORONTO – A research team is working to develop micro-robots with unique dexterity capabilities that could be used to perform minimally invasive brain surgery. Controlled by magnetic fields, this technology is a departure from the rigid, wired designs of most micro-surgical tools.

The research team is co-led by Dr. James Drake, surgeon-in-chief, chief of Perioperative Services at The Hospital for Sick Children (SickKids) and Eric Diller, engineering professor, University of Toronto (U of T).

"Advancing surgery through an endoscope in the paediatric brain requires

miniaturized versatile tools which can be precisely controlled," said Dr. Drake, who is also a professor, Department of Surgery, University of Toronto. "This novel concept of using tiny, magnetized tools, controlled by robotic external magnets shows great promise in addressing this need for both paediatric and adult patients."

Over 700,000 patients in North America are living with brain tumours. These tumours are the most common form of solid cancer in children, and surgery to remove the tumour is often the first recommended course of treatment.

The surgeries can be highly invasive with a long recovery process. Less invasive endoscopic surgery isn't always possible,

primarily because standard endoscopic tools are not versatile enough to remove the tumours while controlling any bleeding.

Building on work by Drake and his

> **Miniaturized neurosurgical tools are controlled externally by magnets, enabling less invasive interventions.**

team at The Wilfred and Joyce Posluns Centre for Image Guided Innovation & Therapeutic Intervention (PCIGITI), Drake and Diller developed this novel concept of miniaturized neurosurgical tools

that are externally magnetically controlled.

The research team has been developing a prototype with tiny grippers mounted on the end of a flexible wire 'wrist' and controlled by external magnetic fields. The tool features magnets on both the gripping forceps and the flexible wrist. As magnetic fields are applied, the tool will either open and close the grippers or move the wrist.

In tests performed on a life-like 3D printed model of the brain with a simulated tumour, the gripper was able to successfully enter the ventricles of the brain and remove the tumour, controlled completely by external magnetic fields.

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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The Next Steps of Healthcare Technology

What you can do now to make an impact

Digital Workplace Technology: The Healthcare Perspective

The digital workplace for a healthcare organization has unique needs. A seamless digital experience for administration, providers and patients alike means that you can focus on what matters most— providing quality healthcare.

Reliable. Secure. Consistent. Your new digital workplace must have a consumer-like user experience, regardless of platform and location. For organizations with distributed users, technical resources are even more important than before. IT support—available anytime, anywhere, on any device—enables the best user experience across the entire network.

Managing Digital Growth while Maintaining Excellent Patient Care

The healthcare landscape was evolving rapidly even before the pandemic. Covid-19 brought about an acceleration of the way we view patient care and how effective healthcare organizations are managed. Many health systems were rushed to solidify their digital capabilities—from improving their IT infrastructure or empowering clinicians to helping patients manage their own care. Moving forward in a more intentional way, you can continue offering quality care while leveraging the benefits of technology.

Appropriate and Effective Health Services for every Canadian

Access to quality medical care is at the forefront of excellent patient care. During the pandemic, this challenge accelerated the use of new service delivery models for digital and virtual care solutions. These innovative approaches answered the immediate need, but also showcased the benefits and possibilities for a future where access to quality healthcare is a reality for everyone. Continuing to enable reliable and connected technology also empowers providers and allows for the cost of patient care to be managed more effectively.

Administrative benefits to the Hybrid Healthcare Organization

Protect your investments by effectively managing and monetizing your device lifecycle to configure, maintain, and secure equipment wherever it is. Provide management and support to maximize the financial impact of lease buyback programs, onboarding new devices and end of life management that supports your sustainable development goals. Partnering with leading technology companies like CompuCom and Lenovo Health ensures that you can focus on delivering quality healthcare and continue to seamlessly deliver in the ever-changing digital healthcare landscape.

Unique Security Needs

The emergence of new data accessibility in the Digital Edge also requires a security solution that keeps your hospital connected while providing safeguards for your employees, patients and entire health system. Customizable and proactive solutions can identify and remediate threats, maintain consistent connectivity at your edge data locations, and deliver experienced technical support.

As technology and healthcare continue to move forward, redefining the hybrid experiences for patients, clinicians and hospital staff will set a foundation for the future of healthcare technology. The new hybrid healthcare technology solutions will help providers be more predictive, effective and accessible for everyone.

If the thought of redefining the next normal seems overwhelming, think about partnering with an experienced technology team.

Your New Normal, Our Everyday.

To learn more about how CompuCom and Lenovo can help you modernize your healthcare organization, visit compucom.com, or call us at 1-800-350-8430.

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1 HealthcareDive, Data Breach Brief, 2019
2 https://www.securityinfowatch.com/cybersecurity/press-release/21123576/ponemon-institute-ponemon-institute-reveals-68-of-organizations-were-victims-of-successful-endpoint-attacks-in-2019
3 IDC Research Group

Virtual care acceleration signals new roles for providers in digital age

BY ROSALIND STEFANAC

As more health institutions gear up for a virtual future by embracing artificial intelligence, robotics and telemedicine, practitioners say their roles will inevitably change along with technology upgrades. "The digital representation of our work has already arrived," said Dr. Lee Schwamm, vice-president, Virtual Care at Mass General Brigham and director of TeleHealth at Massachusetts General Hospital in Boston. "If you were to walk around a typical hospital, you would see doctors, nurses and everyone on a phone or computer all day long."

Already, he said, nurses at his hospital are equipped with iPhones with secure messaging so they can receive data about their patients directly and, in turn, be able to message other team members as needed. "If there's a question, this is real-time access to people and information."

Dr. Schwamm said having a technology interface has become so important these days that when a patient comes into the hospital without a device, the hospital better be equipped to provide one.

"Now it's a given that we are a connected society and that both providers and patients rely on being reachable at all times," he said. "In our case, it's an iPad in every hospital room – we deployed thousands of these during COVID-19 and now we're trying to build more engaging applications."

Eventually, he believes this bedside device will be the way primary care doctors and nurses check in on their patients,

share information and connect to a medical interpreter in a patient's language of choice

Dr. Schwamm, who co-authored Virtual Care: New Models of Caring for our Patients and Workforce, said understanding how to use data and how to connect people with technology is an important skill "that the modern healthcare worker needs to be adept at."

In speculating on healthcare roles over the next decade, consultants say being adept at using digital technologies will be just as critical as having clinical knowledge. In The Future of Hospital Care: A Better Patient Experience video series, released in January 2020 from global consulting firm McKinsey & Company, the presenters say technology training for healthcare professionals will be imperative.

"As early as in medical school, we should start teaching about digitalization in the hospital space," said Bo Chen, a partner in McKinsey's Beijing office. "We should teach about the IT systems and how physicians can play an important part in optimizing the system and optimizing the processes and recognizing the value of technology in medical care."

As the primary interface with patients in the hospital, Dr. Schwamm said nurses in particular, and those considering a nursing career in the future will need to become comfortable with the idea of technology as another service that helps them deliver the best care to their patients.

He urges those resisting technology advances for fear of losing human connections to remember that video and telemedicine have been a lifeline to many during the pandemic. "They could see their nurses on screen without masks and shields, which was actually more human," he said. "In the end, your job as a nurse, physician or other hospital staff member is about how to make this patient encounter as valuable, cost-effective and satisfying as possible."

In adopting new technologies into the hospital, he said it's not about replacing what nurses do with less valuable tasks, but rather enabling them to do the things they care about in a simpler and more reliable way.

"I'm not advocating for more data as you should not have to turn yourself into a data-entry factory to be part of the care team," said Dr. Schwamm. "It's actually about the smart use of technology to accomplish things that would be difficult or impossible otherwise."

New project to better identify and treat ALS uses AI and data sharing

BY FANNY SIE AND INDU NAVAR

In health, science begins with the patient. Roche believes that the only way to improve the way Canadians access care is by working with all stakeholders, including public and private organizations, patient communities and citizens. As a proud member of the Canada Health Infoway Alliance, Roche is committed to meaningful collaborations that optimize the health and well-being of Canadians by enabling faster access to data, digital tools and innovations.

Infoway's ambition to break down the barriers to scaling innovation is fully aligned with Roche's aspiration to bring better health solutions to more people faster.

One of the ways Roche will achieve this is through initiatives which shorten the distance between scientific discovery and the point of care in the system. In 2020, the Roche AI Centre of Excellence was established to bring cross-sector stakeholders together and drive digital transformation in health, leveraging AI and open science to advance healthcare for Canadians.

Through the AI CoE, Roche has

collaborated with EverythingALS, AnswerALS, the Ontario Brain Institutes and ALS Canada to launch an open data science competition called the End ALS Challenge.

Amyotrophic lateral sclerosis (ALS) is a neurodegenerative disease with no scientifically established diagnosis, treatments or cure. Because life expectancy for ALS – once diagnosed by the physical symptoms of the disorder – is only two-five years, it's imperative that an earlier, definitive diagnosis can be made to improve the patient's quality of life and also to create opportunities for inclusion in clinical trials for experimental treatments.

The goal of the End ALS Challenge is to surface insights through an open data competition that connects global AI and neuroscience communities to better understand the overall biology of ALS and improve diagnosis and drug discovery for patients.

The outputs created by the scientific community will be shared with the patient community through an open and continuous feedback loop to help translate rare disease research into positive disease-modifying outcomes for patients faster.

Heading into its second phase, the End ALS Challenge is looking to expand its data sources. Additional data will be contributed to this program by the Digital ALS Biomarker Speech Research Trial, an initiative led by EverythingALS.

The Digital ALS Biomarker Speech Research Trial is the world's largest program driven by AI-powered, citizen-

Fanny Sie

Indu Navar

inspired technology to profile and openly share data related to ALS.

This novel approach was motivated by the need for early detection and improved prognostic accuracy of ALS using advanced computational technology and speech metrics that include audio and facial metrics.

Although similar technology is used

for developing biomarkers for other neurodegenerative diseases, such as Parkinson's, no widespread program has been undertaken to apply AI-powered technology to discover biomarkers for ALS.

Using a volunteer staff recruited from the medical, scientific research, high-tech, entrepreneurial, counseling and college student population, EverythingALS has enlisted more than 500 participants in its Speech Research in only six months – an astonishingly short amount of time for such a study. The non-profit is now aiming to include more than 1,000 citizens to produce the largest and most comprehensive audio-visual ALS database ever made openly available to the research community.

Roche believes that collaboration is a key step toward accessing innovation, and ultimately improving the healthcare of Canadians. It is through meaningful partnerships with stakeholders who are also committed to this shared vision, that optimal patient care and better outcomes can be delivered.

Fanny Sie is Roche Canada Head of Artificial Intelligence and Digital Health and Indu Navar is CEO of EverythingALS.

Maize Analytics and Protenus found to be standouts in privacy survey

To combat the rising number of patient privacy breaches, healthcare organizations are increasingly using patient privacy monitoring solutions for regulatory compliance, efficiency, and peace of mind around medical record access. Market research firm KLAS recently examined several of the leading options in its report titled "Patient Privacy Monitoring 2021".

Overall, patient privacy monitoring is one of the highest scoring markets KLAS measures. For this report, KLAS interviewed 148 healthcare organizations about their customer experience and tracked 48 recent purchase decisions through its Decision Insights research to learn why certain solutions are being chosen and who can reliably lead organizations to success.

Top performers Maize Analytics (recently acquired by SecureLink) and Protenus stand out in a high-performing market; both are frequently chosen in new purchase decisions.

Both vendors' customers receive proactive, responsive, and meaningful service and say their vendor's AI and machine learning technology provides several benefits – key among them, reduced manual investigations and audits.

Each vendor also receives praise for some unique characteristics. Maize Analytics customers report the vendor's training, superb support, and fast response times drive high value. Not only do Protenus clients report extremely high satisfaction, but almost every customer evangelizes their experience and is highly likely to recommend the solution.

They also highlight the intuitive and user-friendly interface. Both vendors have proven their ability to meet needs across organization sizes, though Maize customers include a larger proportion of midsize hospitals; most of Protenus' customer base is made up of larger hospitals and health systems.

Maize Analytics: Maize is the 2021 Best in KLAS winner. It continues to be a top performer and is growing fast, particularly among midsize hospitals. Recognized for great service and support and good technology. New decisions are driven by Maize's reputation and pre-sales experience, functionality, and lower price point. While no organizations have validated replacing Maize, those that considered them but did not select them often cite user experience as being better with the other solution they chose (most often Protenus).

One chief compliance officer said: "For the most part we are now on the Maize Privacy Solution. We went through a formal RFP and narrowed our decision down to a couple of products. Maize Analytics had expertise with our EMR; they had people that worked for our EMR vendor that were now working at Maize Analytics. Our EMR is somewhat problematic in terms of trying to get things to work, so knowing someone that knows our EMR inside and out is great. Having a client that is flexible and is in several other hospitals is the best thing in the world. That is what really won us over on Maize Analytics. They were really responsive and flexible. We would buy the product again if we had the choice."

On the other hand, a privacy officer at another hospital had this to say about Maize: "We queried other health systems of our size as we were making our decision, and Maize Analytics was one of the names that kept popping up. We did demos with them, but in the end, we chose to go with another vendor with a more user-friendly product and more advanced machine learning."

For its part, Protenus consistently scores in the mid to high 90s, and the company is rapidly growing. It has a track record of high customer satisfaction, with customers specifically highlighting the quality service and strong product capabilities. Protenus serves some very large organizations. Customers point to user experience as both a current satisfier and a reason for selecting Protenus. AI and machine learning capabilities are decision
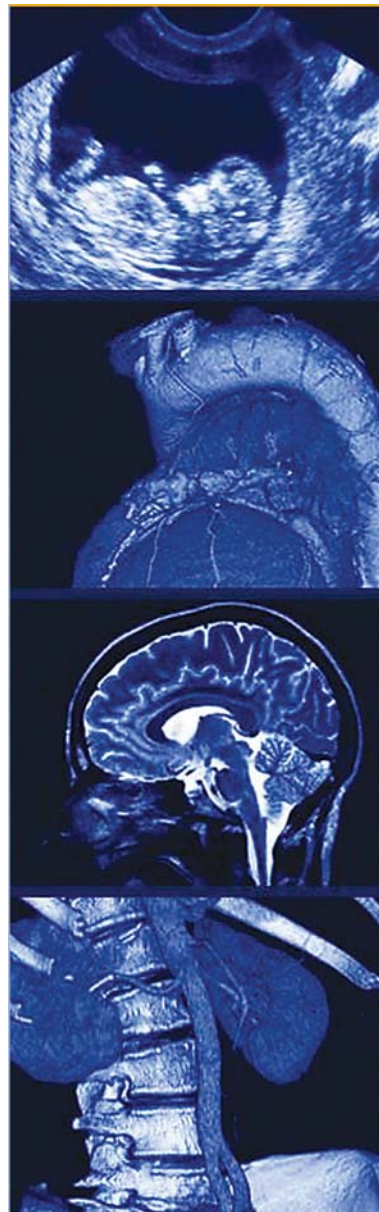
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Data analytics applied to healthcare can improve clinical and operational performance

Data is analyzed for everything from controlling labour costs to identifying individuals at risk of self-harm.

BY DR. SUNNY MALHOTRA

In the past few years, software has shown a much-improved ability for gathering and analyzing data to arrive at clinical and operational insights. These innovations, namely in the form of big data analytics, are making a significant impact in healthcare.

Companies such as Google, Apple, and Amazon have entered the market to mine this untapped and valuable resource. Many smaller companies are also creating new solutions.

Big data analytics can improve the clinical knowledge we extract from Electronic Medical Records (EMR). There are uses, as well, in data sharing, data security, supply chain management, and HR analysis that can help improve hospital performance while reducing costs.

The data analytics used by developers like Kronos can provide healthcare organizations with the tools necessary to create an accountable and efficient workflow.

Kronos delivers daily reports to monitor labour costs, productivity, patient satisfaction, and patient outcomes for continuous quality improvement. These analytic tools can also provide information on which areas of hospital personnel management need extra support, keep track of supply and demand, and relative costs of these supplies.

Using data analytics to staff employees according to patient volume trends allows providers to cut down on staffing and logistics costs and decrease time-consuming workflows, which allow for more effective and efficient patient care.

Data analytics can also facilitate sharing of information between hospitals for better patient care through secure data networks and operating systems.

Allscripts is a program developed to share patient information across EMRs and operating systems. By sharing patient information through a secure net-

> **Prescriptive analytics can enhance patient care by using machine learning to suggest courses of action that are best suited to patients.**

work, Allscripts can help save on unnecessary costs of repeated laboratory tests of patients who have visited multiple hospital locations.

Prescriptive analytics can enhance patient care by using machine learning to suggest courses of action that are best suited to patients by taking various inputs such as vitals, predicted disease progression based on patient health trends, and real-time alerting.

Epic, an EMR system with prescriptive

Dr. Sunny Malhotra is a US trained sports cardiologist working in New York. He is an entrepreneur and health technology investor. He is the winner of the national Governor General's Caring Canadian Award 2015, NY Superdoctors Rising Stars 2018 and 2019.
Twitter: @drsunnymalhotra

analytics integrated within, can alert physicians of care actions, pharmaceutical decisions, and health maintenance screenings dedicated to high-quality healthcare. Other data analytics can facilitate patient engagement through wearables that can track and analyze health habits to better assess patient profiles and care plans.

These wearables, such as Apple smartwatches, can provide alerts when abnormalities are sensed like increased or decreased heart rates, abnormal ECG sensing, and blood oxygen monitoring that can be communicated to the patient's provider so that proper care can be made available appropriately.

Another sector of data analytics, predictive analytics, has aided in health disparities amongst specific communities within patient populations.

Health Catalyst, for example, provides software solutions for anticipation of patient loads and capacity strains to assist hospital organizations in preparation for potential future outbreaks. Predictive analytics can also be utilized in research by mixing historical, present, and predictive machine learning tools to aid in the development of cures and treatments for present-day "incurable" diseases or cancers.

These data strategies involve using treatment results, drug-therapy plans, and genetic analysis of patients with cancer to cross-examine and analyze interactions of these properties to discover new treatments or possible cures.

How to protect patient data from cybercriminals in a virtual world

BY ARIANE SIEGEL

When the COVID-19 pandemic took hold in 2020, the federal government's Canadian Centre for Cybersecurity issued an alert about the elevated risk to healthcare organizations. As physicians and organizations ramped up their use of online systems, they were attracting the attention of cybercriminals.

The same year, eHealth Saskatchewan was compromised by a cyber-attack, information about patient surgeries was exposed in another incident in Nova Scotia, and frontline services slowed down at the Jewish General Hospital in Montreal after cybercriminals forced the institution to curtail its internet connectivity.

Healthcare providers are increasingly targeted because they are rich in confidential patient data, and the use of technology is growing as the medical community responds to COVID-19. Hackers can make huge profits by selling patient records on

the black market or back to the healthcare institution or individual from which they were stolen.

But, by using caution and following best practices, clinicians can help protect personal health information from data theft and protect themselves against liability.

In Ontario, OntarioMD (OMD), a subsidiary of the Ontario Medical Association, offers some practical tips for data protection to clinicians including:

• Deleting emails and any images with personal health information from inboxes and device trash bins
• Ensuring software and hardware applications have been updated with the latest security patches (i.e., operating system, firewalls etc.)
• Encrypting critical data at rest when stored internally, and in transit when communicated externally
• Transmitting personal health information through secure messaging to ensure messages are encrypted
• Using two-factor authentication and change passwords regularly

• Maintaining audit logs; and
• Working with an Electronic Medical Record (EMR) vendor to ensure data is backed-up and to use testing to ensure backup systems are working.

Dr. Lawrence Rosenberg, head of the regional health agency that oversees the Jewish General Hospital, has suggested good security hygiene averted a serious data breach there, as an "anomaly" was detected during a daily verification of the system, which they then determined was a "cybersecurity intrusion."

Ariane Siegel

By acting quickly to curb internet connectivity as well as external and remote access to its networks as a preventive measure, the agency was able to protect the population's data, particularly hospital data, Quebec

Health Minister Christian Dubé said at the time.

OMD provides many Privacy and Security tools and resources to help physicians adapt safely to virtual care, and to assess threats, safeguard information and respond to cyberattacks.

The OMD virtual care web page at Ontariomd.vc provides a list of vendors with virtual care products and other resources to help clinicians understand how to use virtual tools in their practices.

Our OMD Educates sessions also cover privacy and cybersecurity topics regularly.

The OMD online Privacy & Security Training Module, an education tool that offers instruction on how to keep patient and practice information confidential, is available on OMD's website to all clinicians and their staff.

More than 4,000 users have benefited from the training so far, which covers a range of topics.

Ariane Siegel is General Counsel and Chief Privacy Officer, OntarioMD.

5 ways your hospital can prepare for the post-pandemic patient surge

BY JOHN LEE-BARTLETT

It has been more than a year since the World Health Organization declared COVID-19 a global pandemic. Since that time, health systems and patients have been challenged to rapidly adapt in the face of capacity surges, unprecedented resource consumption and an array of new safety procedures. Now, as vaccines roll out across Canada and a return to normalcy is on the horizon, a surge of patients needing non-emergent care is likely to put new strains on our healthcare resources.

Solutions and new workflows will be needed to cope with the increased volume of patients seeking care.

At the beginning of the pandemic, hospitals braced for an incoming wave of COVID-19 patients and took proactive steps to preserve hospital capacity and resources. Most provinces and territories directed hospitals to cancel non-urgent surgeries to accommodate the surge of pandemic patients.

At the individual level, many Canadian patients chose to stay home to reduce their

> We need to explore solutions that enable Canadians to access the procedures they need without comprising quality.

risk of contracting COVID-19. Research shows that fewer Canadians sought medical care for significant concerns like cardiac events and trauma, as well as for common concerns like abdominal pain, colds and the flu.

This may be one of the largest indirect consequences of COVID-19 – nearly every Canadian who required a non-emergent medical procedure or surgery is waiting for care. For conditions such as cancer, surgery is central to diagnosis and treatment, and a delay in either can significantly worsen outcomes.

The true impact of the pandemic on our healthcare system – and Canadians' health – is so far-reaching we likely do not yet know its full scale. It may take years for the system to recover financially and operationally.

From March to June 2020, there were approximately 335,000 fewer surgeries across Canada compared to the year before – a reduction of 47%, according to the Canadian Institute for Health Information.

These numbers represent a massive backlog of delayed surgeries and procedures, which will place unprecedented stress on our healthcare system in the coming months and years. Even before the pandemic, Canadian hospitals were routinely filled beyond capacity, with patients experiencing long wait times for specialist referrals, surgeries or diagnostic procedures.

For their part, provincial and territorial governments have presented recovery plans and investment strategies to address the growing backlogs. For example, last September, the Ontario government announced it would invest $741 million to help clear the backlog of surgeries and build more capacity in the healthcare system.

However, Ontario's fiscal watchdog, the Financial Accountability Office (FAO), estimates it will cost up to $1.3 billion, nearly double what the province budgeted.

The FAO also says it will take the province about three and half years to clear the surgical backlog, which it estimates will reach 419,200 procedures by the end of September.

These projections assume hospitals will be able to operate at 11% above pre-pandemic volumes over the coming years – but to date, there are no plans for how to increase volumes in an already overcrowded system.

And that is just one province.

While increased funding is critical to help our hospitals prepare for the post-pandemic patient surge, healthcare leaders and decision-makers will also have to find innovative ways to increase volume and capacity above pre-pandemic levels to clear the backlog.

We need to explore solutions that enable Canadian patients to access the surgeries or procedures they are waiting for, without compromising quality of care. To achieve this, we need to get to the root of the problem – inpatient capacity planning – which includes hospital admissions, discharges and transfers, as well as staffing and operating-room utilization.

To do this, healthcare leaders and decision-makers should consider five opportunities for alleviating the backlog of surgeries caused by COVID-19:

• Optimize patient access and bed management. Adopting bed management technology can enable fast, accurate patient placement by providing visibility into transfer and discharge activities, expediting patient throughput. One example of this is seen at Saskatchewan Health Authority. Sandra Jensen, director of System Flow, said, "Having Allscripts Patient Flow as a patient matching and placement tool has decreased our time of patients waiting for beds from the ER, as well as from other facilities around the province. The ability to correctly match the care service to the appropriate hospital bed in a timely and expedited way has greatly improved our overall patient flow in our urban acute care sites. It has become an invaluable tool in our everyday operations that shortens patient wait times for hospital beds."

John Lee-Bartlett

• Eliminate environmental services inefficiencies to prioritize patient safety. Eliminating manual processes and ensuring environmental services tasks are completed safely and efficiently will minimize hospital-acquired infections which require lengthened hospital stays.

• Effectively manage the porter pool. To optimize the porter service and limit delays, many organizations centralize the transport workload. Streamlining transport processes with a mobile application maximizes staff productivity by optimizing task allocation with batching and barcodes.

• Harness the power of predictive analytics for proactive decision-making. From an operational perspective, this means actionable staffing-level decisions can be made based on history and predicted demand. When staffing decisions are aligned with demand, a foundation for improved patient access is created. Powerful predictive analytics optimizes capacity planning and discharge forecasting.

• Healthcare organizations can deploy a single command and control team. This provides an integrated patient flow solution that incorporates bed management, portering, environmental services, transfer management, surgical flow and predicative analytics, ensuring communication, efficiency and patient throughput are maximized.

There is no doubt that significant system-level challenges are facing us now and into the months and years ahead as we address the long-term effects of the pandemic on our healthcare system.

While it will take time to clear the backlog, the right tools to enable data-driven decision-making can help significantly reduce the burden on our healthcare system.

As our healthcare organizations prepare for the post-pandemic increase in patient demand, we must focus on using our limited resources effectively and efficiently so that we can reduce the surgical backlog and provide Canadian patients timely access to the quality care they deserve.
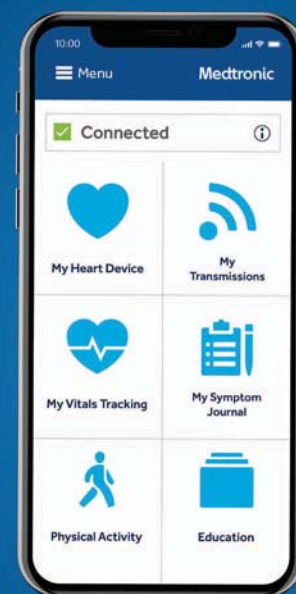
John Lee-Bartlett is Country Director, Allscripts Canada.

Organizations making healthcare more effective with connected tech

BY NICHOLAS CHEPESIUK

At the height of the COVID-19 pandemic, healthcare clinics and organizations were forced to rapidly implement technology platforms as a short-term solution to continue caring for patients. While the solutions succeeded in connecting patients to clinicians, most of the systems were unable to link to the various vaulted CRMs, electronic record systems and repositories housing patient data. For this reason, they were unable to give a full picture of a patient's medical history and conditions.

The consequences of applying this quick fix continue to be felt across healthcare organizations, where providers work in silos and patient data is confined to their electronic medical record systems.

So, how can healthcare organizations increase interoperability, so they work in conjunction with other systems without restrictions, and allow providers to refocus on their mission of providing care?

A recent study by Deloitte on the use of virtual care in Canada confirms that Canadian healthcare's historical approach to technology has been siloed, divisive, and exclusive. However, healthcare organizations are discovering new ways of creating interoperability between their quick fix technology stack and infrastructure.
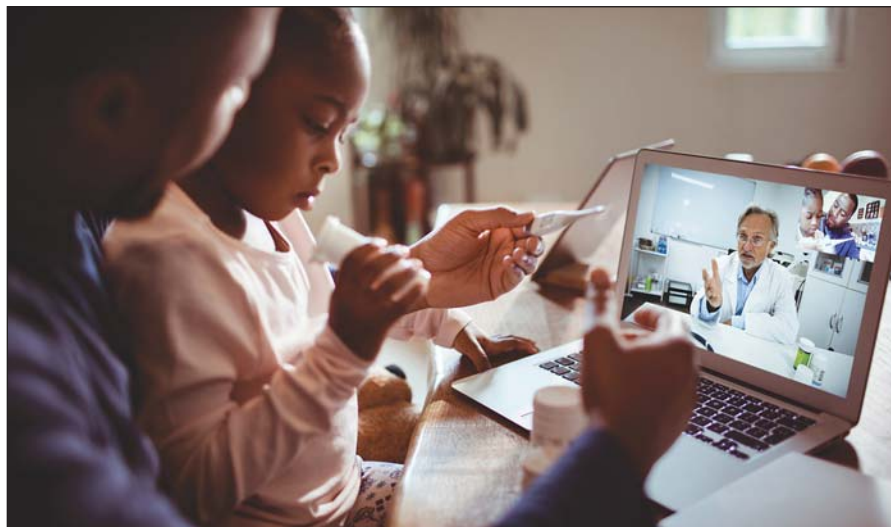
A proven and effective way to liberate patient data and to break down the technology barriers in healthcare is by leveraging APIs. An API is an Application Programming Interface that enables disparate technology and software to "talk to each other". Simply put, an API connects software across an organization so that data is shared between them.

APIs help reduce operational inefficiencies across healthcare organizations, especially as telemedicine operations become increasingly complex with more technology platforms and systems available.

With an open API, like the one offered by OnCall Health, data seamlessly flows from one system to another to reduce administrative redundancies. In this way, providers can be more proactive in their treatment and improve continuity of care across their organization.

TeleCBT, powered by OnCall Health, launched their virtual care program in 2017 with 10 providers using OnCall to manage patients and their operations.

Over the past year, TeleCBT chose to integrate OnCall with their EMR using OnCall's API. This enhancement enabled more than 50 additional providers to access the OnCall platform, thus "reducing redundancy and maximizing provider efficiency across TeleCBT," says Christine Uchida, TeleCBT's clinical director.

For example, TeleCBT schedules appointments in OnCall, with this information passing automatically to their EMR along with patient contact notes, files and forms, and more. With this integration, TeleCBT expanded their care capabilities to save time and money, so providers spend more time caring for their patients and less time on administrative tasks, adds Uchida.

Like TeleCBT, TelASK uses OnCall to virtually care for patients with chronic health conditions, like smoking cessation, cardiology checks, and more.

Providers use OnCall to schedule appointments, connect with patients via video conference and instant messaging, and can share forms and files for ongoing care.

By using an API to connect their systems, TelASK removes the silos surrounding patient data and opens opportunities for better care.

Peter Fallis, TelASK's president, notes that, "The case for interoperability is mammoth, and the ability for providers and organizations large and small to share information from one system to another is a requirement for the future of healthcare." TelASK's long-term operations strategy– to enhance patient services with technology – is made possible with OnCall's API.

Prior to implementation, both TeleCBT and TelASK's leadership took steps to better understand the state of their existing infrastructure in order to make better decisions on the interoperability of their future systems.

As both of these organizations have done, healthcare providers can audit their current tech stack to identify existing silos that prevent interoperability.

OnCall encourages leaders to challenge the purpose of their technology, examining ways in which end-to-end systems may create better care experiences for providers and patients. With an all-in-one system that offers an open API, healthcare organizations can manage patient care and operations within a single, secure platform that also integrates easily with EMRs, Customer Relationship Management systems, and other systems.

By reimagining healthcare delivery and choosing technology that integrates easily, healthcare organizations and their providers can revolutionize how they provide care with a connected system powering their patient care and operations.

Nicholas Chepesiuk is the founder and CEO of OnCall Health, a technology company that provides best-in-class software and services that enable hundreds of healthcare practice owners, brands, and enterprises to launch and grow their own virtual healthcare programs. Under his leadership, OnCall Health is growing rapidly and today hosts over 1 million virtual health appointments annually through its virtual care platform.

Virtual care is more challenging for patients with complicated conditions

BY KAYTLIN SADLER

After a year of lockdowns and restrictions, the way healthcare is delivered in Canada has abruptly shifted. Canadians have experienced tremendous change, particularly regarding virtual care and navigating the complex maze of specialty drug programs.

A new study by Calian Health, conducted at the height of the third wave of the pandemic, asked 1,500 Canadians about their access to virtual care and the quality of the patient journey, especially for those who take specialty medication.

The Calian Care and Medication Index found that half of Canadians have increased their use of virtual healthcare since the start of the pandemic and a similar number intend to continue using virtual care after safety precautions have been lifted. However, only 32 percent found virtual care to be as (or more) effective than in-person primary care.

Virtual care is here to stay, but it's just one part of the transition to a patient-centered approach. Integrated holistically into healthcare delivery, virtual care has the potential to give patients access to the right level of care at the right time and place. The survey highlights this new reality – three-in-five Canadians see virtual care as part of a more resilient healthcare system.

Consider the patient journey for those who require specialty medications. More than half of the respondents in the survey answered that they (or someone in their care) take one or more specialty drugs to treat chronic, complex conditions such as cancer or rheumatology.

In Canada, specialty medicines accounted for 24 percent of the total drug spend in 2014 and are set to reach 52 percent by 2025.

When someone is dealing with a serious illness, the last thing they want to do is spend time searching for information, scheduling healthcare appointments or worrying about billing.

Patient Support Programs (PSPs) are designed to simplify the entire process, from education and administration of medication to financial assistance, payment, and reporting. Virtual care is one of many tools that healthcare providers can utilize as part of a PSP to offer support and convenience to patients when and where they need it, with the added benefit of reducing healthcare cost as a whole.

From a practical perspective, medications that require injections or infusions cannot be administered virtually, so careful integration of communications and patient visits are critical for improving outcomes.

Kaytlin Sadler

Virtual care can be offered as part of the care program to monitor dosing regimens, educate patients about their treatment protocols, provide follow-ups and encourage adherence to the treatment regimens.

The move towards greater digitization makes room for higher-quality interactions with caregivers by automating administrative tasks, enabling different methods of delivery based on patient preferences, and even providing healthcare on demand.

It's not surprising that nine-in-10 Canadians surveyed feel that healthcare providers would be more effective if they spent more time on meaningful interactions with patients and less time on paperwork. People are looking for a personalized care journey with the continuity and convenience that puts them in control.

Canada has a great healthcare system, but it can be fragmented and confusing, especially for patients with complex conditions. There is an emerging need for more integrated, patient-centered care. Virtual care is an exciting part of this emerging story, bringing new tools to transform the overall healthcare experience in Canada.

Kaytlin Sadler is Vice President of Alio Health Services, a Calian company.

GE Healthcare's latest CT scanner offers leading-edge features in one platform

The Revolution Apex CT offers optimal coverage, spatial resolution, temporal resolution, and spectral imaging capabilities.

GE Healthcare's newest version of its Revolution™ CT Platform–the Revolution Apex CT – is currently scanning patients in Prince George, Brandon, and Winnipeg, with additional installations pending in British Columbia, Ontario, and Nova Scotia.

Released in 2020 and currently in operation around the world, the Revolution Apex CT offers optimal coverage, spatial resolution, temporal resolution, and spectral imaging capabilities in one system. It's equipped with the powerful Quantix™ 160 X-ray tube, capable of achieving 1300 milliampere-seconds (mA) of radiation with 16 centimeters of coverage.

"Traditionally, every CT manufacturer had their sweet spot," explained Craig Shelley, GE Healthcare's national product manager for molecular imaging and computed tomography. "Some systems had large coverage, some had high resolution, some had high temporal resolution and some systems could provide spectral imaging capabilities. Most of them had at least one or two of these properties built into their systems, but no one had all of them.

"The Revolution Apex CT is the first system that ties it all together. It gives you the largest coverage

> **If you can acquire the entire heart in one rotation, you'll have a better image, better data, and you'll be able to scan any patient at any heart rate.**

detector at 16 cm. It has the highest resolution performance, it has spectral imaging capabilities and it has the high power Quantix 160 X-ray tube."

Coverage, which refers to the area imaged per rotation of the gantry, is important because it determines the quality of the image and the speed of the exam. For example, with 16 cm of coverage the Revolution Apex CT can image the entire heart in one rotation. Scanners with only 4 cm of coverage require multiple rotations, each producing an image with the heart in a different position because it is always in motion.

"If you can acquire the entire heart in one rotation, you'll have a better image, better data, and be able to effectively scan any patient at any heart rate," said Shelley.

The industry-leading high spatial resolution offered by the Revolution Apex CT allows for the imaging of very small structures, including small blood vessels, small calcifications in and around the heart and microfractures. Temporal resolution, or the speed of the system as it spins around the patient, is also important because the faster it spins, the better it can freeze motion, which is especially important for high quality cardiac imaging.

Spectral imaging, powered by GE Healthcare's GSI Xtream, software, produces multiple energy levels of X-rays for optimal soft tissue and lesion contrast. At one energy level, a lesion may be indistinguishable from the surrounding tissue, while at another, lower energy level, there is just enough difference in density for a lesion to "pop out of the background."

Imaging with different energy levels "gives you the ability to have significantly more information, allowing you to tailor the results and the data you get from the images to diagnose with greater confidence," said Shelley.

The Revolution Apex CT system also includes GE

Healthcare's TrueFidelity deep learning image reconstruction software that is able to produce images with more detailed texture and significantly reduced noise for better diagnostic accuracy. Images are reconstructed using algorithms that incorporate thousands of training datasets and years of ground truth data. "It really is a game changer in terms of image quality enhancement," said Shelley.

Aside from achieving 1300 mA radiation and 16 cm coverage, Revolution Apex CT's Quantix 160 X-ray tube uses state-of-the-art liquid bearing technology designed to withstand the 75 Gs of force produced as the X-ray tube spins around at great speed.

"You have a huge amount of weight spinning around putting a lot of strain on the components. That's something that metal bearings can't withstand," said Shelley.

The first generation Revolution CT, which was introduced in 2015, can be retrofitted with the Quan-

tix 160 Tube, allowing hospitals with a six-year-old scanner to acquire all of the functionality offered by the Revolution Apex release.

To make it easier to stay current with their CT technology, Canadian hospitals can now take advantage of GE Healthcare's Smart Subscription Service, which gives them access to all software updates.

"If you have a five-year-old scanner, there's a significant gap between what you have and what's available on the market because of updates in software," said Shelley.

Multiple scanners purchased at different times with software acquired at the time of purchase will have different attributes, requiring a hospital to decide which scanner will provide the best result for a patient.

By taking advantage of GE Healthcare's Smart Subscription Service, it won't matter which scanner is available because the same functionality can be made available.

AI will make thyroid ultrasounds faster, easier

BY KERI SWEETMAN

EDMONTON – A University of Alberta spin-off company has received U.S. FDA approval for an artificial intelligence tool that could revolutionize thyroid ultrasounds. The company is planning to seek Health Canada approval, as well, making the procedure faster and easier for thousands of Canadians who undergo it each year.

MEDO.ai, with offices in Edmonton and Singapore, received approval in March from the U.S. Food and Drug Administration for its thyroid ultrasound technology.

"This is our crucial first approval. We will be seeking additional approvals in Europe, Canada and worldwide," said MEDO co-founder Jacob Jaremko, associate professor in the Department of Radiology and Diagnostic Imaging, who started the company in 2018 along with Dornoosh Zonoobi, a former post-doctoral fellow at the U of A and research fellow with Alberta Innovates, and Jeevesh Kapur, a radiologist from Singapore.

The MEDO-Thyroid tool, said to be the first of its kind in the world, starts with an ultrasound sweep of the thyroid gland and then uses AI software to analyze the scan results. The company describes the process as "seamless, fast and objective".

One ultrasound scan is performed for every

> **Scanning the thyroid gland using an ultrasound probe is time-consuming and difficult, and interpreting the results can be challenging.**

three Canadians each year, of which three to five percent are thyroid ultrasounds. Women receive more thyroid ultrasounds than men because they are more likely to have lumps or nodules on the thyroid gland in the neck.

Although these nodules are usually benign, some turn out to be malignant, so patients require regular follow-up ultrasounds. An

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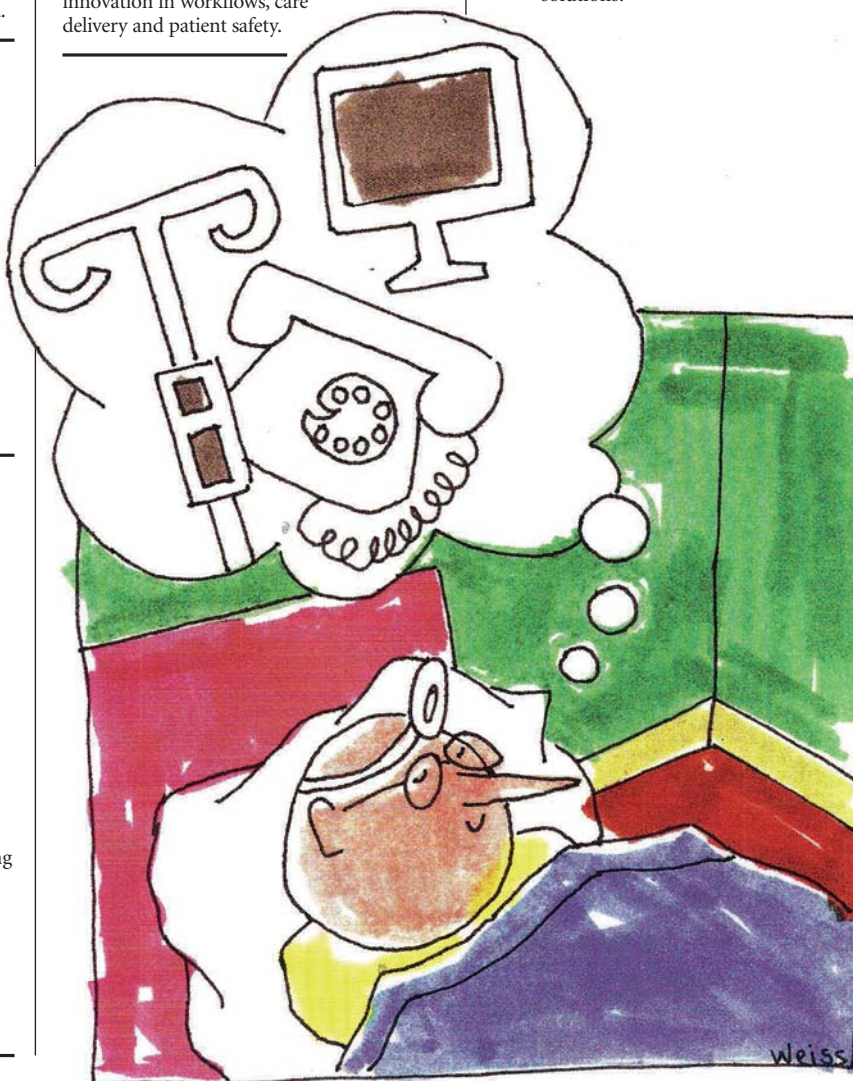
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Magnetic tools

CONTINUED FROM PAGE 14

The researchers are now working on a second prototype of the gripping tool that features a simpler design to allow for more control over the forceps.

Compared to traditional surgical robot tools, which are about five millimetres across, these prototype magnetic tools are being developed to be half the size, while maintaining the same dexterity.

"Developing new technology for paediatric minimally invasive surgery, in this case neurosurgery, takes a collaborative team of engineers and surgeons. Our team from PCIGITI at SickKids and the Department of Mechanical and Industrial Engineering at U of T has been very successful in this regard," said Dr. Drake.

There are still several steps to be taken before these micro-robots are seen in the operating room. The team plans to create more tools, including micro-scissors. They also need to determine the best way to generate magnetic fields in the operating room.

"Our next step will be to join our colleagues at SickKids for a simulation in vivo, which will provide the opportunity to see how these micro-robots will function in the operating room, and to try different ways of setting up the magnetic coils," said Professor Diller.

The research team's work, "Design and Comparison of Magnetically-Actuated Dexterous Forceps Instruments for Neuroendoscopy", was published in the Journal, IEEE Transactions on Biomedical Engineering.

This research is supported by the Canadian Institutes of Health Research (CIHR), the Natural Sciences and Engineering Research Council of Canada (NSERC) and SickKids Foundation.

Privacy survey

drivers as well. Organizations that consider but don't select Protenus often cite cost as a contributing factor.

"Protenus' system had the features and functionality that we wanted. We were especially excited by the system's ability to scan local media names that could be included when looking for violations," said one compliance officer. "However, the system cost more than the other system we looked at. We were disappointed not to be able to go with Protenus' system."

Overall satisfaction with FairWarning, recently acquired by Imprivata, is above the KLAS-measured HIT average (83.1) but behind the average in this market segment (89.8).

Managed privacy services (MPS) are a particular differentiator for FairWarning customers. Those who use Imprivata's MPS report notably higher satisfaction (by almost 10 points) than those who don't. MPS clients are particularly satisfied with their ability to leverage and adopt product features.

A few MPS clients have reported occasional misses from the vendor over the past year, yet as a group, they have consistently scored high the past two years. Non-MPS customers are more likely to feel the product doesn't have all the functionality they need, doesn't work as promoted, and isn't being adequately developed.

With a strong market presence, FairWarning sees new wins due to peer references and capable functionality. However, prospective customers feel the vendor lags behind competitors in some areas.

Organizations that replace the FairWarning product or consider but do not choose it most often cite the need for deeper or more advanced technology. While the latest product version includes AI capabilities, those capabilities are not often recognized by current or potential customers. Customers leaving also mention the cost for storage or feeds.

iatricSystems, a long-standing industry player, has a significant presence in small to mid-size organizations, many of whom are MEDITECH users. iatricSystems benefits from existing relationships – 4 of the 5 organizations who chose the vendor did so because iatricSystems was an incumbent vendor, either with old patient privacy products or other solutions.

Current customers report smooth upgrades and responsive support, though some would like the support to be more proactive. Some also specifically note a poorer experience since recent M&A activity (2018 acquisition by Harris Healthcare, 2019 acquisition by Haystack Informatics).

Several respondents see iatricSystems as less progressive than other vendors in the space; organizations replacing Security Audit Manager cite functionality and technology as their primary reasons. Some current customers express hope for the potential benefits of the Haystack platform.

One critical consideration for provider organizations looking for a privacy monitoring solution is the vendor's ability to seamlessly access records from the organization's EMR, the home of most data being analyzed.

Organizations using Cerner's EMR often use other Cerner HIT applications, including Cerner P2 Sentinel, which has historically generated low satisfaction; KLAS has validated a few organizations live on the vendor's new version, and has shown early indications of improved performance.

Those looking beyond P2 Sentinel have several good options: Imprivata (FairWarning), Maize Analytics, or Protenus all receive high ratings from Cerner users.

Organizations using Epic tend to find a high level of success with Maize Analytics and Protenus. Imprivata (FairWarning) customers using Epic report mostly positive experiences. Some customers mention challenges with how long it takes for the Epic log to be ingested into the FairWarning solution, and some also say Epic audit trails aren't robust enough for clients' patient privacy monitoring needs.

A large portion of iatricSystems' customer base is small to midsize hospitals using MEDITECH, and they have found success with that focus. Imprivata (FairWarning) customers who use MEDITECH report challenges ingesting the EMR data and insufficient detail in the audit trails.

Other options in the privacy space include:
• Intruno – Focuses on large ambulatory practices and small hospitals. The few organizations that selected them cited a strong, usable product.

Those that ultimately selected another vendor recognized strong leadership within Intruno but had concerns with vendor stability and viability.

• Veriphyr – Offers machine learning–based platform that as of today is not on many provider organizations' radars. Was rarely considered in new decisions validated as part of this study. KLAS has interviewed a few current customers, though the sample is too small for performance feedback to be shared.

AI innovation will make thyroid ultrasounds faster and easier

estimated 8,600 Canadians were diagnosed with thyroid cancer in 2020.

The current approach is for a sonographer to slide an ultrasound probe from top to bottom and side to side on the neck, taking multiple side-view and transverse-view pictures of the bowtie-shaped thyroid gland, while locating, measuring and characterizing any nodules.

The process is time-consuming and the next step – interpretation by the radiologist – is complicated and potentially error-prone.

Jaremko said inconsistency in describing nodules and interpreting ultrasound results can lead to confusion and false negatives or positives. False positives can result in unnecessary biopsies, the next step in determining whether a suspicious nodule might be malignant. False negatives

> **MEDO's software analyzes the scans and locates, measures and characterizes any significant nodules for further review.**

could mean a malignancy isn't discovered.

"It's very frustrating because most of the nodules are benign, but occasionally there is a needle-in-a-haystack one that's malignant," said Jaremko, who holds the Alberta Health Services Endowed Chair in Diagnostic Imaging at the U of A and is a member of the Women and Children's Health Research Institute.

MEDO's software analyzes the scans taken by a sonographer, locating, measuring and characterizing any significant nodules and selecting optimal images for analysis. The system produces a preliminary report, giving a score for each nodule indicating whether it is likely benign or malignant. The radiologist is free to edit the report if they have a different opinion on the findings.

"This will make scanning thyroids much

simpler and more reliable, especially in people with complex thyroid glands who need follow-up," said Jaremko. "We are avoiding confusion, making things simpler, faster and easier for patients and clinicians."

MEDO is doing an investigational trial of its thyroid ultrasound tool at a Sherwood Park clinic run by MIC Medical Imaging, scanning several patients a day using the software, as well as using conventional ultrasound as a backup. The pilot was scheduled to continue until the end of June, with Jaremko and his team then analyzing the results. If they are comfortable with the findings, they hope to be using the software in all 10 MIC clinics in the Edmonton area by the end of the year.

The company will then begin marketing the system to other radiology groups, starting in Western Canada, as well as busy endocrinology clinics that could use the tool to do their own scans.

The Singapore arm of the company hopes to piggyback on the FDA approval to get the go-ahead to roll out the tool there soon. Marketing will also begin in the U.S. and eventually in Europe once approvals are obtained there.

This is not MEDO's only AI-based ultrasound tool. They have a total of four, three of which have been approved by the FDA, including MEDO Hip, a tool to screen newborn babies for hip dysplasia, a common hip joint problem that leads to osteoarthritis but is easily fixed if detected early.

"We realized that the three of us shared

the same vision of democratizing medical imaging through simplifying the use of ultrasound," said Zonoobi, who was the motive force behind the startup and is now CEO.

The new tool is already being used by specially trained nurses in two clinics in the Westview Primary Care Network in Spruce Grove. Jaremko expects it will soon be used in other primary care clinics in the Edmonton, Alberta area and hopes to then move into clinical practices throughout Alberta.

The company is also developing other applications, including lung and fracture ultrasounds, and has recently done several trials scanning patients with COVID-related pneumonia in ICUs.

MEDO has 25 employees working out of the U of A Health Hub & Accelerator space in Enterprise Square in downtown Edmonton, but Jaremko says that number could easily grow to 100 over the next few years, making the company one of the high-tech engines in Alberta.

SOPHIE gives start-ups access to expertise

surprise to those that have been watching the evolution of life-science companies in Hamilton.

Muggah calls Hamilton a "goldilocks-sized city" for health innovation that has a "foundation of research, clinical care, health education and training that is pound for pound unrivaled in the rest of Canada."

"You have the capabilities, the capacity, and the resources that you would find in Toronto or Boston, but we aren't so big that it's challenging for a company to access the equipment or expertise you need," he said. "You aren't waiting in a queue for two or three years to get a meeting."

And while the expertise and network start in Hamilton, the scope is global.

"My phone has been ringing off the hook since this was announced," Carter said. "And that's because this isn't about businesses that were created in Hamilton and sell in Hamilton. We're building businesses for a world market."

VoxNeuro's Elliot agreed. The company just expanded into the U.S. market.

"We want to globally change the way brain health is managed and treated," she said. "Ultimately, we are driven to become the gold standard of cognitive assessment, an integral part of every brain health assessment, worldwide."

That was the intention of SOPHIE funding, to support the concentrated expertise found in the Hamilton Region in companies like VoxNeuro and deliver it to people around the world.

British Columbia pilot project manages patients at home

nology does not provide the care, technology allows us to be more efficient." Ultimately, patients need to know they are in the hands of caring nurses, doctors, and clinical pharmacists, and that these clinicians are actively managing their diagnoses and treatments.

To expand the Hospital at Home program, the managers of the project also want to answer important questions. They are actively conducting research, said Dr. Spina, to find out:

• How patient friendly is the technology, and what needs to be improved?

• How safe is the care? How do the outcomes and length-of-stay compare with in-hospital care?

• What are the hospital readmission rates? How do they compare with conventional care?

• How do the costs of acute care at home compare with those in the hospital?

Dr. Spina said all of this has been made more urgent by the COVID-19 pandemic, as hospitals and health regions continue to care for patients during the global crisis.

"There has been a lot of development going on, and a lot of new solutions are being tested," he said.

This accelerated pace of technological change and modernization, he said, has

> **Ultimately, patients need to know that they're in the hands of caring nurses, doctors and clinical pharmacists.**

been something of a silver lining in the midst of the COVID-19 crisis.

To follow BC's Hospital-to-Home journey or to learn more, please see the website at https://www.islandhealth.ca/our-services/hospital-home-services/hospital-home

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First Nations

and has since expanded its capabilities to cover a wide variety of social and mental health issues, including depression, substance abuse and self-harm.

Company president John MacBeth, speaking at the announcement in

> **The app is customized for each user, and can be set up to check-in with patients daily, every few days or weekly.**

Saskatoon, said it will soon be used in Australia and South America, too. The strength of the system is that it tethers patients to skilled professionals, in a compassionate way, and in the language of the user.

MacBeth explained that the app is customized for each patient and can be set up to check-in with patients daily, every couple of days or weekly, depend-

ing on the need. Overall, it takes no more than five minutes per week for the patient to answer quick questionnaires.

By doing so, a nurse or social worker can see how the patient is doing, and whether quick action and support is needed.

Working with Microsoft, IBM and Roche, moreover, TryCycle has devised algorithms that use artificial intelligence to detect problems – even without the input of the patient or caregiver. For example, if there is a change in the pattern of the patient's responses, the system will flag it.

Similarly, the system can detect changes in the usage of a patient's smartphone that can be associated with mood changes, such as depression or anxiety. This, too, can be used to alert a caregiver. "We want to avert problems before they happen," said MacBeth. "We look for behavioural insights to determine if the patient is at risk of harm or not." Said FSIN vice chief Heather Bear, in reference to her colleagues' deployment of TryCycle: "Less people will suffer because of what you've done."

Semantic Health uses machine learning

for medical coding and auditing," said Dr. Sahar.

Semantic Health's software engine also converts the data into structured information that can then be used for other purposes, such as research.

To create the Semantic Health system, he said, the company assembled a team of experienced coders and auditors, as well as machine learning experts. Moreover, the company has been working with the Vector Institute, in Toronto, a centre of excellence for the advancement of artificial intelligence.

The company now has projects under-

way or completed at Humber River Hospital, Unity Health Toronto, and Southlake Regional Health Centre.

"Our goal is to improve the efficiency of the coding process," said Dr. Sahar. "We're making it faster and more accurate."

The pilots were funded in part by the Coordinated Accessible National (CAN) Health Network with support from the Federal Economic Development Agency for Southern Ontario (FedDev Ontario). Semantic Health continues to work with the CAN Health Network and other healthcare organizations in the network to deliver improved healthcare data quality across Canada.

Read all about it.

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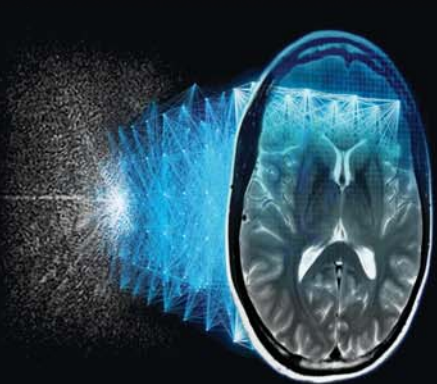
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