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AI in clinical trials

New technology, powered by artificial intelligence, is being used to find appropriate patients for clinical trials with astonishing speed. The software is now available in Canada.

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Partnering with Israel

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Tech plans at CAMH

CAMH, the leading mental health hospital in Canada, will be expanding its facilities over the next few years. At the same time, it will be rolling out tech-powered services to better help patients with emotional difficulties and addictions.

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TELUS provides cybersecurity services to SickKids

Toronto's Hospital for Sick Children has been modernizing its I.T. systems and has implemented leading-edge security technology. Pictured are key members of the team: (l to r) Cynthia Esnard, Account Executive at Telus; Mark Leyser, Senior Sales Specialist, Security; Scott Currie, Chief Information Security Officer, The Hospital for Sick Children; Michael Di Verdi, Director, Ontario Public Sector and Health at Telus. **SEE STORY ON PAGE 8.**

London creates unique DI partnership with Canon Medical

BY JERRY ZEIDENBERG

LONDON, ONT. – The London area, long-known for leadership in diagnostic imaging, is now kicking it up a notch through a partnership with Canon Medical Systems.

The agreement will see the region's hospitals acquire six, top-tier CT machines for clinical use at a cost of \$11.8 million, while Canon is providing an additional CT, angio suite and ultrasound machine as part of a \$4.5 million investment in a new imaging research and development centre.

Western University's Schulich School of

Medicine is also part of the agreement, and the Robarts Research Institute will be the centre of the R&D initiative.

London Health Sciences and St. Joseph's

New imaging techniques will be shared with medical imaging professionals across Canada.

Health Care London will be the recipients of the clinical scanners.

It's the largest installation of high-end, Aquilion ONE Genesis CT machines for Canon Medical anywhere in the world, and

the announcement in March brought the company's CEO, Toshio Takiguchi, from Japan to be part of the event.

"It's our flagship CT," said Mr. Takiguchi. "It has evolved a great deal since its launch 12 years ago."

He said the partnership with the London medical organizations is an important one for the company: "Together, we'll make an impact on society."

Not only will LHSC and St. Joseph's Health Care London benefit from using top-performing CT scanners, researchers at the Robarts Research Institute will also be

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London creates unique DI partnership with Canon Medical Systems

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devising new methods of imaging and image-guided therapies that will be offered to the nearby hospitals and to clinicians across Canada.

“Once we show they work in our pilots, we have an obligation to share them with our colleagues across the province and the country, too,” said Dr. Narinder Paul, chair of medical imaging at Western University’s Schulich School of Medicine and chief of radiology at LHSC and St. Joseph’s.

The research arrangement is being devised to speed up the translation of innovations “from bench to bedside.”

“We’ll also build a training academy to magnify the impact of these treatments,” he said.

Dr. Paul noted that London-area researchers and clinicians will work in close partnership with scientists and engineers from Canon.

London will act as a kind of laboratory to test imaging ideas and technologies produced by Canon, and to validate and refine them. It will also produce new concepts

and technologies through the work of its own researchers.

In particular, it will be pursuing advances in hybrid technologies – where different imaging modalities are combined.

That’s the importance of the combination of CT, angio and portable ultrasound that’s being provided to Robarts by Canon.

On one front, “We’re going to further integrate ultrasound with angio,” said Dr. Aaron Fenster, imaging director at Robarts Research. “Ultrasound gives you real-time images, and is very useful in accurate biopsies, insertion of lines and ablations. It can have even more impact when you add the anatomical detail of angio.”

Similar lines of work will be followed with CT, as well.

And Dr. Paul observed that the CT machines will be near high-end MR devices at Robarts, which could spur further synergies among the researchers.

The acquisition of the equipment is a real coup for Robarts, which currently doesn’t have a CT scanner.

In addition to the CT for Robarts, two CT scanners will be delivered to LHSC’s



Pictured with the agreement: Dr. Davy Cheng, Schulich School of Medicine; Dr. Paul Woods, CEO, LHSC; Toshio Takiguchi, President and CEO, Canon Medical; Dr. Gillian Kernaghan, CEO, St. Joseph’s Health Care, London.

University Hospital, three will go into the Victoria site, and one will be installed at St. Paul’s.

The installations are expected this fall. CTs currently in operation at the hospitals are 10 to 12 years old. “Like old Volkswagens, they keep on working, but the new models are faster and have more advanced features,” said Dr. Paul.

Indeed, the new Aquilion ONE Genesis scanners are capable of head-to-toe imaging within seconds, and produce much thinner image slices. Today’s software is

much improved, too, with advanced 3D reconstruction abilities.

At the same time, the X-ray dose to patients has been reduced, resulting in safer exams.

Jens Dettmann, general manager of Canon Medical Systems Canada, said that synergies between CT, angio and ultrasound will be promoted by locating the CT and angio suites right next to each other at the Robarts centre.

He said the application of AI to imaging will be another major theme of the research. To assist the London scientists, Canon will be providing the services of a full-time physicist and a service engineer. “It’s an investment in human resources, as well,” said Dettmann.

Dr. Davy Cheng, acting dean of the Schulich School of Medicine, noted at the launch: “We’re pleased to partner with the hospitals and Canon Medical.” He said the medical school works with 60 regional partners and is eager to help develop new CT protocols.

For his part, Dr. Paul Woods, CEO of London Health Sciences, said, “CTs are a fundamental tool used in medicine today. We do 70,000 CT scans annually at LHSC and St. Joseph’s.”

He said the six new machines “mean standardization at all London hospitals. As the equipment at the research institute will be the same as at the hospitals, we can expect faster translation of research findings to the clinical settings.”

Radiation reduction has been a major movement in CT and X-ray imaging in the past few years, and Robarts will be investigating this area, too. While vendors like Canon have taken huge strides in reducing radiation dose, Dr. Paul said more can be done.

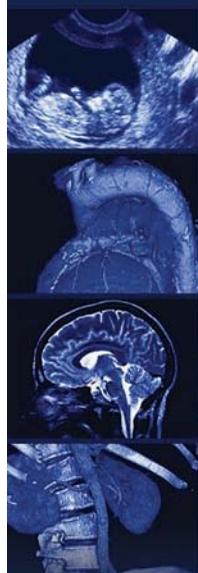
“London has been at the forefront of medical imaging, but we’re taking that excellence to a new level,” said Gillian Kernaghan, president and CEO of St. Joseph’s Health Care London, which hosted the announcement. “This is a very exciting day.”

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AI software accelerates identification of patients for clinical trials

BY JERRY ZEIDENBERG

A Los Angeles-area start-up called Deep 6 AI is shaking up the clinical trials marketplace by applying a new brand of AI to the mix.

Company founder and CEO Wout Brusselselaers explained in a meeting at HIMSS, in Orlando, that traditionally, drug companies have found it very hard to recruit patients for the clinical trials needed to test their new medications.

They often work with hospitals and contract research organizations, which comb through records to find the right patients for the right trial.

Problem is, it's a laborious process and it can take a long time to find even just one patient who meets the criteria of the trial.

Overall, drug industry stats show that pharma manufacturers were hoping to recruit 6.7 million patients in the United States alone for clinical trials in 2016. However, they were only able to find 2.2 million, a shortfall of 4.5 million.

"About 9 out of 10 trials are slowed down by this, as a result," said Brusselselaers.

Enter Deep 6 AI, which has automated most of the process of qualifying patients.

Its first partner was Cedars-Sinai Medical Center, in Los Angeles. "In one instance, using traditional methods, research staff for a cardio study at Cedars-Sinai found and recruited just two patients in six months," said Brusselselaers. "Using Deep AI 6, they identified 16 patients in about half an hour. Three weeks later, eight of them had been recruited onto the study."

These productivity gains allow small departments to drastically increase the number of studies they can successfully perform. Again at Cedars-Sinai, a small team of three recruiters is now finding patients for 30 clinical trials in a year. "Before Deep 6, they had only one research coordinator, who did only one study a year."

The software is making such a difference, that the hospital is hiring more recruiters and launching more studies.

Not only does this benefit patients,



Wout Brusselselaers, CEO of Deep 6 AI

but it's bringing new revenues into the hospital.

"Most hospitals do clinical research as a loss-leader," said Brusselselaers. "It brings them prestige and helps attract talent and patients, but they often lose money doing it." He said that using the Deep 6 AI software, they can find more patients for trial, "exponentially faster", and earn money from the big pharma companies by partnering with them.

The software is proving to be a hit with large, research-oriented hospitals.

Deep 6 AI is now rolled out at 15 different hospital centres, and more are in the works, said Brusselselaers.

This year, the company expanded to Canada, and hired Raj Sharma as Director, Clinical & Academic Partnerships. Sharma is a veteran of the health technology sector both as a clinician and a business leader, and has an understanding of the clinical and technological capacity of



Raj Sharma, Director, Clinical Partnerships

hospitals, universities and their research infrastructure.

His mission is to bring the Deep 6 AI software into the Canadian healthcare sector, to the benefit of patients and hospitals themselves, which stand to earn money from the trials. Raj Sharma can be reached at: raj@deep6.ai

Overall, Deep 6 AI now employs 30 people. Brusselselaers says the company is doubling in size each year, and will hit 60 employees later in 2019.

He explained that it was formed by some like-minded people who worked at different companies, while socializing over "Monty Python, Key & Peele and beers." Brusselselaers himself is originally from Belgium, and speaks English, French and Flemish.

For its part, Deep 6 AI has gained the support of Cedars-Sinai, where it was launched in the hospital tech accelerator, called the Cedars-Sinai Accelerator Pow-

ered by Techstars. The company has also participated in Stanford University's StartX accelerator and TMCx in Houston.

The Deep 6 AI software is quite different than other solutions on the market. Brusselselaers explained that the problem in recruiting patients is that the data needed from their health records is usually in an unstructured format, such as physician notes or pathology reports.

Normally, people are needed to manually read through the records and extract the needed data, which can take weeks, if not months.

"In EMRs, usually only 20 percent of structured data is machine-searchable," said Brusselselaers. "We make the entire record rapidly searchable."

Using AI and natural language understanding (NLU), Deep 6 AI devised a way to convert the unstructured information into data points on a chart. "We take the structured and unstructured data and turn it into a graph. Each patient becomes a multi-dimensional vector, with many thousands of data points."

These points include standard items like blood pressure, temperature, weight, but also more complicated factors, such as tumour histories and Gleason scores, genetic information and mutations, and even lifestyle information, such as smoking history.

According to the company, Deep 6 AI's software's use of graph analyses can also help identify patients with conditions not explicitly mentioned in medical records. As a result, the software finds more patients who better match trial criteria in a fraction of the time.

"This is very difficult for people to do, but it's perfect for machine analysis," said Brusselselaers.

Deploying the Deep 6 software to a health system typically takes about 60 days or less. "Most of that time is spent understanding the system's data structure, setting up the historical ingestion and QC'ing the data, with very limited hands-on time involvement from their staff," said Brusselselaers.

Sunnybrook mobile app helps clinicians easily add notes to patient chart

TORONTO – Imagine being able to add a note about a patient's progress to their chart from anywhere in the world with an iPhone. No physical chart or desktop computer required. That's exactly what's happening at Sunnybrook Health Sciences Centre these days, thanks to an app called SunnyCare Lite.

SunnyCare Lite is a corporate iPhone mobile app that allows clinicians (e.g. physicians, nurse practitioners, residents) to dictate patient notes into the hospital's SunnyCare system by using their phones.

"It was developed in-house and Sunnybrook is the first hospital in Canada to implement this technology," says Oliver Tsai, Director, Information Technology at

Sunnybrook. "We're seeing great results and getting good feedback from our users. It's changing the way they work."

The app is only available through MobileIron (not the App Store.)

When the user logs-in to the secure app, they are presented with their patient list. The user selects the patient they wish to dictate a note on and specifies the note type from a dropdown menu (e.g. consult note, follow-up note).

Next they specify the Service or Clinic, based on whether the patient is an inpatient or outpatient. A Nuance Dragon-powered speech bar appears, and dictation can begin.

Once finished, the note can either be saved as a draft or electronically signed-off. It is then immediately available in

the patient's chart in SunnyCare (the hospital's integrated electronic clinical care system) where it can be reviewed or edited on a desktop computer.

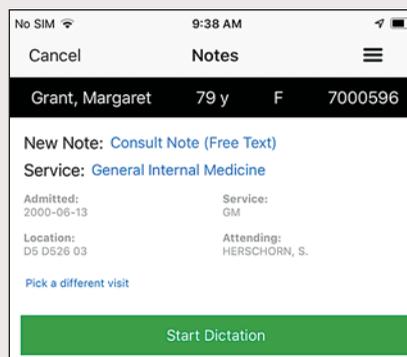
Signed notes are also immediately available in MyChart (the hospital's

patient portal system).

The app launched at Sunnybrook in December 2018 and is already garnering rave reviews from physicians. Dr. Todd Mainprize, Division Head of Neurosurgery, calls the app 'transformative'.

"It has been a major time-saver as it prevents me from having to track down either the physical patient chart or a computer to make a note," says Dr. Mainprize. "It's easy to use because it's with you all the time, and it improves communication within the team, which is ultimately great for patient care."

Dr. Steve Shadowitz, Division Head of General Internal Medicine says, "SunnyCare Lite is a major timesaver, and so functional. I'm dictating notes everywhere, free from desktop or laptop from my phone. It's been tremendous."





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NYGH successfully integrates eCTAS with Cerner information system

TORONTO – North York General Hospital has successfully integrated the provincial eCTAS system into the emergency department module of its Cerner information system. That means more ease of access when triage nurses are logged into the Cerner system and want to use the electronic Canadian Triage and Acuity Scale, as they won't have to switch from one system to another.

eCTAS was created by Cancer Care Ontario in 2017 to provide the tools for accurate triage in EDs, so that hospitals across the province would assess acuity levels in patients in a more standardized way. The project was originally launched after an Ontario auditor general's report found that only 37 percent of patients in sample hospitals were triaged appropriately.

The system was rolled out to hospitals in 2018, and according to the eCTAS website, there are now 120 hospitals using the system.

Many of the hospital ERs adopting the solution were moving from a paper-based environment to a cloud-based, computerized system.

That's a big improvement in itself. But for hospitals like North York General, which has a comprehensive electronic information system throughout the organization, including the ED, it was important to integrate eCTAS with the existing computerized ER solution.

North York General did this, and went live with the integrated eCTAS system in October 2018. Moreover, it also partnered with Cancer Care Ontario, and other hospitals, so the integrated solution could be used by all hospitals across Ontario that have the Cerner FirstNet system for emergency departments.

The project is seen as an acknowledgment of North York General's expertise in



Pictured left to right: North York General's Jennifer Page, Carla Moran-Venegas, Donna Alfoga, Linna Yang.

both electronic systems and emergency medicine.

"We were leveraging the emergency-department knowledge in our hospital for the greater good of all Cerner hospitals in the province," said Sandy Marangos, Director, Emergency and Mental Health. "We see large volumes of patients here, including pediatric patients, and we are able to help improve healthcare, system-wide. It was the right thing to do."

Sumon Acharjee, Joint CIO for NYGH and the Michael Garron Hospital, said leveraging the IT expertise from hospitals who have advanced e-health infrastructure is the best way to move the health system forward and provide more integrated patient care.

The effort was a collaborative one, with

regular meetings and knowledge exchange among NYGH's information technology department staff and ED clinicians, Cancer Care Ontario and the other Cerner hospitals wishing to adopt the solution.

Linna Yang, Manager of Clinical Informatics at NYGH, said that Michael Garron Hospital (the former Toronto East General) was set to go live with the solution in its ED in March, as was the Cornwall General Hospital and Grey Bruce Health Services, in Owen Sound.

Other hospitals planning to use the solution include Mount Sinai Hospital, in Toronto, and Grand River Hospital, in Kitchener, which is a relatively new user of the Cerner information system.

"Each is doing their own testing and tweaking of the system," said Yang. They all

have been working closely with NYGH, and have brought up their own concerns. "They've asked, what about this, and what about that, so they could be addressed in the design of the solution."

Andrea Ennis, Clinical Team Manager, Emergency Department, observed the triage system is an important element for any hospital. "You have minutes to make a decision that could determine the life or death outcome for the patient," she said.

For this reason, triage nurses are some of the most highly skilled in the department, with excellent reasoning and decision-making abilities. For its part, NYGH has 135 nurses in the ED, with 50 participating in triage.

Carla Moran-Venegas, ED Triage Nurse and a leader of the eCTAS integration project, noted that a good deal of work was needed to customize the eCTAS system to suit NYGH's processes and workflow. That meant many meetings, and substantial testing and training. "It's complicated, but it leads to a better outcome," she said. "The system is here to support the clinicians, but they needed to know their existing workflows wouldn't be disrupted."

Donna Alfoga, Clinical Application Consultant, Clinical Informatics, said the go-live for the integrated eCTAS system at NYGH was simultaneous with the October activation of the Computerized Provider Order Entry (CPOE) system. It's another important solution for improving patient safety and quality outcomes.

As a result, last fall was a busy time for information technology at the hospital. Nevertheless, the final testing and training at NYGH went smoothly, said Jennifer Page, Clinical Nurse Educator – so much so, that many nurses started adopting the integrated triage system even before the two-week training period was over. "The transition really was seamless," she said.

Israeli health-tech accelerator is reaching out to Canadian medical centres

A health-technology accelerator at the biggest hospital in Israel is now striking up co-development agreements with Canadian hospitals to mutually devise and test innovations.

The Accelerate-Redesign-Collaboration (ARC) centre, an incubator at the 2,000-bed Sheba Medical Center, recently formed alliances with The Ottawa Hospital, McGill University Health Centre, and discussions are in the works with the Centre Hospitalier de l'Université de Montréal (CHUM).

ARC is reaching out to other hospitals in Canada that are interested in fostering innovation and testing new concepts.

In the United States, ARC is already working with Stanford Hospital and Clinics, Brigham and Women's Hospital, and the Henry Ford Health System, among others.

Some 28 companies are now working with ARC, which started about a year ago at the Sheba Medical Center in Tel HaShomer. "They get access to our

anonymized data, and we are one of the most digitized hospitals in the world," commented Dr. Eyal Zimlichman, chief medical officer and chief innovation officer at Sheba. He added the data must also stay on site, as an additional privacy measure.

ARC was exhibiting at the recent HIMSS conference in Orlando, Fla. It was seeking to publicize its programs and attract further partnerships with medical centres, universities and entrepreneurs, as well as with industry partners and potential investors.

Prof. Robert Klempfner, Director of the Cardiovascular Prevention Institute in Israel, is part of the team at ARC. He explained that ARC is forming partnerships with organizations around the world to share expertise and jointly test new ideas.

"If an idea works in Israel and it also works in Rochester and Ottawa, it's even more valid," said Dr. Klempfner.

He said that unlike most accelerators and incubators, the idea for technologies at ARC start in the hospital. "We're look-

ing at the pain-points of our institutions, and we're looking for solutions," noted Dr. Klempfner. He observed that normally, it's the other way around – companies come to incubators with solutions they already have in the works.

He said there will be ARC centres established in Canadian hospitals, but that ARC is to be more of a state of mind

ARC is seeking partnerships with hospitals across Canada that are interested in fostering new innovations.

than a physical space. "They don't need floor space, they need ideas," said Dr. Klempfner. "The goal is to create a culture of innovation among nurses, doctors, CFOs, and others."

In short, ARC is to be an "ecosystem for start-ups". He noted that ARC at Sheba just gave out 15 grants of \$50,000 each to what they call Level One start-

ups. There will be additional levels of development, including partnerships with large companies like Google, Microsoft and Boston Scientific, to help scale-up innovations.

After a year in operation, there are many promising ventures coming out of ARC, said Dr. Klempfner. They include a tele-cardio rehab project, currently in partnership with St. Paul's Hospital in Vancouver.

Dr. Klempfner observed that after suffering a heart attack, many patients don't return to hospital for rehab, which reduces their chances of a good recovery.

"Only 20 percent of the patients in Canada return for cardio rehab," he said. So instead, ARC and St. Paul's are testing the use of remote monitoring and wearable devices, such as the Apple watch or the Garmin watch, with specialized apps for cardio rehab.

"We believe that you can solve 99 percent of the problem of rehab without the patient coming to the hospital," said Dr. Klempfner.

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CAMH expands its information system, creates portal for patients

TORONTO – CAMH, one of Canada's leading providers of mental health care, has deployed information technologies so effectively that it was awarded a Stage 7 designation by HIMSS in 2017. Stage 7 is the highest tier on the HIMSS ladder, which measures the use of IT in patient care.

The organization continues to expand its use of technologies, but the guiding principle is to use IT as an enabler of better care.

“The overarching principle is to make sure that technology meets the needs of our stakeholders – patients, clinicians and physicians. Technology must be a tool to support the delivery of patient care,” noted Heather Sulkers, senior director, enterprise project management office and clinical informatics at CAMH.

In 2018, Sulkers was named one of the most influential women in health IT by Chicago-based HIMSS. That international award followed Digital Health Canada's recognition of Ms. Sulkers as one of the top 10 women IT leaders in Canada.

Sulkers observed that CAMH is currently in the midst of a large, physical expansion, with two new buildings on its main downtown Toronto campus set to open in mid-2020. The IT team is working closely with engineers and architects to extend the technological infrastructure into the new facilities.

At the core of the tech system is the Cerner electronic health record, called I-CARE, which supports advanced features like computerized provider order entry (CPOE) and closed-loop medication management.

I-CARE extends to all parts of the hospital, and it ensures “there's one source of truth for everyone.”

Sulkers said CAMH wants to make sure it stays current with new features of the system. It also wants to ensure that it's meeting the needs of patients and care teams.



Heather Sulkers notes that I-CARE extends to all parts of CAMH, and ensures there is one source of truth.

CAMH has been putting a great deal of work into analytics, and recently won a HIMSS Stage 6 award on this front, too.

As part of the process, it showed how analytics have improved the delivery of care in three different areas.

Now, using analytics, the goal is to make the jump to “predictive medicine,” she said.

“We have a whole centre researching neuroinformatics,” said Sulkers. “It's leveraging information from I-CARE, and mar-

rying the data with genetics for example.”

She said a new level of insights and understanding will eventually be created by the team at the hospital's Krembil Centre for Neuroinformatics, which is using high performance computing, and new computational methods such as deep learning. “We'll be able to send that data back to the clinicians.”

On another front, CAMH has embarked on creating a patient portal. “We've

been working on it for the past number of months, and it will have a phased-in approach,” said Sulkers.

Patients will be able to access a sub-set of their electronic record in the portal. It will include lab results, along with information about upcoming appointments. The portal will also offer wayfinding, so that patients can more easily find their way around the large CAMH site, and it will provide self-assessment tools.

“Patients will be able to fill out self-assessments in the comfort of their own homes, prior to seeing their clinicians,” said Sulkers. “This will save time, since the clinicians won't have to ask these questions during the appointment.”

Easier access to their own data may also help patients with their therapies and recoveries, as it's believed that providing patients with personal data – in a secure way – is empowering.

CAMH is also committed to making the delivery of care as convenient as possible. For this reason, it has been ramping up usage of video visits – which connect clinicians and patients via computers from any location.

“We've seen a 4,000 percent increase in telemedicine appointments in the last three years,” said Sulkers, an extraordinary surge. “It's all about removing barriers and enhancing services.”

And with smartphones becoming ubiquitous, the organization is also increasing its focus on mobile solutions and apps. “It's incredibly important with our younger patient population,” said Sulkers.

The patient portal will be accessible on smartphones, and CAMH is also piloting a number of mental health apps.

The challenge in this area, observed Sulkers, will be capturing the wealth of information from mobile apps in the central I-CARE system. “There's lots of apps out there, and lots of information. The challenge is how to integrate it with our clinical information system.”

TELUS provides cybersecurity services to SickKids

In 2017, TELUS built on an existing relationship with The Hospital for Sick Children (SickKids) by providing crucial network and security management services to the Hospital.

At the time, SickKids was about to embark on its largest clinical transformation project to date with the launch of its new Epic health information system. This new system integrated all patient information and charting, making relevant data readily available on any device to clinicians, patients and their families.

Operating this platform required its own dedicated network and security solution, separate from those being used by SickKids itself.

As part of the Hospital's digital transformation, Scott Currie, Chief Information Security Officer, was tasked to convert the existing security capabilities at

SickKids into a consistent framework that could withstand threats facing the healthcare industry.

“As a healthcare organization, we are entrusted with a significant amount of very sensitive and private data,” said Currie. “When I joined SickKids, my biggest concern was about all the things I didn't know were happening. The entire healthcare sector trails other industries and we all need to prepare for constantly evolving security challenges.”

TELUS was selected as the preferred proponent for this project, following the broader public sector process of issuing a request for proposals.

SickKids and TELUS have been partners for several years on telephony and some initial security deployments.

TELUS was also able to merge network and security management services and provided a single point of contact for all needs.

On the network side, SickKids retained ownership of its legacy infrastructure and systems, while TELUS's ITIL-based VITILcare services deliver 24/7 health monitoring and emergency response, release management, device management and configuration, patch management and configuration, ongoing

The new Epic information platform required its own dedicated network and security solution.

tuning and optimization, as well as incident, problem and change management.

TELUS also provides full 24/7 management and monitoring for the Hospital's network.

SickKids and its new health information system are now protected by new

firewalls, web content filtering, endpoint security and more, including intelligence from the world's largest SaaS security platform.

They also have ‘single pane of glass’ visibility into any network and endpoint security event. Plus, to ensure issues are either prevented or addressed as quickly as possible, TELUS has embedded a security architect at the hospital four days a week.

“This was a major infrastructure deployment and we wanted to build and design security from the ground up, rather than layer it onto a legacy project,” said Currie, “I want to be able to say to parents and families that we have all the tools necessary to treat your child. That means having access to information when needed, a strong network that supports every platform and a cybersecurity program that protects SickKids at all times.”



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Scarborough Health Network introduces computer-assisted coding

Inpatient coding is a complex and tedious process that has not changed in the past 30 years. Health records departments are under constant pressure to meet tight coding timelines while competing for a shrinking pool of expert coders. A growing number of requests to collect additional data elements, in addition to increased scrutiny on the accuracy of the information, make turnaround times even more difficult to achieve.

Each patient chart can be the equivalent of reading an arduous textbook; coders end up rushing through documents and feeling pressured to code for quantity versus quality.

In addition to struggling between data residing in hybrid systems (e.g., paper, electronic and scanned documents), there are issues of duplication (e.g., copy and paste of text) and inconsistency (e.g., different diagnosis documented by different care providers).

Finally, the introduction of activity-based funding models has increased the pressure on hospitals to improve the quality of their data. Diagnoses and procedures that are missed or not captured at the greatest level of specificity, are costly to hospitals.

Enabling coders to perform consistently along the productivity and data quality axes is a struggle. Combining digital data and computational technologies may provide a possible solution. Computational coding enhances the coder workflow by reading clinical documents, recognizing evidence and making recommendations to coders to capture all significant diagnoses and procedures.

The Scarborough Health Network (SHN) embarked on a journey with 3M in 2017 to introduce Computer-Assisted Coding (CAC) in its coding practice to improve coding productivity and data quality.

Majid Sharafi, Manager, HIM – Coding and Data Quality at SHN, says the intent was to minimize the time spent reading complex and lengthy discharge summaries and OR notes, and to allow more time for



Advancing coding at the Scarborough Health Network. Pictured left to right: Akeela Jamal, 3M; Hemal Shah, Inpatient Coder; Majid Sharafi, Manager HIM-Coding and Data Quality; Minerva Raymond, Patient Coder.

coders to focus on the complex process of assigning codes.

The implementation of CAC at the Scarborough Health Network had an impact on the way coders accessed and viewed documents, as well as on their workflow.

A prerequisite for CAC is availability and access to clinical documentation and other data feeds in electronic and computer readable form that are required for coding. On the coder side, coders are trained to use the evidence and recommendations made by the computational tools to select appropriate codes.

A key feature of the tool is the ‘Coder View’ which brings in all documents used in the coding process into a single point of access through HL7 interfaces. This allows the coder to read the patient’s clinical story without having to go in and out of multiple sources and search for documents.

The Natural Language Programming (NLP) engine identifies and annotates all diagnoses and procedures from the available list of documents. This frees coders from the non-coding tasks of searching for relevant information and ensures that medical conditions are not overlooked by coders. The annotations enable complete and accurate code selection, and guide the coder to the most appropriate set of codes that reflect the acuity of the patient and the care provided.

A year after implementation, SHN conducted a detailed study to understand the impact of using this tool on their data quality. The objective of the study was to measure the accuracy of the diagnosis codes captured and whether using this tool influenced the hospital’s weighted cases.

A black belt statistician compared baseline inpatient data that was coded prior to

the go-live date (about 2,400 inpatient charts) with data coded six months after go-live (about 3,900 inpatient charts) using CAC. The analysis demonstrated that the length of stay and average weighted cases of the two datasets were not statistically significantly different; differences in coding could confidently be attributed to the coders using the new software system.

The study relied on multi-variable regression analysis to measure differences in the following indicators: number of diagnoses and procedures coded, the comorbidity level, the resource intensity level and the weighted cases (both Resource Intensity Weights (RIW) and Health Based Allocation Model (HBAM) Inpatient Grouper (HIG) weighted cases). Overall, the results showed an increase in the level of acuity reflected in the data when coders used CAC to code their charts, particularly when Newborn, Paediatric and Obstetric cases were excluded.

When comparing the baseline data with data coded using the CAC software, it was determined that the absolute number of diagnoses coded per chart increased for all inpatient coders. In addition, there was a 3% increase in the Comorbidity Level and 4% increase in Resource Intensity Level reflected in the data.

Most importantly, there was a statistically significant increase in weighted cases ranging from 5% up to 13% increase in average Ontario-specific HIG weighted cases across all the inpatient coders.

These results were significant from a hospital funding perspective. With additional training, software optimization, and additional documentation being made electronic, it is expected that the outcomes will only continue to improve.

Another exciting opportunity in the CAC roadmap is the benefit from advances in NLP and artificial intelligence. Machine learning technology now exists in being able to analyze coded data and start to suggest the most appropriate diagnosis and procedure codes.

Apps may benefit First Nations older adults living with dementia

BY REBECCA IHILCHIK

Rising rates of dementia in Canada are a known public health concern. What’s less commonly understood is how dementia affects Indigenous communities in Canada.

Rates of dementia in Indigenous communities have been steadily increasing for the past decade – and research shows that onset is now occurring, on average, 10 years younger than in non-Indigenous communities.

The Baycrest-led Centre for Aging + Brain Health Innovation (CABHI) is supporting a pioneering study that explores how language development technology can improve quality of life for Indigenous older adults living with dementia and their caregivers.

The study will introduce a group of

First Nations older adults to apps that use learning, games, and quizzes to engage users in five Indigenous languages (Cree, Saulteaux, Dakota, Lakota, and Nakota). The project will assess how engagement with language stimulates brain activity, as well as identify user needs in adopting the technology.

Participating older adults and caregivers are from 11 First Nations in southern Saskatchewan, represented by the File Hills Qu’Appelle Tribal Council. The 15-month study is being conducted by Indigenous community-based health research lab Morning Star Lodge, led by Dr. Carrie Bourassa, scientific director of Canadian Institutes of Health Research, Institute of Indigenous Peoples’ Health.

“We are working with our partner, the File Hills Qu’Appelle Tribal Council, to explore how technology can address

aging at home as well as treatment and prevention of dementia among their communities,” says Bourassa.

App use is expected to benefit older adults by making it easier to age at home

for longer – reducing costs to the healthcare system – and to improve the quality of life for caregivers. Many older adults in Indigenous communities are aging at home, often in an intergenerational setting.



Dr. Carrie Bourassa

Because the participating First Nations communities are far from urban centres, caregivers do not have easy access to mainstream services that could support them. “We

know the caregiver experience in our communities is a bigger burden, if you will, because they’re taking care of everything themselves,” says Danette Starblanket, lab co-lead.

“We want to help caregivers by giving them access to an educational activity they can do with their loved ones.”

The study is also assessing how to best support caregivers and older adults in adopting dementia technologies in general.

“The communities totally understand the benefits of technology, but it’s a matter of accessibility and readiness,” Starblanket says. “We want to support them to feel more comfortable using technology that will be of benefit.”

The lab hopes the study, as a first step, will lead to a shift in cultural mindset and to the uptake of other technologies.

New app from Brock research team aims to help catch heart disease

BY COLLEEN PATTERSON

ST. CATHARINES, ONT. — Grace Cabral knew she had a family history of cancer, but never thought the pain and discomfort she was experiencing at the age of 45 were early symptoms of heart disease.

“When I think back, I know now that I had been having early warning signs of a heart attack for about seven months before it happened,” Cabral says.

Based on research examining how people want to learn about heart disease, Brock University researcher Sheila O’Keefe-McCarthy has launched a new web app to help identify symptoms before it’s too late.

“The earlier you are able to recognize serious signs and symptoms that lead to heart disease, the faster you can mitigate them and move toward better heart health,” says O’Keefe-McCarthy, Assistant Professor in Brock’s Department of Nursing.

“This cutting-edge, online screening tool will help patients and clinicians identify symptoms of encroaching heart disease and assess individuals at risk.”

The premise behind the app is the development of the Prodromal Symptoms Screening Scale, which aims to proactively identify problematic symptoms – indicative of the development of coronary artery disease – that people experience months, weeks and days before a heart attack strikes.

Along with the screening of possible prodromal symptoms, which are specific warning signs, the tool includes a risk factor profile, including targeted screening for women who may have had gestational diabetes or hypertension, predisposing them to the development of heart disease earlier on in life.

The online screening tool was developed by a team of 12 people, led by O’Keefe-McCarthy, including researchers from Brock and the University of New Brunswick, clinical partner Niagara Health, industry partner Pivot Design Group, community partners and knowledge users from Heart Niagara, Cardiac Health Foundation of Canada and the Canadian Council of Cardiovascular Nurses, along with male and female patients.

“Many patients who have suffered a heart attack look back on symptoms they have experienced, not realizing they were red flags,” says O’Keefe-McCarthy. “Through research funded by the Women’s College Hospital Research Institute’s Women’s Xchange, we learned that patients and healthcare professionals wanted to become more educated about these early indicators and requested that information and tools were developed in this format.”

Cabral’s participation in the research helped validate the findings that developed the 13-item tool that also identifies a person’s modifiable and non-modifiable risk factors, on top of the early warning signs.

She wants the public to realize it can be difficult to recognize heart disease, because it is often not spoken about, particularly among women.

“I would get a burning feeling in my chest or suddenly feel so winded, as if I couldn’t get enough air,” she says. “Since these symptoms usually occurred with increased activity or after a meal, I never

thought anything of it. If I did, I rationalized it as being tired, out of shape, or that it must have been something I ate.”

In April 2017, while on a walk with a friend, Cabral experienced what she described as hot burning water poured all over her chest. It was followed by difficulty

breathing, severe back pain, and eventually a trip to the hospital, where it was discovered that her heart wasn’t getting enough oxygen.

Cabral has been going to cardiac rehabilitation ever since and became involved in Brock’s Heart Health Education Research in September 2018.

“My role in developing the screening tool has been to help interpret the study results as it applies to a woman’s experience of heart disease and act as a health advocate,” Cabral says. “The app is very user-friendly, and the results show various levels of urgency to go see your healthcare provider.”

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Conference aims at helping frontline care-givers

‘Technology and the Future of Healthcare’ takes place May 8 in Hamilton, Ontario.

BY DR. SUNNY MALHOTRA

The healthcare system in Ontario is under strain. Resource limitations have become immediately apparent and our focus has started to turn to efficient use of these scarce resources. Significant inefficiencies have resulted from poor integration among healthcare silos. This can lead to waste – such as redundant testing. It also leads to patient dissatisfaction, as the delivery of care is disjointed.

And as healthcare providers, the satisfaction that we derive from our role as caregivers is directly related to the quality of care that we provide. Poor results worsen our own experiences.

As caregivers, we care. This is who we are – and this is why we went in to medicine in the first place. So as healthcare providers in 2019, we are faced with a choice: do we change who we are to account for the limitations that we face, or do we change the limitations?

Remote monitoring, personalized medicine, harnessing the power of EHRs to improve patient care, convenience and outcomes, data analytics and artificial intelligence are all poised to produce positive exponential and disruptive change in healthcare.

Solutions can range from direct interaction with patients through natural language processing (NLP) technologies to achieving improved administrative efficiencies through machine learning.

The possibilities are potentially limitless if we understand and embrace the technology available to us, while accounting for and respecting the limitations

of the technology itself. Now we have to embark upon the journey of understanding technology in a way that we as healthcare providers have not before.

The Technology & the Future of Healthcare Conference, to be held in Hamilton, Ont., on May 8th, is among the first conferences aimed at forward-thinking, frontline healthcare providers who recognize the

The conference will focus on five key areas: telemedicine, artificial intelligence, cybersecurity, EMRs, and personalized medicine.

emerging need to understand and implement technologies in their practices.

The purpose of TFHC2019 is to define and understand digital health, obtain relevant information which aids in guiding our delivery of healthcare services, and to identify what we see as the most relevant healthcare challenges today. TFHC2019 will examine digital health by focusing on

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



five key areas: Telemedicine, Artificial Intelligence, Cybersecurity, EMR/EHRs and Genetic Testing & Personalized Medicine.

Conference co-chair Dr. Dennis DiValentino says, “It hasn’t yet been determined what our role, as frontline providers will be in this digital revolution. We do know two things are for certain. The transformational change that is required in healthcare can only be achieved through a multi-sector collaborative approach, and that we, as providers, will have to play an integral role in helping drive and shape healthcare delivery.

“One summit won’t solve the problem, but our goal is for it to act as a spark,” he said. “At TFHC, we hope to spark the multi-sector collaboration that is required to produce that change, not just on May 8th, but instead, continue that momentum and

keep it going all year round.” TFHC2019 registration is now open at www.tfhconference.com

The good news is we are at the dawn of a new digital revolution and there are budding technological categories that can position us to address the challenges plaguing healthcare delivery.

We are seeing politicians now attempting to re-structure healthcare agencies to introduce efficiencies. If carried out effectively, these various advancements may very well support us, as providers, and they could play a critical role in the transformation of healthcare service delivery.

Healthcare procurement needs a more innovative environment

BY DENIS CHAMBERLAND

The World Health Innovation Network (WIN) holds an ambitious and refreshingly reformist mandate. It includes brokering “partnerships between key stakeholders to source, embed and scale innovations in health systems.”

It also develops “the evidence of impact and scalability across health systems and disseminates this information to accelerate health system transformation, drive economic growth and improve patient outcomes.”

WIN’s home is the Odette School of Business at the University of Windsor.

One area that WIN focuses on is public procurement, an area not known for its simplicity.

WIN strives to introduce innovation into the healthcare system and, with public procurement, it aims to describe the effects of existing procurement practices on such innovation.

Like a number of other organizations in Canada, WIN shares the view that current practices in procurement impede innovation in the healthcare sector.

WIN’s recently published case study, “Bringing a Surgical Innovation to Market”, offers a concrete example of such obstacles. The case study is presented within the context of a series by WIN entitled “Procurement and Innovation Adoption in Health Systems.”

The case study is sweeping in its analysis and I set out here only the parts which are essential to these comments.

The study describes the steps taken by a Canadian start-up to introduce a new technology that offers a solution for surgical visualization aimed at improving the accuracy, safety and effectiveness of surgical care for patients.

The innovative technology requires less time for clinicians in the operating room and promotes more accurate surgeries.

Achieving both objectives would translate into costs savings over a relatively short timeframe.

To increase the chances of the new technology’s acceptance, the company engaged surgeons in the R&D phases as subject matter experts,

helping to ensure that the innovation would achieve the best possible outcomes for both doctors and patients.

As a result of their direct involvement in the development of the new technology, the study tells us, the surgeons became formidable champions in efforts to procure the technology, particularly in the United States where a privatized health system is more willing to invest now to achieve long-term cost-savings.



Denis Chamberland

In the U.S., moreover, the procurement rules are far less focused on process and more on outcomes. For these reasons, selling to U.S. hospitals tends to be much easier and typically takes much less time.

The study tells us that the Canadian start-up did well in the United States: “The strategy of leveraging the competitive nature of surgeons and the highly competitive, privatized health system in the U.S. was highly successful for this company.” Partly because of the more efficient FDA regulatory approvals process, the start-up sold more than 30 units to U.S. hospitals within months of regulatory approvals.

Contrast that with the constrained capital equipment budgets in most Canadian hospitals, where capital budgets are often frozen, if they are not contracting, and where cost reductions from procurement are typically not tracked.

The study explains how efforts to sell into the Ontario market “had

CONTINUED ON PAGE 18

Technology likely to play a major role in Ontario's health restructuring

BY JERRY ZEIDENBERG

Premier Doug Ford's Conservative government in Ontario is sure shaking up the province's health-care regime. Earlier this year, it announced the creation of a "super-agency" called Ontario Health that will consolidate the operations of the 14 regional LHINs. It's also absorbing six agencies – Cancer Care Ontario, Health Quality Ontario, eHealth Ontario, Trillium Gift of Life Network, Health Share Services Ontario, and the HealthForce Ontario Marketing and Recruitment Agency.

It's not that Ontario Health will act as a monolith. Instead, healthcare delivery will be organized into five regional agencies.

Moreover, hospitals, long-term care facilities, doctors and other clinicians will be re-organized into 30 to 50 teams across Ontario, with each serving up to 300,000 patients.

In making the announcement, Health Minister Christine Elliott observed that one of the problems gumming up healthcare delivery is the silo effect – that currently, various parts of the healthcare system don't really talk to each other.

It's very hard to share information, so oftentimes the process of making appointments and referrals, transferring patients, and getting patients into an appropriate level of care takes too long.

Elliott asserted that the various kinds of caregivers should be collaborating more closely, and to do it, better technology systems are needed.

In particular, long-term care facilities should receive more investment in technology. They're often referred to as the "poor relations" in the healthcare family, in comparison with hospitals.

We know, of course, that too many ALC patients are sitting in hospital beds when they should be in nursing homes or, if possible, back at home with the appropriate home-care services.

Here, too, technology is available to provide the necessary home-care monitoring. Leadership will be needed, however, to set up the "command centres" needed to keep watch on these patients and provide the right feedback to patients. Crucially, these agencies will need to be vigilant when patients are in trouble – connections will be needed to doctors, nurses and emergency services.

And to keep patients out of expensive emergency rooms when they don't really need high-level care, the government is talking about the importance of "virtual visits" with doctors.

Many patients, especially those without a regular GP, make use of the local emergency room when they have a cough, cold or rash. These are the kinds of visits that could be handled via video visits or even text messaging.

The Ministry of Health has noted that in the United States, many providers of healthcare are making heavy use of virtual visits. Kaiser Permanente, a big, non-profit provider of acute and primary care services in several U.S. states, says that 50 percent of its primary care encounters use virtual medicine and telehealth.

If the Ministry follows through, this could mean a bigger role for the Ontario

Telemedicine Network, which is already leading the way in testing and providing virtual visits.

But to really implement a solution of this sort, the province is going to have to re-jig the compensation structure for physicians. Doctors will have to be encour-

aged to use virtual technologies by remunerating them for the calls, whether they're by video, text or email.

This will really amount to a sea-change in the delivery of care in the province, bringing it into the 21st century. To be sure, the technology is there. Several

providers have already offered solutions, but some quickly left the market, as there was no government support for their work. Patients were required to pay monthly or yearly fees to access the services of online physicians, which they just weren't ready to do.

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Cardiology monitoring solutions become smaller and more powerful

A new generation of devices and networks enables patients to track their heart-health while at home.

BY DIANNE DANIEL

While visiting her daughter in Midland, an Ontario resident experienced a fainting spell. Her daughter brought her to Georgian Bay General Hospital where she was prescribed the m-CARDS PocketECG, a wearable cardiac monitor that provides real-time monitoring of heart rhythms and symptoms for up to 28 days.

The small, easy-to-use device was shipped to the daughter's home the next day and the woman began to use it, attaching three electrodes as instructed and using the touchscreen to record her symptoms and activities.

A short while later, on her car ride home to St. Thomas, Ontario, and still wearing the device, she had a second spell. Her husband rushed her to St. Thomas Elgin General Hospital.

While she was being seen in the Emergency unit, the report from her mobile heart monitor was being read by a cardiologist on the m-CARDS system, who subsequently contacted the treating physician to alert him that she required a pacemaker. She was transferred to London Health Sciences Centre where she was fitted with a pacemaker the following day.

"They had been investigating her syncope for 15 years and nobody had been able to capture it," said Sandy Schwenger, CEO and founder of m-Health Solutions, the Burlington, Ontario-based company providing the integrated m-CARDS system for remote patient monitoring and cardiac diagnostics. Recently, m-Health Solutions adopted the Pock-



etECG, manufactured by Medicalgorithmics, as its go-to technology. Schwenger calls it "a Holter on steroids" and says that it is indicative of the "smaller, cleaner, faster and better" trend in the digital cardiac monitoring space.

The PocketECG is about the size of a cellphone. In

addition to capturing and classifying every heart-beat, and detecting all ventricular and supraventricular arrhythmias, it applies proprietary algorithms to run full statistical analysis on the data collected. Reports are in-depth and aid in determining a precise diagnosis for even the toughest of cases.

Whereas in many cases a Holter monitor needs to be returned and data downloaded before a report can be generated, data from the PocketECG streams in real-time. When an alert occurs, the information is uploaded to one of 300 Ontario cardiologists currently on the m-CARDS system, who make diagnoses or recommendations and notify the patient and/or treating physician.

"Our service standard is that the cardiologist has to look at it within 60 minutes of it arriving in the queue," explained Schwenger, noting that patients are matched to the cardiologist nearest to their geographic region. "In the event they can't get to it, we have somebody who is on call who can take a look and do the assessment."

The service is available province-wide and prescribed by more than 3,500 general practitioners. Data is stored securely on servers in Canada and patients are supported by a call centre that supports 12 different languages. The units themselves ship from a central warehouse. To date, more than 85,000 patients in Ontario have been diagnosed on the system and the company is now working on a similar project in Alberta.

"We looked at building it ourselves, but the answer was no, there is something out there that meets our needs," explained Schwenger, who says the company's innovation is on the process side, implementing the mobile technology in a way that makes sense

ILLUSTRATION: LINDA WEISS

Insertable cardiac devices are being integrated with apps

Trevor Cook, senior director of Medtronic Canada's Cardiovascular Group, believes mobile strategies are transforming the cardiac monitoring ecosystem. Medtronic's Reveal LINQ Insertable Cardiac Monitoring System is a tiny device – about the size of a matchstick – that is placed just under the skin in the chest area to provide monitoring for up to three years. Once inserted, heart rhythm information is securely transmitted to the company's CareLink remote monitoring network via a cellular-based patient monitor.

Similar to the PocketECG and other remote cardiac monitors, the information is monitored daily and interventions take place as required. The technology is often used to assist with the diagnosis of unexplained fainting, unexplained stroke, heart palpitations and suspected atrial fibrillation in those patients whose symptoms cannot be successfully diagnosed using a shorter term monitor, such as a Holter.

Last year, the company launched an app-based device management solution called Reveal LINQ Mobile Manager that is improving the way clinicians interact with the device. Designed for the Apple iPad and available as a free download from the App Store, the secure app is "simplifying the clinician experience and making ease of use come to the forefront," said Cook.

Typically, clinicians use a larger, tethered machine called a programmer to manage the process of inserting and activating Reveal LINQ, and to perform follow-up device checks. The procedure normally takes place in a sterile operating room, though some hospitals perform the procedure with a programmer in a clean-room environment. By introducing a mobile app, the company has made the entire process more efficient and has enabled insertions to take place without having to rely on a programmer. Clinicians can also use the app to review and manage patient data from anywhere within the hospital.

"Rather than moving patients around, you can move technology around and improve your workflow," said Cook. "Clinicians are working from a tablet rather than from a programmer that's pretty much set in one room within the hospital."

The Montreal Heart Institute was the first Canadian centre to insert

Workflow and ease-of-use are improved when clinicians are able to make use of apps.

Reveal LINQ outside of an operating room, and has used Mobile Manager since May 2018 to manage the process. Cardiologist Dr. Blandine Mondésert said the app is reducing insertion time by as much as 50 per cent, and called it a "big improvement" for the entire process.

All of the information required to manage the insertable monitor is

displayed on an iPad, including the unique product identification information. As she's completing the insertion, she watches the rhythm strip and follows the technical information to ensure good placement.

"If (the reading) is too low we have to remove it and replace it, because if it's too low we can have under-sensing of the arrhythmia," explained Dr. Mondésert, noting that the wireless system doesn't require sterilization and frees up space. The institute adopted Mobile Manager after only a handful of pilot implants were performed. According to Dr. Mondésert, the benefits were immediate. "It didn't take long to convince us to use it. It's part of our workflow now and we don't want to go back."

For its part, Medtronic is working to integrate medical technology with the IT world, said Cook. "It's all about getting these devices to the point where they're less than minimally invasive," he said. "And if you can integrate that with an IT platform, there's a ton of benefit to be had."

for the Canadian market. “We’re a virtual cardiac healthcare facility,” she said.

A two-year study under way at Hamilton Health Sciences is using the m-CARDS system to monitor patients at home as they recover from minimally invasive transcatheter aortic valve implantation (TAVI). Funded by the Ministry of Health and Long-Term Care Health Technologies Fund, the project aims to show that remote monitoring can reduce complications after TAVI and shorten the time patients spend in hospital post-implant.

“We call it expanding the walls of the hospital into the home,” said Katie Porter, Director of Research Administration at Hamilton Health Sciences.

Typically, patients recovering from TAVI remain in a special telemetry unit where they are closely monitored for five to eight days. Now that open heart procedures are being replaced with minimally invasive surgery, however, they feel normal soon afterwards and are eager to return home.

Funding for the study is being used to build out a closed-loop notification between the m-CARDS system and HHS’s Meditech electronic health record so patients can receive the same high-quality monitoring for adverse or unusual events at home as they do in telemetry.

The real-time reports generated by the wearable monitors are securely stored by m-Health Solutions and forwarded to electrophysiologists at HHS for review. The TAVI team is brought in for consultation as required to provide direction as to whether a symptom is perfectly normal or a patient should return to hospital. Ultimately, the streamlined process reduces unexpected visits to the ER and catches symptoms that may be ignored otherwise.

“The goal is to see if we have better outcomes using remote monitoring,” said Porter. A comprehensive economic analysis will be completed as part of the study to show the return on investment and compare the cost of remote monitoring versus a hospital stay. Results are expected to be available by spring 2020.

The University Health Network, in Toronto, is another Ontario healthcare and medical research organization investing in remote cardiac monitoring as a means to shift care to the home and reduce the burden on acute care services.

A telemonitoring program called Medly, developed at UHN and now used by the Peter Munk Cardiac Centre (PMCC) to remotely monitor and manage heart failure patients, is the new standard of care.

The program includes both a technology and a service component and is embedded into the day-to-day practice of the clinic. Patients are referred to Medly on a case by case basis.

The first step is onboarding which includes training on the smartphone app and remote monitoring process, and on any Bluetooth-enabled peripherals required to measure weight, blood pressure and heart rate.

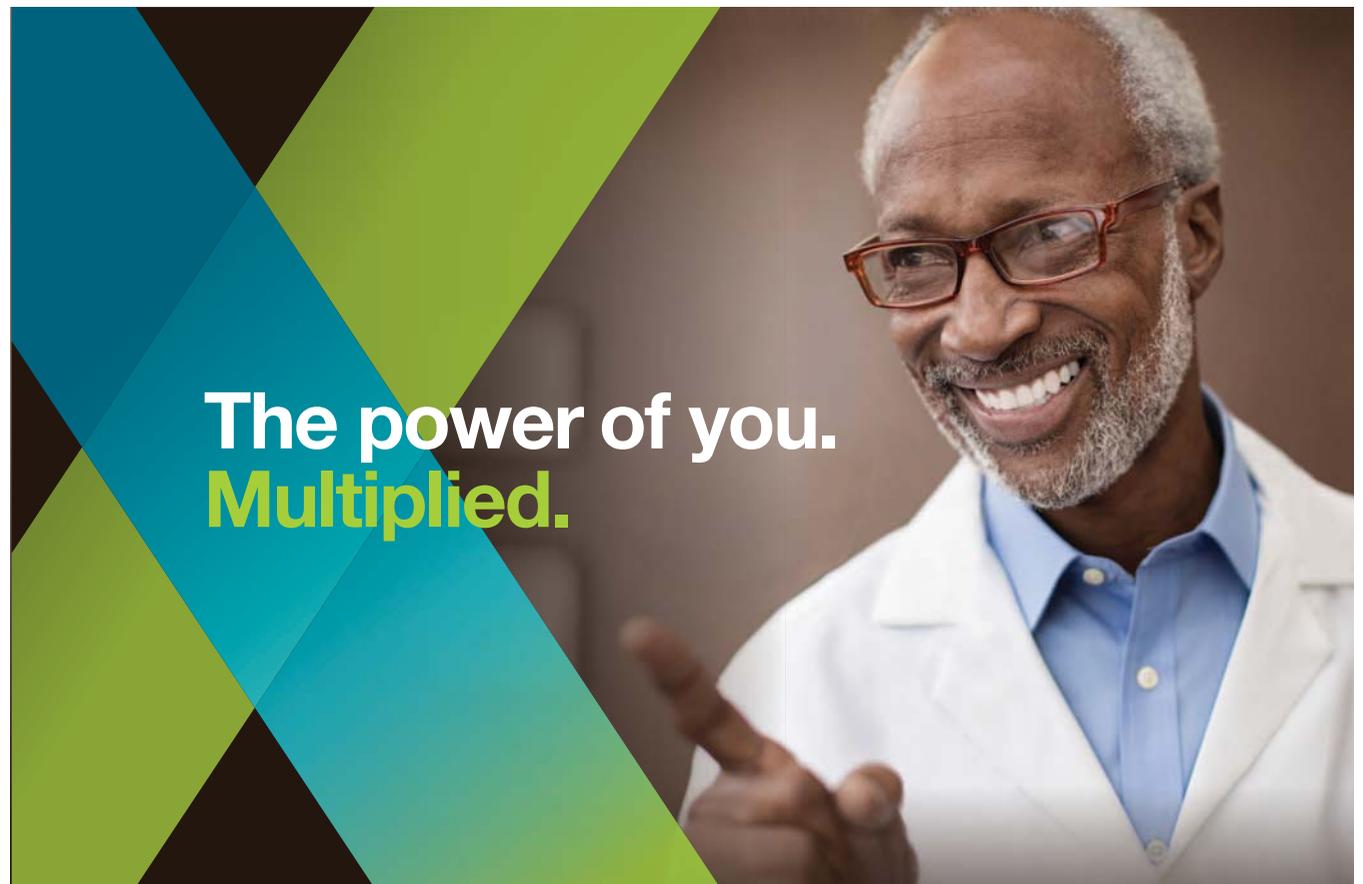
Kits range from a full model that includes all required devices to a bring-your-own model that allows patients to use their own phone, weight scale and blood pressure cuff. Once home, they record their readings and complete a brief symptom questionnaire each day.

The proprietary Medly algorithm, a rule-based expert system refined by PMCC heart failure clinicians, automatically analyzes the information that is entered and generates feedback tailored to personalized thresholds and treatment plans set out by prescribing cardiologists. If a patient’s physiological parameters are normal, no action is required. If something falls outside of the normal range, the app may tell

them to take a prescribed medication or to contact the clinic, for example.

Registered nurse Mary O’Sullivan serves as the full-time Medly clinical coordinator, helping to onboard patients and monitor alerts remotely using dashboard software that is part of the program. One of her primary roles is to monitor alerts, triaging and escalating clinical concerns to cardiologists as required.

“When a physician identifies that somebody might be Medly appropriate, I teach them about the technology, what we expect from them and what they can expect from us,” said O’Sullivan. Not only does the dashboard enable her to “evaluate quickly who’s getting into trouble” but it also provides a holistic view by summarizing a current medication list, heart failure-related lab data, and historical trends for each patient.



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Apps and telemedicine are transforming care for the Cree in Quebec

BY PETER SHEAHAN

On a recent first-time visit to the Cree Nation village of Chisasibi on the eastern shores of James Bay, Dr. Yunghan Au made a list comparing the prices of certain food items in the remote community against what he would normally pay in Montreal, located just a day's drive away.

"A jar of peanut butter, which is less than \$5 in Montreal, costs almost \$13 in Chisasibi," says Dr. Au, vice president of medical affairs at Swift Medical Inc., a Toronto company that provides digital wound care imaging and touchless measurement through a smartphone app. "Cauliflower is almost double the price and carrots are triple the price, so you can imagine how hard it is for most people here to access healthy food."

Affordable healthy food isn't the only necessity that's hard to get in Chisasibi, one of nine Cree villages in northern Quebec.

Like most Indigenous people who live in remote areas across the country, the residents of Chisasibi lack convenient access to many healthcare services – a situation that's all the more lamentable given the relatively higher prevalence of chronic conditions, such as diabetes and obesity among Indigenous peoples in Canada.

"We have the Chisasibi Hospital and various clinics, but when our clients get sick, they have to be (flown) to a hospital with more specialized services," says Katherine Morrow, communications coordinator at the Cree Board of Health and Social Services of James Bay. "This isn't optimal for patients because they're having to get care away from their families and responsibilities."

Technology is helping northern Quebec's Cree bridge the healthcare gap in their communities. At the start of this year,



CBHSSJB nurse David Stroppolo explains how to use the Swift Skin and Wound app to a group of clinicians.

the Cree board of health, Swift Medical and RUIS McGill Telehealth – which serves a vast territory in Quebec stretching from Montreal in the south to Nunavik in the far north – kicked off a new healthcare project. This project sought to give the region's Cree communities something they've never had before: digital technology that measures and tracks chronic wounds accurately, and makes it easier for offsite wound care specialists to assess and diagnose wounds remotely.

"They do have videoconferencing for telemedicine, but for wounds that's not really appropriate because you need a high-resolution image to get a proper understanding of the wound," says Dr. Au. "It's also important to have accurate wound measurements and assessments and be able to track these things over time, because changes in wound area, size and

depth are key indicators of whether or not a wound is healing.

"For a doctor or nurse to have this information is quite powerful because it allows them to confirm if the treatment program is working. Patients are likely to be more engaged in their care if they can view images of their wounds over time."

Access to proper wound care is critical for Canada's Indigenous Peoples, who have a rate of diabetes three to five times higher than the rest of the population and who are one-and-a-half to two times more likely than other Canadians to develop heart disease, according to the Heart Research Institute in Toronto.

Both diseases are associated with higher risks of developing chronic wounds, which affect up to 2 percent of the population in developed countries. Worldwide, more than 305 million acute, traumatic and burn

wounds are recorded and treated each year.

The Swift app pilot project, enabled through digital wound care technology provided by Swift Medical, is just the latest example of how northern Quebec's Cree communities have harnessed technology to improve healthcare for their residents.

Over the last decade, the Cree board of health has rolled out a number of tech-driven programs. Today, pregnant women in the region can get ultrasound exams done in their local clinic while an obstetrician-gynecologist in Val d'Or – about 600 kilometres north of Montreal – reviews the images and talks to the patient and community nurse by videoconference.

One of the earliest applications of telemedicine in the region was in diabetic retinopathy screening, where a Cree health worker takes a close-up photo of a patient's retina and transmits it as a high-resolution image to an offsite specialist. "That was the first use of telemedicine that has now become a mainstream service in our organization, says Morrow.

"We've gone from an era of fax machines and binders in terms of clinical care to 21st century telemedicine. For us, it's all tied to safety and wellbeing of patients – it's best to provide as many services as we can in their communities."

These innovations are all enabled by a high-speed fibre optic network, which was first conceived and built about 10 years ago to loop all nine communities to the Internet. This is a work in progress, says Morrow, with two more communities still to be connected. Still, the application of telehealth and mobile technologies by James Bay's Cree villages could serve as a model for other remote Indigenous communities.

Peter Sheahan is an Associate in Business Development at Swift Medical in Toronto.

BC study shows benefits of secure texting for physicians and patient care

BY SEAN P. SPINA, PHARM.D.

VICTORIA, B.C., is similar to other cities across Canada in that pharmacists are often in high demand and short supply. In my role as Island Health's clinical coordinator of pharmacy, we wanted to improve the efficiency and effectiveness of communication across the care continuum.

Previously, communication occurred when a pharmacist would page a physician and then needed to wait by a landline phone for a return call. The pharmacist usually waited a long time because the physician had no way of knowing the urgency of the page. At some point, the pharmacist would turn to the unit clerk and say, "Hey, when Dr. ABC calls back, tell her about this important drug issue with this patient."

In an era when everyone texts on smartphones, using a pager to communicate critical information is not only inefficient, but also potentially detrimental to the quality and safety of patient care.

My colleagues and I knew that secure texting options were available, but we wanted to make sure the technology we chose to replace pagers would save valuable time and improve care. After evaluating our options, we decided to pilot Vocera Collaboration Suite and study its impact on clinical collaboration and healthcare delivery.

As we planned this study, we discovered that Island Health staff members used a variety of technologies, including personal and corporate smartphones, pagers, and hands-free Vocera badges.

We also discovered there was no master directory of numbers for employees using smartphones or pagers. The lack of a digital directory meant that when someone called, texted, or paged a physician, only a phone number would appear on the physician's device.

Clinicians did not know who was contacting them, the context, nor the urgency of the call or message.

The new solution under evaluation would address this key missing compo-

nent. Vocera Collaboration Suite enables voice communication, HIPAA-compliant texting, and alert notifications via smartphones, hands-free badges and web consoles.

The intelligent software system powering the app routes the right information to the right care team member

based on name, role, group or availability. The solution also has many other benefits, including the ability to exchange key patient data to support medical decision-making. But our study focused purely on the results of using the software's secure texting feature.

Our IT staff, Island Health Pharmacy Services, hospital physicians, and a senior executive all were involved in our

study of the new texting solution. The Information Management and Information Technology (IMIT) department delivered intensive support to implement the technology, and we also received strong backing from physician leaders, including 10 department heads who agreed to use the smartphone app.

Two Vocera support team members trained the research team for a day. After that, our team delivered one-on-one training to users or in group sessions. We used live training videos off iPhones to show the pharmacists and physicians how to use the app. Almost all the physicians downloaded the app to their personal smartphones.

Measuring the physician experience: After implementing the mobile app, physicians reported fewer interruptions. Twenty-eight percent of doctors said they agreed or strongly agreed that the solution improved patient care; 31% said they thought it improved patient safety, and 38% said they believed it hastened care

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Sean Spina

Microsoft returns to mixed-reality headset market with HoloLens 2

At a February Microsoft event in Barcelona, corporate VP Julia White, along with Microsoft CEO Satya Nadella and Technical Fellow Alex Kipman, introduced a new version of the HoloLens, called HoloLens 2.

White noted that after the HoloLens was first introduced in 2016, customers asked for three key improvements. They wanted HoloLens 2 to be even more immersive, more comfortable, and to accelerate the time-to-value.

Immersion has been enhanced by advancements across the board, including in the visual display system, making holograms even more vibrant and realistic.

“We have more than doubled the field of view in HoloLens 2, while maintaining the industry-leading holographic density of 47 pixels per degree of sight. HoloLens 2 contains a new display system that enables us to achieve these significant advances in performance at low power,” said White.

“We have also completely refreshed the way you interact with holograms in HoloLens 2. Taking advantage of our new



time-of-flight depth sensor, combined with built-in AI and semantic understanding, HoloLens 2 enables direct manipulation of holograms with the same instinctual interactions you'd use with physical objects in the real world.”

In a demonstration of the HoloLens 2 in Toronto, in March, users were able to put on the headset, and “virtually” grab and turn what seemed to be objects, in mid-air.

In addition to the improvements in the display engine and direct manipulation of holograms, HoloLens 2 contains eye-tracking sensors that make interacting with holograms more natural.

“You can log in with Windows Hello enterprise-grade authentication through iris recognition, making it easy for multiple people to quickly and securely share the device,” said White.

The new headset is much more comfortable to wear than the older one.

Comfort is enhanced by a more balanced center of gravity, the use of light carbon-fiber material and a new mechanism for donning the device without readjusting.

“We’ve improved the thermal management with new vapor chamber technology and accounted for the wide physiological variability in the size and shape of human heads by designing HoloLens 2 to comfortably adjust and fit almost anyone,” said White. “The new dial-in fit system makes it comfortable to wear for hours on end, and you can keep your glasses on because HoloLens 2 adapts to you by sliding right over them. When it’s time to step out of mixed reality, flip the visor up and switch tasks in seconds. Together, these enhancements have more

than tripled the measured comfort and ergonomics of the device.”

Time-to-value is accelerated by Microsoft mixed reality applications like Dynamics 365 Remote Assist, Dynamics 365 Layout and the new Dynamics 365 Guides applications.

“In addition to the in-box value, our ecosystem of mixed reality partners provides a broad range of offerings built on HoloLens that deliver value across a range of industries and use cases. This partner ecosystem is being supplemented by a new wave of mixed reality entrepreneurs who

are realizing the potential of devices like HoloLens 2 and the Azure services. HoloLens 2 will be available this year at a price of \$3,500. Bundles including Dynamics 365 Remote Assist start at \$125/month. Customers can preorder the systems at www.microsoft.com/en-us/hololens/buy.

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been limited to the use of the technology for research and pilot-testing, with no direct link to procuring the technology.” Unwittingly, it appears, the study makes a compelling case for offering innovations first to U.S. rather than Canadian hospitals.

The study takes direct aim at RFP processes in Canada, which often focus on specifications and cost and much less, if at

all, on other more subtle considerations having to do with patient outcomes and other measurements of value.

What is needed, is procurement that focuses on a broader definition of value, on procuring a solution or specific outcomes to specific challenges, with all the adjustments to traditional procurement practices that are entailed.

Such an approach, I believe, should include at least the following:

- Recognition that for the most part the laws that frame procurement in Canada al-

low for procurement processes that far extend beyond measuring narrow specifications and costs. As the study notes, outcome-based specifications are recognized (in Ontario at least), so there is no reason why hospitals should feel legally obligated to restrict their procurement activities to traditional approaches;

- Support for more value-based procurement at the executive level is imperative within hospitals and health authorities, if a shift to value-based procurement is to happen;

- Because innovation is typically organic, all stakeholders – clinicians, physicians, vendors, executives, procurement specialists, and others – should come together early, well before any bid call document is issued, to align the conditions for innovation;

- Vendors, in particular, should be brought in early and presented with the desired outcomes, allowing them to become better innovators/collaborators, including start-ups that need to showcase their solutions to explore how they may provide new value;

- Traditional boundaries between vendors and hospitals need to be redefined while the respective roles in procurement need to be clear to ensure the existing fairness principles continue to apply.

Denis Chamberland is a public procurement and trade law specialist with extensive experience working with hospitals. He can be reached at dachamberland@gmail.com.

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Study shows benefits of secure texting

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delivery.

The metric I like most is that 81% of the physicians agreed or strongly agreed that they wanted to continue using the solution. This response speaks volumes to me, because if there are issues with a new technology, many people will simply drop it.

Physicians also appreciated the ability to receive messages without the loud beeping of a pager. They can discreetly look at the contextual information and make decisions in real time. And because the app transmits information securely, they feel confident that patient privacy will not be compromised.

The trial also demonstrated that smartphones reduced the time required for pharmacists to answer drug information questions. In addition, their use of the app improved the pharmacists' confidence and their ability to resolve drug therapy problems.

Reflecting on lessons learned: One of the most important lessons we learned from our study was the importance of involving key stakeholders, so they could help us solve problems we encountered. Second, we initially implemented only the texting capability of the solution to get physicians engaged – a good decision in retrospect because it kept things simple. Third, using a formal project protocol and applying scientific rigor to our study were essential to establishing the credibility of the results.

In conclusion, our study turned out to be the key to gaining widespread acceptance of the solution among our physicians and pharmacists. The feedback from our study was invaluable as we continue to improve quality patient care, safety and experience.

Sean Spina, BSc (Pharm), ACPR, PharmD, FCSHP, is the Coordinator of Clinical Services at Royal Jubilee Hospital in Victoria, BC. He is also a Clinical Associate Professor with the University of British Columbia.

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