

CANADIAN Healthcare Technology

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New hospitals using IoT

Some of Canada's most advanced hospitals, including the new Humber River Hospital and the upcoming Mackenzie Health Vaughan, are planning to make greater use of the Internet of Things and 'actionable' computerized monitoring.

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All-in-one healthcare app

The Winnipeg Regional Health Authority has devised an app that provides users with a variety of in-



formation, including ED wait times. The idea is to provide patients and the public with an app they will use regularly and find helpful over a long period of time.

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Disgraceful social media

Healthcare providers in Canada and the U.S. have been using smartphones and social media to post embarrassing photos of patients. What is the best way to put a stop to this?

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Alzheimer's detection

A made-in-Canada technology is able to diagnose Alzheimer's in less than five minutes by using



speech analysis algorithms. Traditional tests use pencils and paper, put patients under stress and take considerably longer.

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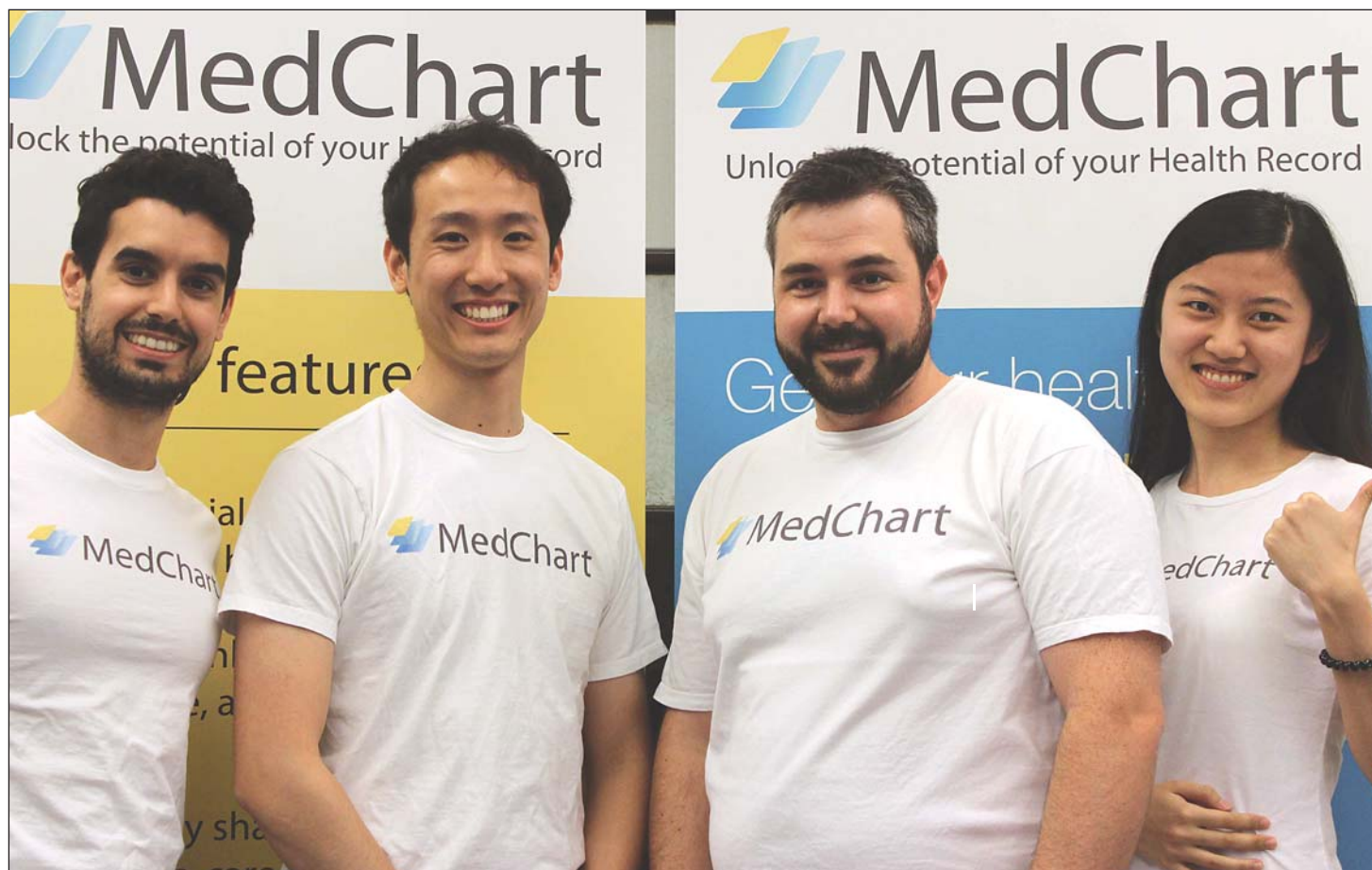


PHOTO: COURTESY OF MEDCHART

Company devises way to consolidate patient records

MedChart, a fast-growing Toronto-based company, retrieves electronic and paper health records on behalf of patients from doctors' offices and hospitals, and centralizes them in a secure repository. Patients have digital access, and can include their caregivers and family members. Pictured are members of the MedChart team: Luca Gobbi, Derrick Chow, James Bateman and Yuqing Du. **SEE STORY ON PAGE 6.**

CT scanners in the ED are life-savers

BY JERRY ZEIDENBERG

VANCOUVER — Too often, trauma patients brought to hospitals wait hours to receive the diagnostic images needed to confirm a diagnosis. Vancouver General, however, has reduced the wait to just minutes by installing high-powered CT scanners right in the Emergency Department.

Top-tier CT scanners, like the Siemens Somatom Force, also provide high-resolution pictures of tiny structures in the body — enabling trauma radiologists to increase the accuracy of their diagnoses. The combination of speed and quality in imaging has meant the difference between life and death for many patients.

"Every single day, we see people with blocked arteries, with strokes, with damage

from trauma, and we're quickly able to tell surgeons and ED specialists whether operations are needed," says Dr. Savvas Nicolaou, Director of Emergency/Trauma Imaging at the Vancouver General.

Dr. Nicolaou tells of a recent case in which a 23-year-old was brought to the department

Instead of waiting hours for a CT exam, patients in the Vancouver General ED are scanned in minutes

and scanned after a nasty fall while skiing at Whistler, the resort close to Vancouver.

"We were able to see the vessels of the heart, and that there was a tiny tear," said Dr. Nicolaou. "The patient had started to develop clots, and was close to having a heart attack."

Within minutes, the patient was trans-

ferred to the cardiac cath lab, where the clots and dissection were repaired with medication and stents.

"We saved his life," says Dr. Nicolaou.

The patient benefited from a highly skilled team of radiologists, technologists, nurses and ER physicians, along with the cath lab team. Another crucial component was the newly installed Siemens Somatom Force CT — a top of the line scanner that is so fast that there's no need for breath-holds when imaging the heart.

The machine also takes crystal-clear images of tiny structures — giving radiologists more certainty about clinical decisions.

Radiologists at the VGH were so impressed with the higher speed and clarity of the Siemens Somatom Force that they pitched in \$250,000 to help buy it.

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Vancouver General reduces wait times with CT scanners in the ER

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The high-end machine is the first in Canada to be installed in an emergency department. For its part, Vancouver General pioneered the phenomenon of using CT scanners in the ED – Dr. Nicolaou led the effort in 2005, and the department now has four CT scanners.

Two of them are dual-energy Siemens Flash CTs, while the latest generation Force was installed just last December. Dual energy CTs make use of two X-ray tubes and two detectors, for very fast and detailed imaging. As well, X-ray dose can be reduced considerably to achieve these results.

Seeing the impact that ED-based CT scanning has had, other hospitals across Canada are starting to follow VGH's lead.

Ottawa, Hamilton and Oakville have installed CT machines in their emergency departments, and this year, Sunnybrook in Toronto and a centre in Halifax plan to do so, as well.

"This is now the model, and everybody wants to do it," says Dr. Nicolaou. "It's the way things are going."

So if VGH has been doing CT scans in

the emergency department since 2005, and has proven its worth, why haven't others followed suit more quickly?

Dr. Nicolaou explains that when he and his colleagues started their campaign, it was difficult to get the ball rolling. "Now we're seen as pioneers and trail-blazers, but at the time, we were seen as madmen."

Not only does it take committed radiologists, ED physicians and other clinicians, but hospital brass, board members and foundations must also be persuaded. And of course, the funds must be raised and the technology acquired.

It's a process that can take years.

What really galvanized Dr. Nicolaou in the late 1990s and early 2000s was seeing young people brought to the emergency department after suffering car crashes, only to die of blood loss while waiting for imaging studies to be done.

"We lost five or six people, aged 18 to 23, because by the time they were transferred upstairs, it was too late," he said.

He spearheaded the drive to bring CT imaging into the emergency rooms, to speed up the imaging process.

And there is no lack of need for this service. Trauma is the number one cause of death in Canada for people under the age of 44, with the majority of them suffering car crashes and subsequent blood loss.

Diagnosing them correctly is imperative – and that's where CT comes in. "Time is brain, and time is heart," notes Dr. Nicolaou.

Dr. Nicolaou mentions another recent

Seeing the impact that ED-based CT scanning has had, hospitals across Canada are starting to follow VGH's lead.

trauma patient who benefited from having a powerful CT in the ED.

The patient was brought in with gunshot wounds, with bullet fragments in his chest. It was difficult for the ED physicians to tell if the fragments had penetrated the heart muscle, or whether they were on the surface of the heart.

"If they were inside the heart, you'd have to open up the chest to do the surgery," explains Dr. Nicolaou. "But that

means you have to stop the heart, and the danger is that it might not start again."

Using the Force CT, Dr. Nicolaou was able to image the beating heart, and determine definitively that the fragments were on the surface of the heart.

"They didn't have to open the chest, and we may have saved his life," he said. "We could do it all in minutes. It was amazing."

It's important, too, says Dr. Nicolaou to have trauma radiologists on-site at all times. "Emergencies are unpredictable and sudden," he notes. When they happen, you want to have an imaging expert on hand, to make fast decisions and advise the ED physicians and other specialists.

Tele-radiology is not an option, he says, because most tele-radiologists are generalists and not trauma imaging experts.

As well, it would take them too long to download images and advise the ED doctors.

"Speed is of the essence," he says. "You can't wait for a tele-radiologist to download 6,000 CT images, read them and get back to you."

Dr. Nicolaou is now campaigning to acquire an MRI scanner for the Vancouver General Hospital's emergency department – something that would be another first for a Canadian ED.

MRI, he notes, is excellent for soft tissue imaging, such as the brain and heart, and it also has the benefit of using magnetic waves rather than X-rays. As a result, it is safer for patients.

"For stroke imaging, MRI is the gold standard," says Dr. Nicolaou.

"It would also mean that the ED is a one-stop imaging centre," he said. "That's my vision."



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Coming in October: Telehealth edition

THE OCTOBER EDITION of Canadian Healthcare Technology will contain our annual report on developments in telehealth, including articles on Remote Patient Monitoring and how the Internet of Things is being integrated into the latest systems.

As well, the October edition will contain new research findings about telehealth in the field of gerontology, and summaries of reports from COACH. There will be updates on telepathology in Newfoundland and the state of telehealth in British Columbia.

The regular reporting of the issue will include news articles, including profiles of new EMRs.

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Winnipeg Regional Health Authority releases multi-purpose app

BY MIKE DALY

In what its developers liken to opening a virtual mall, the Winnipeg Regional Health Authority (WRHA) has launched a new, free iPhone app that provides users with fingertip access to a range of healthcare information, including emergency department wait times.

Called Connected Care, the app was developed by Manitoba eHealth, a provincial government program responsible for providing healthcare delivery transformation through the use of information and communications technology. The app was launched in January.

“Connected Care is our first mobile application,” said Craig Kozlowski, Director and Solution Information Officer, Manitoba eHealth. “I describe it as a virtual shopping mall populated by various information stores. Each store is an information module that we can add easily without having to re-write the underlying application software.”

The app’s current modules include:

- Emergency department and urgent care wait times – allows users to view approximate times in eight Winnipeg emergency department/urgent care locations, and to explore those locations on a map based on the user’s current location.

- Health Services Directory – a comprehensive directory that allows users to search for services based on service type or community area. The directory also allows users to send health service information to a friend or family member and to explore services on a map based on their current location.

- MyRightCare.ca – MyRightCare.ca is designed to help Winnipeggers choose the right care option so they can get the right treatment, faster. (There are about 280,000 visits to Winnipeg’s emergency departments each year. As many as half of those visits are



Craig Kozlowski and Matthew Sodomsy have been leading the development project at Manitoba eHealth.

for non-life-threatening conditions that could be treated more efficiently another way.) Assisting people to make the right choice for their care reduces the demand on emergency departments, resulting in more efficient and effective healthcare delivery.

- SignUpForLife.ca – users can register their intent to be an organ donor in just a few clicks.

- Family Doctor Finder – helps connect users and their families with a regular primary care provider who can provide them with a home base for their healthcare needs.

“Our primary goal at Manitoba eHealth is to provide the right information to the right person at the right time in the right place,” said Perry Poulsen, CIO, Manitoba eHealth. “This is a first step for a mobile offering by the WRHA and a respectable showing of Manitoba eHealth’s app development capabilities.”

The WRHA agrees.

“There’s increasing demand in our society for easy access to accurate information through mobile technologies, and this app is a really great start in that direction,” said Madeline Kohut, Community Development and Seniors Specialist for the WRHA.

“Whether the public wants to see emergency department wait times, information about our QuickCare clinic locations, or where there is a breastfeeding group for young mothers, the Connected Care app provides them with great opportunity to explore the information they need,” she added. “And for those who don’t have access to a mobile device or computer, the information is available in other formats to help ensure that everyone has access to information in the way that best work for them.”

Though the app was launched with minimal fanfare, uptake has been impressive, with several thousand downloads in just a few months, said Manitoba eHealth

Senior Developer Matthew Sodomsy.

“The WRHA issued a single press release that spawned a number of media stories,” said Sodomsy. “What impressed us after that happened was the number of ‘likes’ those stories generated. Word-of-mouth was quick to spread, and to get that happening organically without the support of advertising speaks to the power of our original concept.”

The number of new users continues to climb, with an average of 100 unique users turning to the app each day.

“It’s relatively easy to get people to download an app and use it once, but to keep them coming back is the real test,” said Sodomsy. “From the outset, we recognized that the public wouldn’t want to download 10 separate apps for 10 different purposes. The central idea behind Connected Care is to offer people the convenience of ‘one-stop shopping’ for a wide variety of their healthcare information needs.”

Kozlowski says that the development leveraged the longstanding relationship between the WRHA and Manitoba eHealth.

“The information available through the app is drawn from a number of existing websites and databases we have managed for the WRHA,” said Kozlowski. “So the requisite equipment and data feeds were already in place in a secure and accessible form, and no additional infrastructure was required. That being the case, we were able to develop the app for what we believe is a fraction of the cost of an outside, commercial developer.”

A more important consideration than cost, however, was accuracy.

“The accuracy and timeliness of the information is paramount,” said Kozlowski. “The accountability has to be there, because people are now using this information

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Document scanning facility in Hamilton runs 24/7

There’s so much content generated in healthcare, both electronically and physically, it can be overwhelming, says Peggy van Wyck, director, Bay Area Records Conversion (BARC) in Hamilton, Ont. So when a document imaging specialist can consolidate the data and deliver it in formats that make sense, there is immense value for healthcare providers.

“One of my biggest concerns these days is we’re giving people so much information in so many different places, that for a human being it becomes almost impossible to navigate,” says van Wyck, whose healthcare experience spans more than 30 years, including the position of hospital vice-president. “More and more we’re hearing from the end-user, from physicians and nurses: ‘We need systems that allows us to find what we need.’”

Established in 2003 as part of the Bay Area Health Trust, BARC works in partnership with Octacom Ltd., a full-service document management company. It operates a secure scanning facility in Hamilton, running 24 hours a day, seven

days a week, to provide vendor-neutral services to hospitals, community agencies and individual providers. Its largest hospital clients include Hamilton Health Sciences, the Niagara Health System and the Joseph Brant Hospital.

The majority of clients send their paper-based documents via bonded courier in tamper-proof containers. Once scanned, the information is encrypted and returned, either on a USB stick or portable hard drive, or across a virtual private network connection.

As a high-volume facility, BARC uses state-of-the-art scanners with features like double feed alerts and blowing air between pages to ensure high-quality images. The company also works with several different software partners so that scanned information can integrate into a variety of electronic medical record (EMR) environments.

“It’s a pretty long and complicated journey,” says van Wyck. “We spend a lot of time helping clients to understand, this is where you are, this is how we’ll help you get over there.”

When the company started out in 2003, van Wyck expected demand for scanning would eventually peter out. Thirteen years later, volumes have only grown, she says.

Digitizing paper is a necessary step in the ongoing evolution towards fully electronic health records. No matter how far along an organization is in its

There will invariably be pieces of paper looking for a home, including charts, physician notes and consent forms.

digital journey, there will invariably be pieces of paper looking for a home, including historical charts, physician notes and consent forms. The goal of a scanning initiative isn’t simply to do away with paper, she says, but to ensure it finds a useful home.

“How do you manage the documents and the information in a way that actually improves the situation instead of

making it worse?” poses van Wyck, noting that sorting and cleaning paper files prior to scanning is an important step.

In addition to high-speed scanning and archiving, BARC also provides consulting services such as project management, risk analysis, governance, readiness assessments, and policy and document procedure development. Putting governance models in place is important, says van Wyck, because different users have different document requirements.

“The health records department needs a full comprehensive record they can release to a lawyer or another hospital if a patient moves. But that’s quite different from what the doctor or nurse at bedside needs, or the Finance department that’s trying to bill for crutches or uninsured services,” she explains. “Everybody is using the same document and the same solution but their needs are so different.”

The more that content is digitized, the more the healthcare industry is shifting from document management to electronic content management (ECM).

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Technology detects Alzheimer's, offers results in under five minutes

TORONTO – A new technology that analyzes a person's natural speech to detect and monitor Alzheimer's disease, and other cognitive disorders, has won the AGE-WELL Pitch Competition: Technology to Support People with Dementia.

The new tablet-based assessment tool records short samples of a person's speech as they describe a picture – even a family photo – on the screen. It extracts hundreds of variables from the samples, producing results in under five minutes.

"Speech is a rich source of information on people's cognitive health," said Liam Kaufman, CEO and Co-founder of Winterlight Labs, who developed the tool with Dr. Frank Rudzicz, Maria Yancheva and Katie Fraser of the University of Toronto. Dr. Rudzicz is also a scientist at Toronto Rehab-University Health Network in Toronto.

"Because of word-finding difficulties, people with Alzheimer's disease will tend to pause more between words and the complexity of their vocabulary is reduced, so they will use a word such as 'car' instead of 'SUV' or 'sedan,'" Kaufman told a panel of expert judges at the AGE-WELL Pitch Competition in July.

The new technology uses artificial intelligence to analyze about 400 variables, such as pitch, tone, prosody (rhythm), and rate of speech, as well as pauses and choice of words. In the laboratory, the software can reliably identify Alzheimer's disease, Parkinson's disease and aphasia with between 85%

and 100% accuracy, the company says.

The new approach is fast and objective, and improves on time-consuming 'pencil-and-paper' neuro-psychological assessments, which can be stressful for people with memory problems, said Kaufman, a software developer.

The researchers are set to begin field tests in assisted living and home care settings, with funding from AGE-WELL. Five organizations which collectively care for over 100,000 seniors are partnering with Winterlight Labs.

The tool will be used in seniors' facilities to improve the ongoing monitoring of residents' cognitive health, provide family members with quantifiable updates and help everyone plan when it's time to transition to a higher level of care, said Kaufman.

Regulatory approval will be sought in Canada and the United States to make the technology available to family doctors and speech-language pathologists.

"The incidence of Alzheimer's disease and other dementias is growing worldwide, and new technologies like this novel speech-assessment tool present a real opportunity to help people with dementia and those who care for them," said Dr. Alex Mihailidis, Scientific Director, AGE-WELL Network of Centres of Excellence.

Ten teams from Canada and around the world competed in the AGE-WELL Pitch Competition, which showcased a wide variety of technology solutions that address the many challenges faced by people living



Pictured: Alex Mihailidis, AGE-WELL; Kabir Nath, Otsuka; Liam Kaufman; and Mary Michael, Otsuka America.

with dementia. Second place was awarded to an automated vision system for ongoing pain assessment and monitoring in dementia, while third place went to MotioSens Inc., which develops smart-home technologies.

"The quality, breadth and depth of the ideas presented was impressive," said Mary Michael, Senior Director, Otsuka America Pharmaceutical, Inc. and one of the event's speakers. "It is going to take multiple modalities of solutions to really make an impact on Alzheimer's disease, so it is exciting to see

such a diverse range of technologies and services aimed at disrupting Alzheimer's."

The pitch event was co-hosted by the Global Council on Alzheimer's Disease (GCAD) and sponsored by Otsuka America Pharmaceutical, Inc., Aging 2.0 Local Toronto, the Ontario Brain Institute, and the Women's Brain Health Initiative. For more information on the finalists, judges and prize package, please visit: www.agewell-nce.ca/pitch-event. For more about Winterlight Labs, visit: <http://www.winterlight-labs.com/>

Fast-growing start-up consolidates personal health records

BY JERRY ZEIDENBERG

TORONTO – Hospitals, clinics and even provincial governments have all taken a stab at creating patient portals, but for most patients, their health charts remain scattered among various providers – including hospitals, GPs, specialists, labs and clinics.

"The records are all over the place," says James Bateman, co-founder and CEO of MedChart, a company that will consolidate patient records and keep them in a secure, electronic repository.

The company, which officially launched in June after a trial run with 200 patients, charges \$79 to collect your records from each healthcare provider. It will digitize the paper records and organize them as searchable pdfs; the electronic records are also stored in a searchable manner. Patients are empowered to access this information on the MedChart Portal anytime and anywhere with an internet connection.

"We showed that we were able to retrieve 100% of the records from all doctors," says Bateman. "People were surprised we could get their records, but once we get their permission, we know how to do it."

Many people have experienced how arduous it can be to retrieve a health record. Even though the documents legally belong to the individual, health-

care institutions are hesitant to give them up. Moreover, doctors' offices will usually charge for the copies.

"Some are charging \$30 to \$40 plus \$1.50 per page," says Bateman, and mentions a recent case in which a physician charged a patient \$650 to hand over a copy of a person's record.

"We can advocate for the patient and push back on doctors like that," says Bateman. "We let them know that their LHINs have guidelines on how much they can charge."

He says that one doctor who wanted to charge \$100 for a copy of a patient record was reminded of local rules, and adjusted the price down to \$50.

"We take care of all of this for the patient, and will only charge them \$79 for everything – getting the record, digitizing it, setting it up in our system and giving the patient access to it, along with online tools to uncover insights from their official clinical data."

The service is proving to be so popular that Bateman estimates MedChart would have 1,000 customers after its first week in business. And in a year's time, he expects to have 10,000 customers on board.

Some of those clients are doctors, who have signed on with MedChart as a way of getting records from other physicians when new patients come to them. They're embracing the idea of centralizing data on the patient, and finding it's

easier and more effective to have MedChart handle the job for them.

Other customers include the elderly, who often have multiple caregivers and a highly fragmented health record. As well, their records can go back quite far in time. "We've provided some people with records going back to the 1950s," says Bateman.

MedChart is currently available to the public in Ontario, British Columbia, Alberta, Saskatchewan and New Brunswick, and the company plans to roll out to the rest of Canada in the coming months. As well, it's planning to

Some of the clients are doctors, who have signed on as a way of getting records from other physicians.

expand to the United States next year.

Once MedChart creates your personal repository, you can access it with your own security codes, and you can also provide permission to family members, care-givers, and doctors. In this way, all members of a circle of care can have access to the records.

"We give full ownership to the patients," says Bateman. "They can share their records, and everything is secure and encrypted."

You can also update the records and request corrections. Bateman points out that giving patients access to their records is an effective way of reducing medical errors.

"We've had a large number of people who spot mistakes in their records," says Bateman. "It's a help to everyone when this happens," as physicians are making decisions based on information in the charts.

Using MedChart, says Bateman, "You can request amendments with two clicks of a button." He says the process has been refined so that patients then receive notifications when the error has been corrected.

Bateman and his business partner, Derrick Chow, were both graduate engineering students at the University of Toronto when they met.

Bateman went on to work at Sunnybrook Health Sciences Centre, in Toronto, where he became familiar with the MyChart personal health record, a system that allows Sunnybrook patients to see parts of their hospital charts.

While MyChart is helpful to Sunnybrook patients, Bateman points out that it only contains information from Sunnybrook's own electronic system, and not from other healthcare providers.

"Even if you do include information from other providers," says Bateman,

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System improves monitoring and documentation of moms and babies

BY DIANNE DANIEL

When a baby is born, news spreads quickly. Everyone wants to know: Is it a girl or boy? How much does she weigh? How long is he? How is mom doing?

At Michael Garron Hospital in Toronto, all of that information, and more, is now a permanent part of both mom and baby's health history, following the successful implementation of a fully integrated electronic health record for maternal and newborn care that includes a digital copy of

the fetal monitoring strip. "The documentation we had before was cursory at best. Now we have a very full and gradual record of every pregnancy event," says Adrian Harrington, Manager of Clinical Informatics at Michael Garron Hospital, the former Toronto East General Hospital, and

one of only three in Ontario to achieve the Baby Friendly designation, a globally recognized quality standard.

The hospital's transition to an integrated system was prompted by the need to replace an aging, standalone fetal monitoring system that was no longer supported by the vendor. Equipment was unreliable, computer screens would freeze during documentation, and there was no way to remotely monitor fetal strips outside of labour and delivery.

"We used to spend a lot of time hunting down equipment because things were broken or missing," explains Soraya Visram, a Registered Nurse and Clinical Informatics Specialist. "We have 12 birthing rooms, but sometimes we would only take four patients because we didn't have a working monitor."

The family birthing centre at Michael Garron Hospital consists of two operating rooms, 12 labour and delivery rooms, a four bed Maternal triage unit, as well as a three bed antepartum testing unit, the NST clinic, and an additional 18 inpatient beds, staffed by an 88-member nursing team, 14 obstetricians, 13 family practice physicians and 13 midwives who are responsible for delivering approximately 3,500 babies each year.

Its new, integrated system includes 22 fetal and maternal monitors from Philips, the Cerner FetaLink electronic fetal monitoring solution, and Cerner PowerChart Maternity, an electronic health record solution that uses the Cerner Millennium architecture. FetaLink went live in the spring of 2014, followed by PowerChart Maternity in November, 2014.

"Not only did they recognize a need to automate and deliver better integration with documentation, but they are also very busy and handle extremely complicated cases so they wanted to ensure they didn't have to take a step backwards," explains Michael Billanti, Cerner Director and General Manager, Central Canada.

Instead, the hospital took a giant step forward, he adds, becoming one of the first in Canada to integrate fetal monitoring data into its centralized electronic health record. "Before, birthing information would only exist in one place. It may have been printed out and stapled to a chart, but it would only be in one spot," says Billanti. "With FetaLink, the fetal strip is stored electronically. It's captured in real-time and displayed in real-time, along with the physiological data about mom and baby."

To associate a patient to a fetal monitor, nurses scan both the patient armband barcode and the fetal monitor barcode.

The patient's chart is then electronically connected to the fetal strip for storage. In order for the fetal strip to be viewed and archived in FetaLink, it must first pass through a connectivity engine that compresses the fetal waveform. After the birth takes place, the patient is disassociated from the fetal monitor and the strip is then archived to storage.

FetaLink's remote monitoring capability means that real-time information about mom and baby can be viewed anywhere in the hospital.

When physicians need to be consulted,

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Mohawk College integrates ClinicalConnect into digital health learning

HAMILTON, ONT. – Leadership teams at the Health Information Technology Services (HITS) eHealth Office and Mohawk College's Institute of Applied Health Sciences (IAHS) have successfully partnered to integrate the training environment for ClinicalConnect, the Regional Clinical Viewer for the connecting South West Ontario (cSWO) Program, into the College's nursing and health science programs.

The cSWO Program is part of eHealth Ontario's Connecting Ontario initiative, which is enabling the Province to achieve an electronic health record solution for all Ontarians.

ClinicalConnect is a secure, web-based portal that provides physicians and clinicians with real-time access to their patients' electronic medical information from all acute care hospitals, Community Care Access Centres (CCACs) and Regional Cancer Programs in South West Ontario, plus select provincial data repositories.

Hamilton Health Sciences and Mohawk College have a long-standing and collaborative relationship that helped advance this new kind of academic partnership and learning opportunity for students. It paves the way for similar partnerships with other academic institutions in South West Ontario.

This particular project began when staff at the HITS eHealth Office approached Donna Rawlin, Associate Dean of Mohawk College's Collaborative Nursing and Health Sciences Program, with the opportunity to integrate simulated electronic health solutions into the College's nursing program curriculum.

Rawlin immediately saw the potential this integration could offer their students: "The goal of the project was to bring ClinicalConnect into the learning environment to expose students early on to eHealth solutions they will eventually use in their workplaces. Using the training environment, our faculty can teach students how to deliver healthcare more effectively through access to aggregated health information."

Rawlin first identified nursing faculty champion leaders to form working groups, who in the first phase of the project would work with the HITS eHealth Office staff to define the most appropriate points in the curriculum to integrate ClinicalConnect. A project plan was developed that included goals and objectives to optimize students' learning experiences.

From there, the HITS eHealth Office built customized, simulated test patient records that aligned with curriculum requirements. Nursing faculty were provided with comprehensive hands-on training sessions where simulated patient data was validated.

The College's technicians and tutors in the Centre for Professional Practice (CPP) simulation lab were also provided training, as well as information about technical support services provided by HITS' Helpdesk at Hamilton Health Sciences.

Once the test patient scenarios were tested, students were provisioned with accounts to access the training environment. Just like authorized health service providers'

access to ClinicalConnect's live environment, students' access to the training environment is also subject to audit.

In-keeping with the original project goals and objectives, faculty and students are seeing first-hand how ClinicalConnect enables clinicians to create a more com-

plete patient picture much more quickly than spending time contacting various data sources, piecing together details of their patients' care.

Rawlin said, "Using the training environment, we are developing competent clinicians through the routine use of

eHealth solutions to improve workflow efficiencies, and enhance the quality of care and patient safety across the continuum."

Paul Armstrong, Dean of Community and Urban Studies, Health Sciences at Mohawk College explained, "The oppor-

CONTINUED ON PAGE 22



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The Internet of Things is making healthcare delivery more effective

BY JERRY ZEIDENBERG

TORONTO – The Humber River Hospital calls itself North America's first 'digital' hospital, while a few miles north, in Vaughan, Mackenzie Health says it's building the first 'smart' hospital.

Whether the facility is digital or smart, executives at both hospitals agree the data produced must be "actionable" to improve quality and patient outcomes.

And by actionable, we mean it must be able to automatically trigger events, so that care is delivered more quickly and effectively.

"We want data to be actionable, to drive innovative workflow and better decision-making," said Peter Bak, Humber's CIO, who spoke at the Internet of Things & Big Data Healthcare Summit in June. "But not just so that we can reach EM-RAM 6 or 7. That's the clinical side. We

want all systems to be actionable." The facility, which opened last October, installed chromatic windows that automatically adjust their tint to keep the hospital cooler in summer and warmer in winter. That helps with energy efficiency, and also with patient satisfaction.

Each room is outfitted with a bedside terminal, which can be used for entertainment, but is also tied into the real-time location system. "If you walk into a room, your name pops up on the screen, so the patient knows who you are," said Bak.

"We also use a lot of robotics," he said. For example, the hospital deploys automated guided vehicles (AGVs) to deliver medications that can detect people around them and warn them to stand out of the way; they can also open elevators by themselves.

There's a fully automated lab that's capable of processing 4 million samples per year, and the pharmacy makes use of a robotic pill picker that puts together prescription packages for patients.

"We have a lot of technology generating data," he said. "We're connecting it all, not for the sake of integration, but for better outcomes."

However, improvements can still be made. Projects in the works include expanding the use of texting to communicate among clinicians, as well as the use of photos and videos. Texting is a faster method of communicating, than phoning, noted Bak. "Our kids are texting all the time, and they expect an immediate response," he said, adding that this quick form of communication is ideal for healthcare.

And the use of images and videos can give clinicians a quick confirmation of the status of a patient.

However, he said there has to be a structure in place for texting and sending images, with rules and a closed loop of communication. If a response isn't made to a message, it must be escalated to another care-giver, and records of messages must be kept so that all care-providers are able to find out what has happened to a patient.

Messaging will also be extended to the patient's family, circle of care, and pharmacy, all of which can be outside the hospital. Bak said much of this will be working in a matter of months.

When it comes to intelligent systems, a neighboring hospital in Richmond Hill, Ont., has also been a trail-blazer. Mackenzie Health is seeking to advance the use of computers and informatics, and is literally designing the hospital of the future – construction of its second campus, in nearby Vaughan, will begin this fall.

"For a long time, healthcare has been focused on data repositories, on collecting information and displaying it," says Dr. Aviv Gladman, chief medical information officer at Mackenzie Health, who also spoke at the Internet of Things & Big Data in Healthcare Summit, in Toronto. "But that relies on clinicians to go in and extract the information."

What's starting to emerge, noted Dr. Gladman, are solutions that gather information and on the basis of if/then scenarios, can automatically trigger events that help both clinicians and patients.

He gave several hypothetical examples:



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• If there is a code blue in the hospital, set off by telemetry, the computer system can send a wireless alert to the closest member of the care team. Location sensors can detect who should get the call – if the prime caregiver is on break or busy in another patient's room, the call will be automatically routed to the next closest clinician. At the same time, the computer can bring the elevator to the floor, turn off alarms in other rooms, and bring up the patient's EMR on the room monitor, so clinicians don't need to spend time logging in. "These are all things that can help care delivery," said Dr. Gladman.

• IoT can also be used in home care, he observed. Congestive heart failure patients who are taking diuretics, and are in danger when their weight goes up, can be monitored with pressure cuffs and smart scales. If the system finds the patient's weight is up, but the blood pressure is okay, the system could notify the patient to increase his or her intake of the diuretic. At the same time, the system can send a prescription to the local pharmacy and schedule a follow-up appointment for the patient.

• To increase handwashing compliance in hospitals, the computer system can monitor activity at handwashing stations. It can then send staff members an email each day informing them about their compliance rates. "If you report on how people are doing, by sending them emails, it boosts their compliance considerably," said Dr. Gladman.

These are all problems that healthcare experts are working on, and will likely appear in the future. There are, of course, complexities to deal with, which make the problems more difficult to solve than may first appear.

For example, what if the CHF patient hasn't been taking his medication, and that's why his weight has increased? Per-

haps the computerized system can tie in a solution that determines whether the patient has been compliant.

As for handwashing, it has been found that clinicians who intend to spend several minutes in a patient's room will wash their hands upon entering. However, those who plan to go in for just a few seconds often won't bother.

"But you can do an awful amount of

harm in that 20 seconds, from an infection point of view," said Dr. Gladman.

So solutions beyond an email reminder may be needed to change behaviours.

For its part, Mackenzie Health has created a 34-patient 'living lab' on a floor of its existing hospital. There, it is testing new, computerized solutions that will be implemented at the new site in Vaughan, as well as at the Richmond Hill facility.

Many of the solutions involve the Internet of Things and actionable data, such as handwashing monitoring, intelligent alerts with routing to the most appropriate clinician, and smart beds and systems that can prevent bed falls.

At the Internet of Things & Big Data Healthcare Summit, Dr. Gladman emphasized, "Making data actionable is the key point of my talk."



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Winnipeg releases multi-purpose app

CONTINUED FROM PAGE 4

tion to make real-time health decisions. There again, our existing partnership with the WRHA was an advantage; all of our data comes from trusted, accurate sources with the appropriate checks and balances already in place."

Reaction from clients within the WRHA has been positive. "At its heart, Connected Care is a public-facing app, but we get just as much positive feedback from people working within the WRHA as we do from the public," said Kozlowski. "We've kept it simple, so it helps the public and staff quickly navigate the information they want with a minimum of effort. The reason it's receiving such good feedback is that it's delivering on that value proposition."

With the app off to a fast start, and with internal and public users expressing satisfaction with its ease of use, the future for Connected Care is bright, said Kozlowski.

"It's just not the information that's available today, but what it can be added in the future. As we expand the app with additional modules offering new types of information the public wants to see, the value proposition is only going to grow."

Mike Daly is a Communications Specialist with the Winnipeg Regional Health Authority.

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Improper use of social media can lead to invasions of privacy

U.S. announces crackdown on employees who post demeaning photos. Should Canada follow suit?

BY HUGH MACKENZIE

New technologies are accomplishing amazing things in healthcare. Social media tools, for example, are being used by providers and families to coordinate care; Facebook, Yammer, and Twitter are also keeping the public informed about new medical techniques, hours of service, wait times and more.

But there are always some who misuse new technologies. One such example occurred last year in Prince Edward Island, when a nursing-home worker was fired after posting a photo of a dead resident on Snapchat and forwarding it to a friend.

Apparently the worker, who was employed at the Margaret Stewart Ellis Home in O'Leary, PEI, had shared multiple "inappropriate and degrading photos and videos of vulnerable residents while they were eating, sleeping, using the commode and when ... co-workers were providing personal care to certain residents after a bowel movement."

Health PEI conducted its own investigation and spoke to more than a dozen employees at the facility, as well as to members of the community. When contacted by CBC News, the former employee claimed there was another side to the story but did not wish to speak to the media.

Documents obtained by the CBC show that the fired employee was not explicitly linked to the degrading social media posts that are at issue.

The Health PEI investigation, it seems, set out to determine how such actions took place and to come up with rules to prevent them in the future. The agency already had policies in place stipulating that employees are not to have personal communication devices, like cell phones, with them during work hours.

It discovered that employees were using electronic devices on the job, for talking and texting. And why not? The leading-edge thinkers are all touting the benefits of instant communication and tying circles of care together using electronic devices.

The cameras on phones are being suggested as the next great improvement – by including photos of patients or residents, caregivers will be able to see exactly who needs help during an alert; photos and videos can also be used to show the current health status of these patients – a still image or video can quickly demonstrate how far a patient has declined.

Of course, images can also be used poorly, to embarrass or disgrace patients and residents, as the incident in PEI shows.

Nursing home workers aren't the only ones taking photos of patients and sharing them inappropriately – doctors are doing it, too.

For example, as his patient lay unconscious on a surgical gurney, a Victoria, B.C. urologist took out his smartphone and photographed the location where he'd just attached a urinary catheter. Then, as a "joke," the doctor texted the image of his patient's genitals to various friends and acquaintances. The ethical lapse ended up costing the specialist \$20,000 in fines and a six-month suspension from medical

practice in 2015, the National Post reported earlier this year.

In Prince Edward Island, the nursing home incident only came to public attention through the efforts of the CBC. Now, the privacy commissioner in PEI is calling on Health PEI to disclose more details.

According to Karen Rose, the commissioner, disclosure of this type of information will promote public safety. "The resulting transparency ensures that there is sufficient public knowledge of publicly operated community care facilities. In my view, such knowledge brings issues to the forefront, encourages discussions and spearheads changes, where necessary."

In July, the commissioner gave Health PEI 40 days to prepare the information for release.

Meanwhile, the incident has exploded into a political issue, with the opposition Progressive Conservatives in PEI calling for the immediate release of details.

"Honestly, I don't know why this file was not turned over to the RCMP for an investigation," said opposition health critic James Aylward.

Aylward said it took a Freedom of Information re-

degrading photos of patients is a bigger problem than one might think.

The Pro Publica website, an independent source of information in the public interest, has been charting such invasions of privacy in the United States since the beginning of 2012. In that time, it has noted 47 cases of inappropriate social media posts by nursing home workers.

These include photos and videos of residents who were naked, covered in feces or even deceased. They also include images of abuse.

(See <https://www.propublica.org/article/inappropriate-social-media-posts-by-nursing-home-workers-detailed>)

And in early August, federal health regulators in the United States announced plans to crack down on nursing home employees who take demeaning photographs and videos of residents and post them on social media.

The Centers for Medicare and Medicaid Services, which oversees nursing homes, said in a memo to state health departments that they should begin checking to make sure that all nursing homes have policies prohibiting staff from taking demeaning photographs of residents.

The memo also calls on state officials to quickly investigate such complaints and report offending workers to state licensing agencies for investigation and possible discipline.

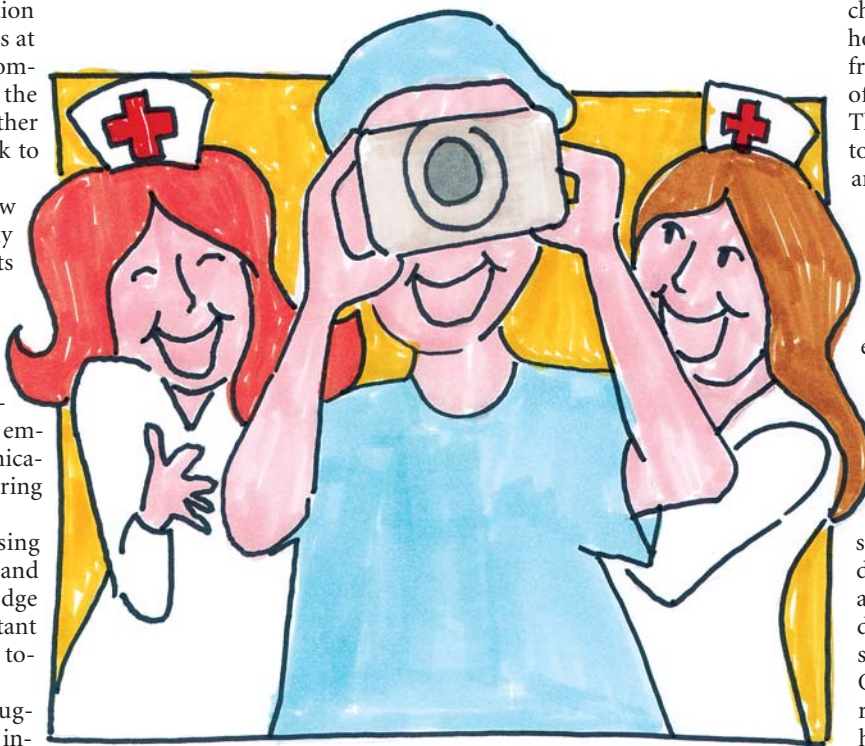
"Nursing homes must establish an environment that is as homelike as possible and includes a culture and environment that treats each resident with respect and dignity," said the memo signed by David Wright, director of the CMS survey and certification group. "Treating a nursing home resident in any manner that does not uphold a resident's sense of self-worth and individuality dehumanizes the resident and creates an environment that perpetuates a disrespectful and/or potentially abusive attitude towards the resident(s)." CMS said that nursing homes have a responsibility to provide training on how to prevent abuse, and to investi-

gate all allegations of abuse. If homes fail to do so, they can face citations, fines and theoretically even termination from the Medicare program.

Also in August, Sen. Charles Grassley, chairman of the Senate Judiciary Committee, called on other federal agencies to take action on the problem.

He sent letters to the U.S. Department of Justice and to the Office for Civil Rights within the U.S. Department of Health and Human Services asking whether "rules and protections are in place to prevent and punish these types of abuses." He also has sent letters to social media companies, calling on them to pay more attention to this.

In Canada, the incident in Prince Edward Island may have national importance, as it's one of the first instances of social media abuse in a nursing home to be publicized in this country. It may spark nursing homes and governments across Canada to be more vigilant about staff use of social media, and to educate employees more vigorously about privacy issues.



quest by the media for the breaches – which allegedly involved multiple photos and videos of elderly residents – to be brought to light.

"If pictures are being taken of either a deceased individual or a senior in a vulnerable circumstance and then shared publicly, fundamentally it is just wrong," Aylward said.

He said there are still unanswered questions based on the media report, which did not connect an employee who was fired over the incident with taking the photo of the deceased resident.

"So if it doesn't connect the person who was fired, then who was taking the pictures?" asks Aylward. "I want some kind of assurance here that the policies are being adhered to and that any other infractions that may have occurred have been dealt with accordingly."

Aylward said a full audit needs to be done of long term care homes in the province, to probe further into privacy issues.

Healthcare workers misusing social media to post

ILLUSTRATION: LINDA WEISS

New Brunswick deployment achieves province-wide health data integration

BY GARY FOLKER

By deploying an efficient integration engine, New Brunswick's province-wide EHR system has connected caregivers with 100 percent of finalized laboratory and diagnostic imaging reports. By the end of this year, it also plans to connect them to 100 percent of the dispense records for prescription medications from community pharmacies.

As a result, these records will be accessible to authorized clinicians throughout the province. That was no small task, as the records were fragmented across New Brunswick, with data located at many sites in a variety of systems and formats.

To make its vision of 'One Patient, One Record' possible, the New Brunswick Department of Health selected Orion Health's Rhapsody integration engine, and later on acquired Orion Health's Clinical Portal and Clinical Data Repository (CDR).

Originally, the Department of Health had the difficult task of choosing between 'ripping and replacing' all of the systems that were in use – an extremely costly route – or implementing an integration engine. The decision to go with Orion Health's integration engine and related technologies meant that most of the systems could be left in place. The solution has proven to be efficient and cost-effective.

These high-powered tools are paving the way to a completely integrated record. In one instance, New Brunswick wanted to consolidate five-years-worth of data and capture it in the Clinical Data Repository. Using the integration engine, 90 million messages were migrated into the CDR securely – ready to be used within the province for healthcare delivery.

What could have been an arduous task was made significantly simpler with the right integration solution. This situation underscores the importance of having an engine and repository that are scalable and future-proofed for the needs of tomorrow, and are not merely focused on the immediate demands of the healthcare system.

An integration engine needs to be flexible, scalable and highly adaptable to new needs. A province's changing priorities, agendas and policies also heavily influence healthcare technology rollouts. Not only is New Brunswick meeting these needs, but it is already looking to the future, including bringing in analytics to improve healthcare delivery. This would include studying the correlation between adverse weather events and the volume of ER visits.

There are more integration issues and challenges looming in New Brunswick and across Canada. But they can be solved with the right integration engines, tools and repositories.

New Brunswick, for its part, is now tied with Nova Scotia for having the oldest population in the country (18.3 per cent of residents are seniors). Only Florida has a higher proportion of seniors in North

America. Adding to this challenge, New Brunswick must also contend with a population that is split nearly 50-50 between those who live in urban and rural areas.

In many cases, rural patients will see their GPs in town, but will travel to the city to meet with specialists.

As a result, the patient chart is located at several different sites – especially in the case of seniors, who often have multiple specialists and care-givers. As we look to improve the delivery of care, healthcare systems need to be integrated and interoperable so that patient health information is

made available to care-providers, no matter the location.

Gary Folker is Executive VP, Orion Health, North America. He is a frequent commentator on the topic of eHealth and healthcare system modernization.



Gary Folker



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There are ways to attain greater security in your computerized healthcare solutions

There are always new threats to patient information, but there are methods of safeguarding data, too.

BY DR. SUNNY MALHOTRA

We are seeing increasing dependence on technology to enhance patient care in hospitals, clinics and pharmacies. However, as more records are stored electronically, patients are also becoming victims of snooping and data theft.

Cybersecurity therefore becomes an important and prevalent issue. Healthcare providers must be properly educated about privacy issues, and they must also ensure they have secure networks and the ability to detect intrusions.

Providers should be aware of the latest standards for security. For example, there is a particular level of security for mobile applications and electronic medical records in healthcare; they should have 256-bit encryption, which is analogous with banking grade security.

Secure networks ensure that the sharing of details between healthcare professionals can be done without an unauthorized third party viewing the information.

A new mobile application that has been developed, called TigerText, allows for patients to communicate with their physicians via text, in a secure format.

Importantly, the messages only exist for a set period of days. Messages can be recalled or resent by the sender and the sender is notified when a message is sent, delivered and read.

Furthermore, messages can be marked as a priority to remain at the top of the recipient's inbox. TigerText also allows for secure sharing of multimedia files, such as voice notes and PDFs.

Secure networks are maintained through the use of verified professional accounts; they are regularly monitored to ensure the accounts are not fraudulent. These are important when using patient portals and Picture Archiving and Communication Systems.

It is also important to ensure that information is shared with the appropriate parties and the information is not sent to the wrong doctor or intercepted by a third party. This will not only ensure confidence in the physician but also improve patient outcomes if patient portals and PACS are used correctly.

Another commonly used method of protecting patients is to censor patient information when using apps and tools such as Figure 1. Figure 1 ensures that all patient details are hidden and any photos of patients do not show any identifying details.

When someone uploads a case with photos, the

TigerText enables patients to communicate with their physicians via text, in a secure format. Importantly, messages will disappear in a few days.

case is first reviewed by a group of moderators and technical analysts who will then publish the case on the app. In addition, there is a face monitor that will automatically censor any faces. This system illustrates cybersecurity being implemented through manual work to analyze the data to maintain patient anonymity.

In addition, data sharing is often limited and in different ways. Some information can be shared around the country while

other information is only shared amongst physicians on the case.

This can be based on policies of the hospital, the system or the country. For instance, in the United States, healthcare providers must follow the Health Insurance Portability and Accountability Act (HIPAA) Privacy Rule, which regulates sharing and sets a baseline of protection for patients.

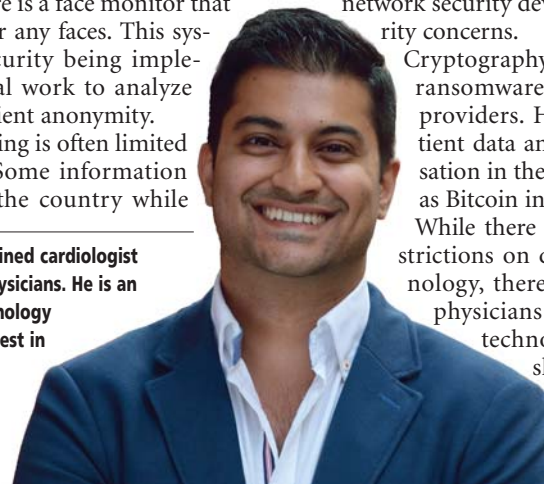
There is a similar governing law in Canada called the Personal Information Protection and Electronic Documents Act (PIPEDA). Patient document transfer security ensures that patient files will not be intercepted while they are being sent between physicians. It also protects physicians and ensures all data sharing is done without violating HIPAA or PIPEDA requirements.

Public Key Cryptography is being used thousands of times a day for VPN access online, documentation, and using multi-factor authentication system.

Still, cyber-security dangers have emerged – and will likely continue to appear. The HeartBleed bug in openssl, and backdoor entrance software found in network security devices, have caused major security concerns.

Cryptography can be used in the form of ransomware attacks against healthcare providers. Hackers encrypt sensitive patient data and demand financial compensation in the form of digital currency such as Bitcoin in return.

While there are many regulations and restrictions on data sharing and health technology, there are benefits that encourage physicians and patients to implement technological developments. Data sharing allows for rapid communication amongst healthcare professionals, which aids in diagnosis and consultations.



Dr. Sunny Malhotra is a US-trained cardiologist working at AdvantageCare Physicians. He is an entrepreneur and health technology investor. He is the winner of Best in Healthcare – Notable Young Professional 2014 and the national Governor General's Caring Canadian Award. Twitter: @drsunnymalhotra

How to handle threats to health record security

BY DOMINIC COVVEY

Veneral disease! What does it have to do with threats to health record security?

Back in the late 1970s I had the great honour to work with Justice Horace Krever on his Report of the Commission of Inquiry into the Confidentiality of Health Information. It was an honour because of the importance of the project and the chance to work with one of our greatest jurists. I have throughout my life been grateful for the all too brief chance to learn from him.

There were a number of things that led to, or were revealed during the evidence taking by, the Commission. Probably the one that sticks out most prominently in my mind was the "VD Fun Run" (figures, eh!).

However, the actions of representatives of the Canadian Medical Protective Association (CMPA: it provides malpractice insurance to physicians) also deserve mention.

This skinny on these occurrences is revealing about why we need to be concerned about security.

The CMPA representatives dressed up like any other doctors and went into medical records departments to access records. They did this to get information about cases with which they were dealing.

This effectively put patients and their families at significant disadvantage, as it gave the representatives information to which patients and families had little access, except through ponderous legal means. Of course, in those "good old days", records were on paper, often in thick and heavy

tomes, and typically only accessible individually. These representatives were not in the circle of care as we define it today and had absolutely no right, even by that those days' standards, to do what they did.

Snooping sometimes occurs in order to win court cases; other times, it is out of pure curiosity.

The VD fun run sounds more risqué and interesting! It was supposed to have occurred on the computers at OHIP. A technician claimed he had accessed several magnetic tapes and had gotten personal information regarding people registered as VD patients (a database required

by law). Justice Krever determined that this was largely braggadocio and did not occur, but it was clear that it could have occurred and, at the time, there was nothing to prevent it.

Looking at this, it becomes clear that there are at least two reasons why people might have or did illicitly access computer-based health records. Either for the sake of winning court cases or out of pure curiosity. Needless to say these two drivers still exist, and curiosity has proved to be a recurrent problem generating significant evidence of illicit activity.

In the last few months, for example, newspapers in British Columbia have reported two major instances of curious staff inappropriately accessing patients' records. The good news for British Columbians is that these

CONTINUED ON PAGE 18

Rules are changing for companies wishing to sell to U.S. government

BY DAN WASSERMAN

Health IT companies targeting U.S. government regulatory agencies have recently been given a boost and are now on an equal footing with aerospace, defense and security providers. That's good news for Canadian companies seeking to sell into the lucrative U.S. market.

On August 1, 2016, the US General Services Agency (GSA) added a new Special Item Number (SIN 132-56) to Schedule 70, the schedule covering Information Technology. This addition specifically lists six health-IT areas: electronic health records, mobile and telehealth technology, cloud-based services, medical sensors, remote monitoring devices, and assistive technologies.

The GSA forecasts \$31.3 billion will be spent on health IT in 2017, with much of that by the US government.

Being listed on the GSA Schedule opens up government departments and agencies as new market opportunities beyond the traditional hospital groups, insurance compa-

that have a track record the pathway is much clearer and using an experienced consultant smooths the process.

Having spent over 11 years in Washington, DC, with eight years of US government procurement, Mammoth Health Innovation immediately identified the mag-

nitude of the GSA announcement for Canadian healthcare IT companies. We also recognized what a Health Economic and Commercial Impact Study (HECIS) meant for earlier stage companies' ability to meet the new standard. However, for those already likely to qualify we have the

expertise to immediately prepare a submission. For additional information, see: <http://mammothhealth.org/>

Dan Wasserman is President of Mammoth Health Innovation. He can be reached at: dan@mammothhealth.ca

In the past, listing was arduous. But the GSA's new FASTlane process cuts the typical 110-day process down to 45 days.

nies, long-term care facilities, large medical practices, etc., often with larger contracts.

This includes such entities as the National Science Foundation (NSF), Social Security, the Veterans Administration (VA), and under Health and Social Services (HHS), the CDC, FDA, NIH, and CMS.

Plus, under the Trade Agreement Act (TAA) Canadian companies can qualify for a listing. Typically, Canadian health innovators target American private institutions either to overcome the heavy procurement limitations in Canada or as their first export market. With this change they have an even greater potential customer base in the US.

However, there are 123 other countries covered by the Act and these include such heavy-hitters as Ireland, Israel, Taiwan, and the UK. Innovative companies from all of these nations are expected to list. But if that isn't enough of an impetus to get on the schedule, one only needs to look at the upcoming American election.

Should Donald Trump win and execute his threat to tear up the existing trade agreements, only grandfathered companies will remain. As for Hillary Clinton becoming the next president, by waffling on TPP it is unclear just what her policies will be.

In the past, the listing process was arduous and time-consuming. However, the GSA's new FASTlane will cut the typical 110-days down to 45-days. That means there are effectively three approval cycles between August 1, 2016 and January 20, 2017, when the new president is sworn in.

Additionally, some Canadian innovators will benefit from the elimination of the two-years in business rule that has been replaced by project experience. There are specific requirements for approval under this change. However, for companies



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Data on tap: Manitoba and Ontario give clinicians easier access to patient records

By linking records and automating access to information, physicians can quickly reach useful data.

BY DIANNE DANIEL

CTRL +E is Dr. Tunji Fatoye's favourite computer shortcut these days. As unit director at Winnipeg's Kildonan Medical Centre, he uses it when he's seeing a patient for the first time and wants to know what drugs were prescribed previously. He uses it to check lab results, including diagnostic imaging services, urine and blood cultures, and smear tests. As of July 2016, he even uses it to learn about his patients' recent hospital visits.

It's a simple sequence of keys that delivers big results, thanks to ongoing efforts within the province of Manitoba to deliver eChart, a secure electronic system that allows authorized healthcare providers to access integrated patient health information.

"If I'm on my electronic medical record (EMR) system and I'm looking at Jane Doe, all I have to do is hit CTRL +E and I open Jane Doe's eChart, right within my EMR," says Dr. Fatoye, one of more than 5,800 active users who are regularly accessing eChart each month.

It wasn't always so straightforward. When Manitoba eHealth first launched eChart in 2011, early users like Dr. Fatoye had to minimize their EMR screens, log in separately and search for a patient. "We said, 'This is great but we need it to work better. How can we integrate it?'" he recalls.

Each healthcare provider accessing eChart is assigned a unique user name and password. If they are using a Manitoba certified EMR, Manitoba eHealth will work with the EMR vendor to embed a link to eChart, establishing what's referred to as an in-context pass-through. The link – in Dr. Fatoye's case, CTRL +E – automatically connects to the correct patient, removing the need to re-enter information and decreasing the likelihood of error. Although integration happens behind the scenes, users still need to refresh their passwords every 90 days and remain subject to the same auditing procedures as users who don't have a certified EMR and log into eChart separately.

Integration is a primary focus as Manitoba eHealth works towards its vision of "one system, one network," says Liz Loewen, Director, Coordination of Care, at Manitoba eHealth. "We're very happy with the inroads we've made."

The province is using Allscripts dbMotion to collect and store data from disparate clinical information systems. As Loewen explains, data is held in a clinical data repository hosted and managed by Manitoba eHealth, and presented to healthcare providers through eChart.

Data sources connected to date include the provincial client registry/registration system which holds unique personal health identification numbers (PHINs) for each Manitoban; immunization records; prescriptions filled through the province's Drug Programs Information Network (DPIN); laboratory test results; diagnostic image reports; and, most recently, administrative information related to hospital visits at Winnipeg and Interlake-Eastern hospitals. Two modalities not yet connected are cardiology and pathology test results.

"The originating information is always very

clearly living with those source systems," says Loewen. "If there's ever a concern about the result being posted correctly, or that it has come with an error, we work back with that source to get it updated and sent through, if need be."

Five years after its launch, eChart is in 61 percent of primary care settings, 77 percent of hospitals and 96 percent of nursing stations. Work is continuing to make eChart available to authorized healthcare providers. "I would say the work in operating a system like this is as heavy on the business side as it is on the technical side," says Loewen.

Manitoba eHealth follows a very structured process to qualify and authenticate users, establishing formal relationships with employer organizations to ensure users only have access to the information they are supposed to. "A nurse in one setting may have a very different role from a nurse in another, so we didn't feel it was appropriate to assume all nurses needed the same level of access," she says.

All user access to eChart is recorded and audited to comply with Manitoba's regulatory and legislative

Manitoba's approach to delivering integrated health information was province-wide from the start and is advancing each year. Dr. Fatoye says every change is a welcome one.

For example, results were only accessible from one lab in the beginning. Now, several private laboratories are also onboard, meaning he no longer has to steer patients towards hospital labs when handing out requisitions. "It's more patient-friendly in that regard. They can go where it's more convenient for them and the data is still available in the provincial repository," he says.

For its part, Ontario is also working toward province-wide access to patient healthcare data. However, given the large population of the province, eHealth Ontario decided upfront to take a regional approach, dividing the province into three major partners: the Greater Toronto Area, Northern and Eastern Region, and Southwest Ontario.

"We thought that was the most efficient and cost effective way to go ahead," says Patricia Trott, eHealth Ontario Director of Communications. "Right now we have all of the foundational elements of the connected electronic health record in place ...

and we've made great strides in connecting clinicians in each of the regions."

Trott reports the program currently has about 80,000 users across the province, gaining 40,000 or so within one year after launching the ConnectingOntario viewer in central Ontario last summer. Due to the ongoing success of its regional integration strategy, the program recently announced a shift in branding. Originally the three regional hubs were referred to as connectingGreaterTorontoArea, connectingSouthWestOntario and connectingNorthern and Eastern Ontario (cGTA, cSWO and cNEO respectively); they will now share the ConnectingOntario brand, accompanied by their regional name.

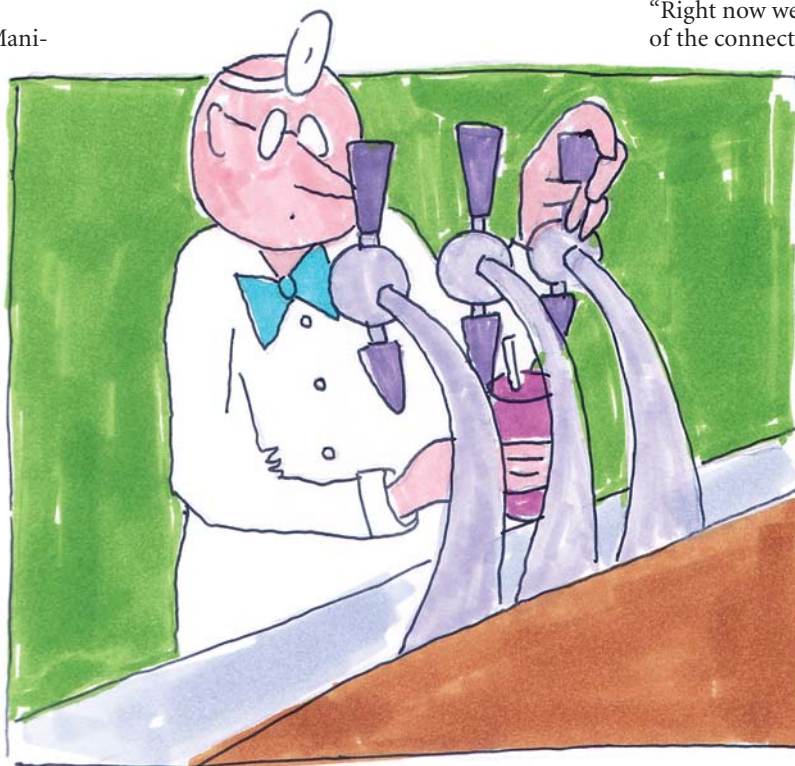
A top priority for all three service delivery hubs is to ensure rigorous standards are in place, starting with the collection of priority

clinical data from various regional systems, including drug information, lab information and hospital discharge summaries.

"Leveraging provincial assets is a very efficient way of getting at data," says Mel Casalino, Senior Director, ConnectingOntario North Eastern Region, and Acting Director, ConnectingOntario Greater Toronto Area. "We're also building interfaces into the hospitals for all hospital reports and information that's being collected and managed there."

Moving forward, the program is looking at ways to connect with the primary care community, as well as public health units. Community Care Access Centres (CCACs) are already contributing data, he says.

Similar to the way Manitoba's eChart operates, users can either log onto the ConnectingOntario viewer using their secure user name and password, or they can use a single sign on approach, accessing



standards related to protecting personal health information. At any time, patients can request a copy of their personal information presented in eChart, ask to see who has viewed their information, or use a disclosure directive to hide their personal information. "It's hidden but it can be retrieved by a subset of users who must indicate the reason for doing so," says Loewen. As of June 2016, there were 136 disclosure directives in place and 537 patients had made requests for records of user access.

One unexpected benefit of eChart is that the province is collaborating around what Loewen calls "small s" standards. For example, work is under way to ensure lab results have a similar look and feel, eliminating the differences created because laboratories use disparate analyzers. If a client goes to multiple labs for their bloodwork and other tests, those results can be difficult to navigate because results for the same test are displayed differently.

it from within existing applications such as a hospital information system, electronic medical record system, or the Client Health and Related Information System (CHRIS), a web-based patient management system used by Ontario CCACs,

"Say they're looking at a patient and they want to access information about that patient from ConnectingOntario," explains Casalino. "They click on a button and that patient information is automatically uploaded, there's no additional searching because the system already knows you're looking at that patient." Most importantly, accessing the information doesn't cause a disruption in workflow, he adds.

The complexity of integrating a variety of data sources is hidden in the background and is supported by rigorous standards. In both Manitoba and Ontario, the eHealth organizations need to ensure multiple patient identifiers are linked. "Because every hospital could have a different identifier ... we have very sophisticated client registries in the background, making sure the information on the patient is accurate and timely," says Casalino.

Trott reports that users of the ConnectingOntario viewer are calling it transformational and are starting to use the data available to them in ways they never anticipated.

Doctors can quickly call up diagnostic imaging test results and lab results, a real time-saver and something that will reduce the need to repeat tests. As well, they can access drug information for millions of Ontarians, including seniors, a particularly vulnerable population, to see what the patient has been taking and to guard against adverse reactions. Patients no longer have to remember their medical histories, including the last time they visited a hospital.

"You build in pockets, you build the foundational elements, and then once you get to that point where you've really done your work behind the scenes and standards are done, you start to see it spread more quickly and you start to see other people wanting to come onboard because the system is so useful," she says. "It takes time. It's a big task, but we're really making progress."

Key priorities for the ConnectingOntario program include rolling the viewer out to more sites and looking at different data types that could be added. Trott says eHealth Ontario is also working to ensure the systems are as fast and reliable as they need to be. "We're looking at technology to make sure clinicians have responsive systems that are faster and continue to be available close to 100 percent of the time," she says.

In Manitoba, Loewen is also hearing positive feedback about eChart. At first, clinicians considered it an extra place to visit and did not work it into their daily workflow immediately, she says. But that all changes after one "aha moment." "When they actually find something in eChart that they didn't realize was available to them, they kind of have that moment of realizing this is a very powerful tool," she says.

Both eChart and ConnectingOntario

initiatives provide a certain degree of customization, allowing users to filter information provided so they can more quickly access what's most relevant to them.

At the Kildonan Medical Centre, Dr. Fatoye says he has come to rely on eChart. He finds it particularly useful for treating elderly patients who aren't always familiar with their medications, sometimes referring to pills by colour. "You ask them ...

and they'll tell you it's the pink pill," he says. "If I look at the same patient in eChart, I could go back five years and say, 'You took this medication four years ago. Why was it stopped?'" Prior to eChart, it was only possible to access prescription information within the last six months, he adds.

Access to integrated information is also useful in helping to manage pain medica-

tions. If a patient arrives at the centre seeking a renewal for a narcotic, Dr. Fatoye can check eChart to ensure pills weren't already prescribed at an earlier emergency room visit, for example. He also finds it useful to view results from tests ordered by another practitioner in cases where he isn't formally copied. "Those results won't be in my electronic medical record, but they will be in eChart," he says.



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tunity to use ClinicalConnect in the real-life learning labs helps students develop leadership skills to advance the eHealth agenda when they are in professional practice.”

The HITS eHealth Office team benefits too from this unique partnership. Dale Anderson, Senior Manager of the HITS eHealth Office said, “The simulation lab provides a great venue to experience ClinicalConnect and access to other valuable data sources. We value the feedback provided by prospective healthcare workers as they enter the field so we can

continuously improve eHealth solutions in the region.”

For Mohawk College, the partnership helps prepare nurses to practice in informatics-intensive, fast-paced and complex healthcare environments. In addition to accessing their patients’ health information from multiple sources more efficiently, students can access the Registered Nurses Association of Ontario (RNAO) Best Practice Guidelines, as well as DynaMed, an evidence-based, contextually-relevant clinical information tool, all from ClinicalConnect.

Marzena Cran, Education Specialist at the HITS eHealth Office and primary lead for this initiative, said: “Providing students with early and frequent exposure to Clini-

calConnect throughout their academic career enriches their experiential learning in a safe and simulated training environment. Students are able to apply their critical thinking skills while leveraging the technology to support their learning.

For Mohawk College, the partnership helps prepare nurses for informatics-intensive healthcare environments.

“As a result,” she added, “using ClinicalConnect becomes second nature to them, and upon graduation, they can take their experience into the field, not only as

competent clinicians, but as eHealth champions able to encourage their peers to adopt digital health tools and realize the same benefits.”

Since the introduction of ClinicalConnect into Mohawk College’s Registered Practical Nursing and the BSc.N undergraduate programs in January 2016, feedback from faculty and nursing students has been overwhelmingly positive. Victoria Labadia, a Transformational Analyst at the HITS eHealth Office who has provided education support during the first phase, said “staff and students alike are well-engaged and motivated to access electronic health information from ClinicalConnect, and immediately see how this eHealth tool can help make better informed decisions.”

Project team members from Mohawk College and the HITS eHealth Office continue to meet regularly to ensure phase one milestones for ClinicalConnect’s integration into the College’s B.Sc. Program Level 1 and the Registered Practical Nursing Program are being met and obtain faculty and student feedback.

Together, the organizations will continue to measure the effectiveness of integrating eHealth solutions in the nursing program, and apply lessons learned to future phases of the project. Results to date demonstrate that ClinicalConnect is proving to serve as a catalyst for change, as future nursing professionals learn to regularly use eHealth solutions as a means to deliver more efficient, safer patient care.

System improves monitoring of moms and their babies

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they can call up live data remotely rather than relying on someone else to relay information. If a mom needs to be rushed to the intensive care unit for emergency treatment, the fetal strip is easily monitored from the labour and delivering nursing station.

Each strip shows fetal heart rate, contractions and last set of maternal vital signs taken, and patient demographic banners change colour to reflect three different alarm states: red signifies a mom or baby alarm, yellow means a device problem and orange indicates a time sync error.

“It looks the same whether you’re sitting 10 feet away from the fetal monitor, on another floor or at home,” says Harrington. “It’s no different.”

Another advantage is the two-way electronic flow of information that’s now automatic. Prior to implementing an integrated system, nurses would have multiple pieces of data in multiple places that they would need to transcribe or print out. Now, everything is stored in PowerChart Maternity where it is easily accessible to all care providers in real-time at the point-of-care.

The customizable pregnancy summary in PowerChart Maternity, for example, can reflect weight tracking, laboratory orders, allergies, problems, obstetrical exam documentation and other key data points. In-

formation from the mother’s health record is also electronically copied to the baby’s record and clinicians can toggle between the two.

“Now, the full history of the pregnancy and everything that happened is available to all care providers, all of the time,” Harrington says.

An added benefit is the ease with which external reporting is completed. For example, the Better Outcomes Registry Network (BORN) in Ontario mandates the collection of data on every pregnancy, birth and young child in Ontario.

Growing start-up consolidates personal health records

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“only one-third of that is [typically] in electronic format. The rest is paper.”

The value of MedChart, he observes, is that it collects all of a patient’s records, in digital format or paper, and consolidates them in one secure place. “We’re digitizing everything you have and building a unified system,” he says.

Doctors using MyChart, which has been deployed at Sunnybrook and a number of other Toronto-area hospitals, also use their discretion about what you can

see. “It’s not your whole record,” says Bateman, noting that MyChart is usually only a partial record.

By contrast, MedChart includes all of the records produced by doctors and clinics that the patient wishes to consolidate in one place.

MedChart is currently in talks with the University Health Network, which is using a version of MyChart called myUHN for its patients. It’s possible that a link between these systems and MedChart could be developed. “We could give you one-button access to MedChart,” says Bateman.

That would allow patients to toggle between the two systems and utilize all of their health data across North America in one place.

MedChart now employs eight people at an office in downtown Toronto. The engineer-led company has built the system on their own.

The fast growth of the company, which was created just last year, is due to its ability to solve a pressing problem, comments Bateman. “We’re moving health records out of silos. We’re making the records accessible to patients, wherever they go.”

Dominic Covvey

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accesses were detected and, apparently, the perpetrators have been dismissed – although their names do not seem to have been made public.

So, it turns out that plain old human curiosity may be a common threat to the security of patient records. And the crime is an “inside job”! The same motivation that drives scientists to discover new phenomena or to develop new theories, turns out to be a clear and present danger. Unfortunately, it is unlikely that this motivation will be suppressed by moral indignation or even the harsh tools of law.

Obviously, we can (and do) educate our staff, making it utterly clear that this is not permitted! We can even scare the bejesus out of them (sounds like the military’s approach to VD prevention, doesn’t it?), so they don’t act

on their curiosity. However, human nature being what it is, ablating this natural propensity is unlikely. Thomas Hobbes put it well: “Curiosity is the lust of the mind.”

In those instances where money (like that involved in a medical lawsuit) is involved, it is also unlikely that this will be suppressed, given humans’ greed gene.

Are there any solutions?

It does seem like, in addition to staff education, the education of system developers and managers is crucial. Some seem to have gotten this, but others seem to have missed that class! They are the next line of defense beyond what we succeed in inculcating in people’s minds. Further, we must augment developers and managers with tools to enable them to apply this education in real-time, all the time.

To accomplish this, it is absolutely clear that several things must be done that are not all yet in place:

- The challenges of creating secure systems must be addressed by development

discipline and new architectures. Structures like Aspect Oriented Architectures that centralize security control must be implemented and there must be a single point of security-controlled entry in all our systems;

- Software, likely ‘intelligent’ software, must be developed to monitor system access versus permission lists and must

It is unlikely that human curiosity will be suppressed by moral indignation or even the harsh tools of law.

automatically report possible violations to attentive operators. Yes, this is very challenging – but until it is addressed our systems are effectively unsafe and unsuitable for the real-time, prime time uses to which we attempt to put them;

- Management personnel must be dedicated to the constant monitoring of the

security status of systems, both as reported by the aforementioned software and through constant circumspection and an ear to the ground to detect violations; and

- All violations must be publicly reported, perpetrators named and pink slips issued. Illicit access is a crime!

To quote Bruce Schneier: “The mantra of any good security engineer is ‘Security is not a product, but a process. It’s more than designing strong cryptography into a system, such that all security measures, including cryptography work together.’”

When human nature itself is a threat, then detecting this threat, addressing this threat and preventing this threat must be in human hands; hands augmented by more secure technology and functionality that enables robust actions.

Dominic Covvey is President, National Institutes of Health Informatics, and an Adjunct Professor at the University of Waterloo.






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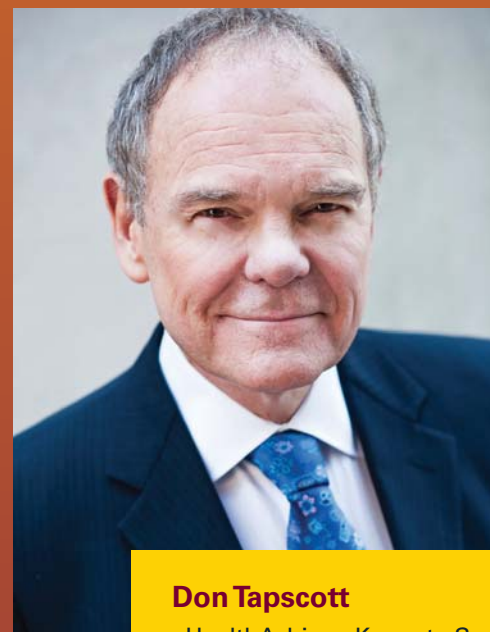
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