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INSIDE:

PHOTO: COURTESY SUNNYBROOK HEALTH SCIENCES

Sunnybrook has been using its expertise in clinical I.T. to devise a unique, Electronic Health Record system. The solution is enhancing teamwork and leading to improved patient-care. Pictured (l to r): Katherine Vandenbussche, Clinical Documentation Project Team Leader; Sam Marafioti, Vice President and CIO; and Laura Viola, Director of Sunnybrook's Project Management Office and Client Service.

Sunnybrook creates its own advanced EHR

BY JERRY ZEIDENBERG

TORONTO – While other hospitals have been implementing commercial electronic health record systems, Sunnybrook Health Sciences Centre has created its own health information system – called SunnyCare. It has done this over the past few years, tying together best-of-breed components from the private sector and adding its own, home-grown software to create a solution like nothing else available in Canada.

"SunnyCare is a single, integrated workflow solution," said Sam Marafioti, Sunnybrook's Vice President and Chief Information Officer. "In my 30 years in hospital IT, I've never seen anything as powerful."

A key element of the system will be rolled out next year – it's the clinical documentation component that will extend electronic, clinical charting to every healthcare professional in the three-campus hospital.

That's no small task, as there are currently over 6,500 clinicians and care-givers in the organization, working in acute care, rehab and long-term care settings.

But already, SunnyCare is providing online documenting to nearly 3,500 physicians, residents and allied health professionals in the organization. The charting ranges from consult notes and admission order sets to medication reconciliations and care plans to progress notes and discharge summaries.

> **A key element of the system will be rolled out next year – it's the clinical documentation solution.**

"Clinical documentation is a crucial component of the solution," said Marafioti. "It's important for patients, physicians, staff alike."

While electronic charting systems are available in other EHR platforms, SunnyCare is extending the solution to each and every care-giver in an integrated fashion. In short, everyone will be able to use the same system – that's a real breakthrough, as healthcare has traditionally operated in a fragmented, siloed way.

"All forms have been re-designed to fit into this single workflow," said Marafioti. "It's designed by clinicians, for clinicians. SunnyCare gives them a single, integrated view."

What's more, Sunnybrook plans to make SunnyCare available to other healthcare organizations, just as it has offered them its patient portal, called MyChart. The MyChart portal is used in a variety of hospitals across Ontario, and in April, Sunnybrook announced its first MyChart customer out-

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Sunnybrook creates enterprise-wide system for clinical documentation

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side of Ontario – Fraser Health, in British Columbia.

SunnyCare is a web application platform developed at Sunnybrook and certified by Canada Health Infoway as a jurisdictional class electronic medical record system. "SunnyCare meets clinician needs by integrating information from highly specialized, departmental systems and presents clinical workflows that are easy to use and can be accessed from desktop computers and mobile devices," commented Oliver Tsai, Director of IT at Sunnybrook.

While SunnyCare supports electronic documentation, most nurses are currently charting on paper – as they are in many healthcare organizations. The goal is to switch everyone over to electronic documentation, and to support best-practice documentation standards.

That will promote information sharing among teams, and will reduce duplication of effort for clinicians and patients.

Sunnybrook has partnered with Orion Healthcare to integrate its clinical documentation engine into SunnyCare. Orion has been working closely with the team at Sunnybrook to customize its solution and integrate it with SunnyCare workflows.

"Electronic documentation will allow us to capture information once, and to share it, instead of asking patients the same questions over and over again," commented Katherine Vandenbussche, a registered dietician at Sunnybrook and a Clinical Documentation Project Team Leader.

Not only will this save time and trouble for care-givers, but it will also provide a better experience for patients. She noted that patients sometimes get anxious if they're asked to repeat the same information, such as names, addresses and birthdates, to different clinicians. "Enabling all clinicians to document in SunnyCare will better align with how we work together as an inter-professional team to provide the best care possible for our patients," said Vandenbussche.

Sunnybrook is a leading-edge healthcare provider with three different campuses in Toronto – an uptown rehab hospital; a central site in mid-town Toronto, which houses a major trauma centre, cancer and cardiac care, research, a long-term facility, and a host of other medical programs; and a downtown orthopedic hospital.

"Using the principles of user-centred design, the development team and clinicians across Sunnybrook have invested a great deal of time in the design of SunnyCare's clinical documentation workflows to support best-practice standards for various clinician groups," said Laura Viola, Director of Sunnybrook's Project Management Office and Client Services.

Over 1,000 different forms, across interdisciplinary teams, have been standardized to ease collaboration and workflow.

The participants include nurses, physicians, occupational therapists, physiotherapists, and many others, she said.

Medical and everyday language in charting was a significant issue for workflow. "What a doctor means when he or she uses a term may have a completely different meaning to a physiotherapist or occupational therapist," said Dr. Chris Hobson, Medical Director for Orion Health.

Indeed, the design team started by identifying 39 different patient care categories where standardized terminologies could support inter-professional team documentation. This included service-related information used in areas like cardiology and respiratory medicine, as well as patient data and personal information – such as the name a person prefers to be called by, and what kinds of supports he or she has at home.

The ClinDoc team at Sunnybrook is using the standardized terminologies to streamline over 1,000 different forms across the interdisciplinary team, so that clinicians all speak a common language.

To ensure effective and efficient documentation workflows, where possible SunnyCare will use a template driven format instead of free-form notes. In many cases, check-boxes will be used, so that documenting can take place much faster than before while adhering to agreed-to standardized terminology.

As well, SunnyCare will pull data directly from medical devices. As a first step, vitals monitors will be integrated to SunnyCare so related clinical documentation will update automatically. This kind of device integration ensures a comprehensive "one-stop-shop" for patient clinical information, saving time for all clinicians and improving patient safety.

Moreover, SunnyCare clinical documentation will provide value across the interprofessional team. For example, embedded clinical workflow will allow orders to flow to a nursing kardex and work list, and will prompt clinicians with appropriate assessments and templates for documentation.

This is a leading-edge feature and required specialized, intelligent coding in SunnyCare, noted Marafioti. "Sunnybrook can quickly and seamlessly embed workflows to facilitate the clinician's care delivery process," he said.

Standardized, electronic information can also be analyzed more effectively, giving the hospital a greater ability to understand the condition of patients before, during and after hospital stays. This can be a powerful tool for improving service quality and for planning enhancements for future services.

Ultimately, adding interprofessional clinical documentation to SunnyCare's existing functions will lead to a single, shareable electronic record for each patient, rather than a mixture of paper and digital notes in departmental silos.

Through this project, Sunnybrook may be achieving a first in Canada. No other major hospital has yet to create an electronic health record that encompasses

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Introducing: AICloudQA™
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AICloudQA™ is a secure, expandable healthcare quality-assurance system that combines Google Cloud Platform infrastructure, with and Real Time Medical's Intelligent Peer Review solution and Client Outlook's eUnity™ viewer. Now you can use AI-assisted peer learning with AI-assisted workload balancing to increase clinical efficacy and improve acute care performance.

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Google Cloud

REALTIME MEDICAL

Six partners in Eastern Ontario join forces to implement Epic EHR

BY SHAFIQUE SHAMJI

Consider the care journey many patients face as they negotiate their way through multiple hospitals in the healthcare system to be diagnosed and treated.

A patient in a rural area, for example, might first go to the nearest hospital for tests and initial treatment. There would be registration, care visits and scans performed. If there's a need for specialized care outside the scope of that facility, then the patient is referred to a specialist at a larger hospital for more treatment.

As the patient moves from one hospital to the next, he or she might have to repeat basic information multiple times or there could be a lag between when diagnostic results are transferred from one hospital to the other. All of this is an extra burden on patients at a time when they need to focus on their health.

Ontario is moving forward with a 10-point implementation plan for its Digital Health Strategy, aiming to enhance access to health information and services, strengthen quality, effectiveness and accountability, and stimulate innovation and growth.

In step with the province, my goal at The Ottawa Hospital is to harness technology to create a better patient experience. And I am very excited about a pivotal project underway involving five partner organizations in eastern Ontario.

The Ottawa Hospital, The Ottawa Hospital Academic Family Health Team, Hawkesbury and District General Hospital, Renfrew Victoria Hospital, St. Francis Memorial Hospital in Barry's Bay, Ont., and the University of Ottawa Heart Institute have come together as the Atlas Alliance to implement a Health Information System (HIS) by Epic, an industry leader in electronic health record software.

When this digital hospital network launches in June 2019, there will be one integrated electronic system to manage patient information, chart across specialties, and manage research data and physician documentation.

Epic provides a patient-centered platform, with an electronic health record that is accessible regardless of where patients receive care. That means informed decisions can be made with the most up-to-date information.

Shafique Shamji, Executive Vice President and Chief Information Officer; Michelle Leafloor, Program Director; Dr. Glen Geiger, Program Medical Lead; and Yvonne Wilson, Program Clinical Lead, at The Ottawa Hospital, believe the Epic Health Information System will harness technology to create a better patient experience.

The Epic team at The Ottawa Hospital. Planning for the implementation has been highly collaborative.

Through Epic's MyChart, patients will be able to view their lab or radiology results using their mobile devices. They will have access to education materials, pre-visit questionnaires, and post-visit summary of care.

Patients will become active partners in managing their health.

The Epic HIS will improve the experience of care, the work life of healthcare providers, and the health of our populations, and it will reduce costs. It will provide: best-practice order sets; electronic documentation tools; care pathways; care process management; inter-provider communications; clinical decision support tools; and performance measurement.

Recently, I met Lamia Almorsay, who has the unique perspective of looking at the healthcare system through the eyes of both a provider and a patient. Almorsay, who is a pharmacist, worked overseas for much of her career in quality management, patient safety and hospital administration.

When she was diagnosed with breast cancer, she started a year-long journey that enabled her to look at the healthcare system through a patient's eyes. The view was quite different from the one she has had as a pharmacist.

"Many things could have been done in a better, faster and safer way. I hated the redundancy of repeating myself to every healthcare provider who I consulted with or was referred to. This redundancy or repetition of information may result sometimes in missing information, forgotten information or even misinterpretation of information," said Almorsay.

It's stories like these that compelled the partner hospitals to look for a better approach for patients and staff alike.

The scope of the project is broad, the pace is fast, and the dynamic collaboration of analysts, developers, stakeholders, and trainers across six healthcare centres is what will ensure we will reach our goal of implementation. Over the 20-month project our analysts and trainers will configure a system that involves all workflows that support patient care and billing.

Interface developers and business intelligence developers will manage device integration and data conversion. Epic application managers and coordinators are working in concert with the analysts and the developers for each of the 29 modules to support the development, testing and integration of the Epic system, the successful Go-Live and post-Go-Live support.

Stakeholders, including clinicians, radiologists, porters, clerks, and patient advocates, are providing input, reviewing material and making decisions when necessary for the build.

Trainers will be leading mandatory training for 18,000 end-users.

At Go-Live, we will empower staff to deliver 21st-century care using this 21st-century solution. And, we will enable patients to navigate their care journey effortlessly, so they can concentrate on what matters most – the quick return to good health.

Shafique Shamji is Executive Vice President, CIO, The Ottawa Hospital

Sunnybrook system

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standardized, electronic clinical documentation for each and every healthcare professional.

One of the first steps in creating a successful system of this sort is to gain the acceptance and buy-in of every clinical group. Through a user centred design process, Sunnybrook has been asking all clinician groups to help design the new solution, so that everyone has input into the process and end result.

That's meant regular, multi-departmental meetings, guided by experts in design and change management. As part of the process, Julie Waspe, a registered nurse and Clinical Informatics Specialist at Sunnybrook, noted there's an iterative process going on, where models are sent out to clinicians to look at and comment on.

"We're sending out wireframe models that show what the system is looking like, and we're asking clinicians to comment on them," said Waspe. "Users get to play with and interact with wireframes of the solution, which allows them to provide specific and detailed input about what their requirements are and how the clinical documentation team can improve the solution."

In this way, there is a constant flow of information and communication among groups. And in the end, it becomes a group project, where clinician groups across the hospital have a say in the design. While a detailed change management and training plan will be put in place, user engagement and ownership of the solution has proven to be a powerful component of SunnyCare adoption.

> **It's a big shift, as many clinicians are moving from paper to the shared, electronic charting system.**

Users like being consulted about how SunnyCare clinical documentation should work, and they see the potential benefits – the time savings and the ability to quickly see what others have already charted and build on it from an inter-professional perspective.

"It's a big shift," said Vandenbussche. "Many are moving from non-standardized paper notes to a standardized electronic document." Nevertheless, the gains of the system appear to be outweighing any trepidation from users. "People are getting excited about it," said Vandenbussche.

Real Time Medical launches AI-powered quality assurance solution

BY JERRY ZEIDENBERG

Real Time Medical, of Mississauga, Ont., has announced a partnership with Google that not only positions the Real Time Medical platform on the Google Cloud, but also creates a working partnership to create new, AI-driven solutions for clinicians in Canada and worldwide.

Real Time Medical is the creator of a peer-review, quality and education system for radiologists and other clinicians. The solution checks the quality of the readings done by radiologists and other specialists by sharing a portion of their work among a group of peers on the Real Time Medical network.

Their identities, however, are anonymized, so there is no fear of embarrassment or repercussion. If mistakes or "discrepancies" are found, the clinician is alerted so he or she can modify reports and brush up on skills for the future.

"We've conducted seven radiology quality audits across four provinces, for ministries of health, hospital networks and physician insurance organizations," said Dr. Nadine Koff, a radiologist and President of Real Time Medical. "We know that performance varies not only by individual, but also by exam type and sub-speciality. It's for this reason that our system, unlike so many others, provides for per user, per subspecialty, anonymized and individualized peer learning and review."

Indeed, while a discrepancy rate of one to two percent is considered normal, independent reviews have found the rate of discrepancies for some radiologists run as high as 20 percent. Nevertheless, many hospitals and health regions still haven't implemented quality assurance systems for their clinicians.

Those that have, say executives at Real Time Medical, haven't always installed effective systems. Ian Maynard, CEO of the company, says that some hospitals are using peer review systems that may check only one exam reading per day for a radiologist.

By contrast, Real Time Medical's system can be set to check any number – even 100% of a particular exam type, if so desired.

"Many systems amount to nothing more than an arbitrary one case per user, per day, regardless of the number of diagnoses generated," said Maynard. "That's really nothing more than a "check the box", we do peer review approach. Other systems have users comment on a historical exam while interpreting the current. Not only is that approach objectively invalid because the historical report is not anonymized, but more importantly, historical exams can be 6 or 12 months old. The patient is being rescanned for a reason, likely a worsening of symptoms. These solutions are behind the times, and they fall far short of what we're capable of as a country."

Maynard noted that Real Time Medical's technology, which is used in hospitals and regions across Canada, offers a more thorough analysis of readings.

Moreover, the intelligence component of its system can spot where clinicians may need extra help with readings – for example, discrepancies may be found more often when they're reading head and neck CTs, or certain types of ultrasound scans. The system can alert them to this.

The AI component of the Real Time Medical system can spot where clinicians may need help with readings.

Real Time Medical's alliance with Google is one of the first instances of a Canadian health technology company putting its solution on the Google Cloud. By doing so, it lowers the cost of using the system for hospitals and clinics, as they don't have to acquire their own infrastructure – they simply make use of the computing power of the cloud.

Dr. Koff observed there are no issues of sovereignty or privacy involved, as Google has a high-security data centre in Montreal.

Real Time Medical's leadership team: (l to r) Dr. David Koff, Dr. Nadine Koff, Ian Maynard, Enzo Costanza.

The platform now available offers shared peer review and quality assurance for radiologists and pathologists. Other specialities will be added in the future.

So, right now, hospitals and clinics that join the system benefit from the expertise of radiologists and pathologists outside their own facilities. It's a system of shared expertise that spots discrepancies and raises quality, no matter the size of the organization that uses it.

"It doesn't matter if you're in a clinic with five radiologists," said Enzo Costanza, Vice President of Product Development and Implementation at Real Time Medical. "Our Canada-specific deployment allows for radiologists and pathologists in hospitals and independent healthcare facilities throughout this country to connect and gain the benefits of large-scale, AI enhanced peer review, regardless of their size, or number of practitioners."

He added that, "Other systems are site-limited, or tied to site specific, EHR, RIS, PACS or voice reporting solutions and offer very little in terms of a critical mass of peers with the same subspecialties."

On a cloud-based system, by contrast, users are connected to a far bigger community of peers. And they're not constrained by the type of PACS or EHR they are using.

The partnership with Google will allow Real Time Medical to draw on the expertise that Google has in artificial intelligence – Google is a leader in AI and Deep Learning, and the company has established AI centres of excellence in Toronto and Montreal. It is also a partner in the Vector Institute, an AI think-tank and accelerator in Toronto.

At the same time, Real Time Medical will be helping Google develop its own healthcare applications. "They approached us and since then things have progressed quickly from a partnership perspective," commented Dr. Koff.

Indeed, in conjunction with Google, Real Time Medical plans to develop four different AI-driven applications. The first of these was announced by the company at the recent Healthcare Information Management and Systems Society (HIMSS) conference, held in Las Vegas in March – it consists of the 'intelligent sampling' app, which spots areas in which a particular radiologist may need to get up to speed.

As well, at HIMSS, the company announced a powerful alliance with Client Outlook, the maker of the eUnity viewer. The company's next AI-powered solution will likely be announced at the Radiological Society of North America (RSNA) conference in November.

Many benefits to AICloudQA platform, for quality and peer learning

Below is a summary of how Real Time Medical's innovative and award-winning AICloudQA platform will help clients lead peer learning and review initiatives to improve physician skills and patient outcomes:

• **Simultaneous prospective and retrospective peer learning:** It's the first platform capable of simultaneous prospective and retrospective peer learning and review of current and historical studies.

• **Highest granularity system for user and case specific continuous quality improvement:** Unlike systems restricted to non-user specific, system-wide, or modality-based sampling rates for all physicians across their network regardless of experience or skill level, the RTM system provides adjustable, user-specific sampling by study type and sub-specialty. This provides high granularity, high value, continuous quality improvement specific to each individual user and is responsive to their peer learning experience and performance over time.

• **All user peer review feedback:** Because AICloudQA integrates peer review into your processes and workflows, it provides a continuous educational opportunity. Specialists and medical learners benefit from performance-enhancing, ongoing, anonymized feedback and acquisition of additional knowledge through collaboration and AI assisted pattern recognition and learning assistance.

• **Minimal impact to workflow:** AICloudQA uses standards-based messaging to communicate to your current image acquisition systems and presents physicians with a browser-based, required actions worklist and diagnostic quality viewer.

• **Best practices:** The system meets and exceeds CAR, ACR, and Health Quality Ontario guidelines for "ideal" and "best practice" peer review system characteristics, including workload balanced peer review. Additionally, AICloudQA provides "on the fly" anonymized Peer Review in accordance with best practices, whereby neither the original specialist nor the reviewer knows the other's identity.

Specialists and medical learners benefit from ongoing, anonymized feedback and knowledge.

• **Extensive analytics:** Create customizable dashboards or select your own metrics to view and export a wide range of data.

• **Patient critical results communication:** Unlike other systems, AICloudQA closes the loop for critical results notification and management. It comes complete with automated monitoring of critical findings, acknowledgements and required escalation.

• **Cloud-based:** The solution removes the need for concern over the acquisition, cost and maintenance of your own servers unless on-site solution deployment is preferred.

• **Offsets increased workload:** This is the first system on the market capable of providing clients with workload balanced peer review. The ability of RTM's solution to provide workload balanced peer learning, as well as diagnostic workload balancing helps to offset the increased work associated with peer learning while contributing to overall quality improvement.

Healthcare technology: A game-changer for Brampton and patient-care

Healthcare providers, corporations and entrepreneurs are collaborating in Brampton to build an international health-tech hub.

Toronto, Montreal and Edmonton have all touted themselves as leading-edge developers of healthcare technology. Now, get ready for Brampton to join the club. The city, located just north of Toronto, is home to a rapidly growing cluster of medical and life-sciences companies, educational facilities, and leading-edge hospitals and clinics. Brampton is about to build on that, with a strategy that fast-tracks its development as a health-technology hub.

At the heart of Brampton's healthcare expertise is the giant William Osler Health System – with three campuses and one of Canada's busiest Emergency Departments. The hospital is now taking that expertise and allying with educational centres and entrepreneurs to create new technologies – to both improve medical outcomes and generate economic activity.

> "Over the next year, we're creating a focus on innovation at Osler. We'll be taking front-line companies and inviting them to work with our clinicians. It will be a bit like Dragon's Den, with a number of projects completing their validation at Osler."
>
> *– Dr. Naveed Mohammed, VP, Medical Affairs William Osler Health System*

"Over the next year, we're creating a focus on innovation at Osler," said Dr. Naveed Mohammed, Vice President of Medical Affairs at the hospital. "We'll be taking front-line companies and inviting them to work with our clinicians. It will be a bit like Dragon's Den, with a number of projects completing their validation at Osler, with complete support from the hospital."

Already, the hospital has launched a research and innovation unit, headed by Dr. Ronald Heslegrave. "We've now got four or five companies working with us, and we're coordinating the development of an app for supporting palliative patients in their homes," said Dr. Heslegrave. On the research side, the group is spearheading a large study of cardiac patients; many more studies and innovation projects will be launched in the near future.

A key component of the city's healthcare technology strategy revolves around the Peel Memorial Centre for Integrated Health and Wellness, which opened last year in downtown Brampton. The $500 million hospital – part of the Osler network – is geared to a new model of healthcare: disease prevention and wellness promotion. As well as restoring patients to health, the centre is focused on preventive care for nearly 1.3 million people in the Brampton catchment area. "The focus of the centre is unique in Ontario, and possibly across Canada," said Martin Bohl, Sector Manager for Health and Life Sciences at the City of Brampton.

To this end, Brampton is taking a special interest in methods and technologies that prevent people from becoming ill in the first place. City planners are already envisioning the creation of a "super-cluster" of innovative preventive health technology companies surrounding the Peel Memorial Centre for Health and Wellness. The aim is not only to serve the hospital next door, and the Brampton-area community, but to export the new solutions worldwide.

Indeed, the local population travels back and forth between Brampton and south Asia so readily that William Osler Health System recently struck up a partnership with the Apollo chain of hospitals and clinics in India, one of the largest providers of healthcare services in the country. Not only are the partners sharing medical expertise with each other, but the stage is also set for the transfer of new technologies, too. "We're contributing to hospitals outside our borders," said Dr. Mohammed.

Brampton is geographically advantaged for this role. It's located 20 minutes from Pearson International Airport. It has excellent links to downtown Toronto – it's just 30 minutes away by GO Train. And Brampton sits at the centre of the Innovation Super Corridor.

There are over 800 health-sector businesses and agencies, from doctors' offices to global players in medical research and devices, in the Brampton region.

Brampton already has a base of top-tier corporations, including Medtronic Canada, Canon, Dynacare labs and surgical robotics developer MDA Corp. All told, there are 800 health and life-sciences companies in the Brampton region, employing more than 12,000 people, with an average growth rate of 6% a year.

Other major players include Taro Pharma, Loblaw, the owner of Shoppers Drug Mart, Stericycle, Sharpsmart Canada, and The Stevens Co., a national distributor of medical equipment. And Canadian Blood Services is based in the city, too. "CBS just invested $20 million to expand their labs here," said Bohl. "They added 90 new jobs."

In addition to healthcare providers like William Osler Health System, Brampton is home to Peel Manor, a large seniors' facility, and the ErinoakKids Centre for Treatment and Development, a large autism care and children's disability care provider. There are some 600 medical and dental clinics and facilities in the region, employing 12,000 workers in the life sciences. "There are amazing opportunities for synergies here," said Bohl.

Education and the development of talent is another important building block in the healthcare innovation strategy. Sheridan College's largest campus is located in Brampton and specializes in applied health and community studies. Moreover, Ryerson University – in partnership with Sheridan College – has announced an expansion to Brampton, where it plans to build a $150 million educational campus; it will focus on science, technology, engineering and math (STEM). The school, world-famous for its DMZ business incubator in downtown Toronto, aims to create a new accelerator at the Brampton site. Part of the plan is to connect student entrepreneurs with area business people and clinicians to devise new medical apps and technologies.

Dr. Wendy Cukier, a professor of IT management at Ryerson University and the school's former VP of Research and Innovation, notes that innovation thrives more readily "on the periphery" – not in traditional hospitals or universities in downtown centres, but in companies and institutions that are willing to take risks and break boundaries. "Breakthroughs often come from unexpected places," she observed. In this respect, she continued, Brampton, the William Osler Health System, and entrepreneurs have a wonderful opportunity to collaborate and create new solutions.

An artist's rendering of the health cluster, near the Peel Memorial Centre for Integrated Health and Wellness.

Survey identifies the benefits of a patient portal in mental health

WHITBY, ONT. – After implementing a web-based patient portal in December 2014, Ontario Shores Centre for Mental Health Sciences conducted a year-long survey to assess the benefits for patients and healthcare providers.

The results showed significant benefits in several areas. In particular, the study found that portal users were 67 percent more likely to attend an appointment than non-users. Provider productivity is significantly enhanced when patients keep and attend their appointments.

Moreover, portal users were nearly 30 percent less likely to make requests for information than non-users. Patients with access to their own medical information could find information themselves.

Researchers at Ontario Shores noted that, "Treatment for mental illness has shifted from focusing purely on treatment of symptoms to focusing on personal recovery. Patient activation is an important component of the recovery journey. Patient portals have shown promise to increase activation in primary and acute care settings."

The study, titled "A Web-Based Patient Portal for Mental Health Care: Benefits Evaluation", was published in The Journal of Medical Internet Research.

Ontario Shores studied 461 patients who made use of the portal in the one-year period following its launch.

The objective of the survey was to conduct a benefits evaluation of a Web-based portal for patients undergoing treatment for serious or persistent mental illness in order to examine the effects on:

- patient activation
- recovery
- productivity, and
- administrative efficiencies.

Ontario Shores Centre for Mental Health Sciences is a 346-bed public teaching hospital in Whitby, Ontario, that provides a wide range of assessment and treatment services to those living with complex and serious mental illness.

By employing evidence-based approaches that leverage clinical best practices, innovative technology, and the latest advances in research, Ontario Shores became the first HIMSS Davies Enterprise Award recipient in Canada and the first behavioral health organization in the world to achieve HIMSS EMRAM Stage 7.

The hospital is a user of the MEDITECH electronic health record system, and also implemented the company's patient portal.

Ontario Shores is recognized as one of the world's leading advocates for the "recovery model" of mental health care, which is focused on restoring fuller function and quality of life to those living with mental illness. Under this model, patients are encouraged to become more active participants in their own care and care planning. Patient engagement, therefore, is considered an essential component of the recovery model of care.

All registered inpatients and outpatients at the tertiary level mental health care facility were offered the opportunity to enroll and utilize the patient portal. Those who chose to use the portal and those who did not were designated as "users" and "nonusers," respectively. All patients received usual treatment.

Users had Web-based access to view parts of their electronic medical record, view upcoming appointments, and communicate with their health care provider. Users could attend portal training or support sessions led by either the engagement coordinator or peer support specialists.

The MEDITECH portal provided these patients with:

- Secure, web-based access to key medical data, including lab results, medications, visit history, discharge instructions, and educational materials
- A secure method to electronically communicate with their caregivers
- The ability to view and request appointments, renew their prescriptions, and update their demographic information
- Access via any web browser on any com-

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Cloud DX and Sheridan bring mixed reality to patient monitoring

BY JERRY ZEIDENBERG

OAKVILLE, ONT. – Cloud DX, the award-winning developer of the Vitaliti vital signs monitoring system, has teamed up with Sheridan College in Oakville, Ont., to further develop the AI-powered solution.

Cloud DX, based in Kitchener, Ont., recently won an Epic Bold Innovator award at the Qualcomm Tricorder XPRIZE competition, in California's Silicon Valley. Its advanced technology is able to read more than a dozen vital signs when worn by a patient, and it processes the data in the cloud using artificial intelligence to provide a diagnosis on 19 different medical conditions.

"We're now taking the technology and adding a mixed reality environment," said Magdin Stoica, a professor in Sheridan's Faculty of Applied Science and Technology, and leader of a group of staff and students working on the project.

"The goal is to create a more efficient way of diagnosing patients," he added. "Mixed reality is being used to replace the paper chart."

Dr. Ed Sykes, Director of Sheridan's new Centre for Mobile Innovation, observed that the Sheridan team is applying augmented reality, virtual reality and Deep Learning to the Vitaliti platform, all in an effort to improve medical outcomes. The Centre for Mobile Innovation, funded by the federal government, is conducting several collaborative projects with industry partners. The partnership with Cloud DX is one of six projects currently under way at the school.

The Vitaliti technology – with sensors that attach to the chest and ears – is ideal for remote monitoring. It can help maintain the health of users in their own homes, and can also act as an early warning system, detecting the onset of serious conditions before a patient would otherwise need to rush to the hospital. In this way, the technology could help reduce pressure on Canada's overloaded ERs and hospital wards, while improving medical outcomes.

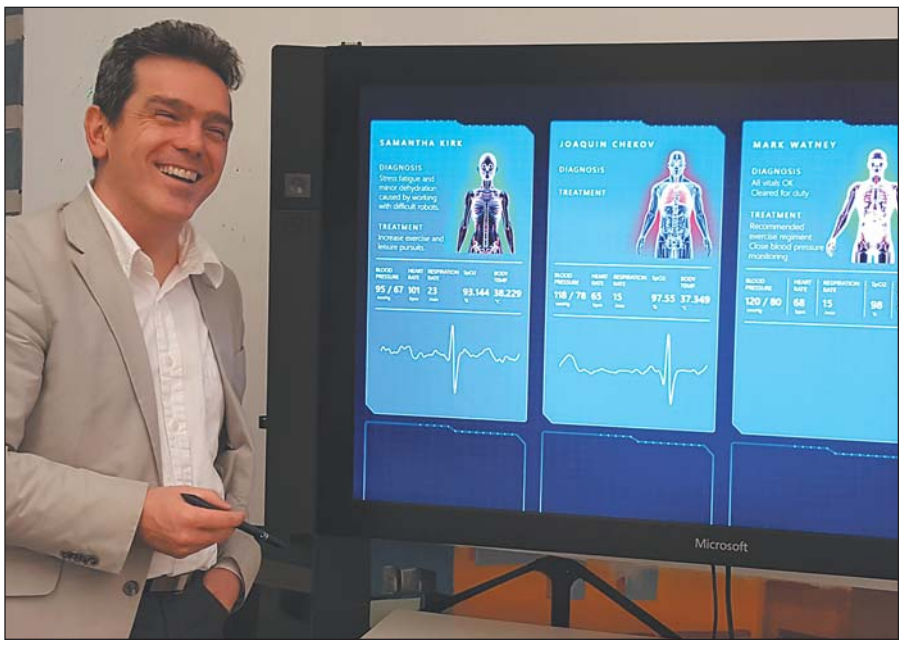
In the same way, it's also extremely useful for in-hospital monitoring – providing clinicians with comprehensive data about vital signs and predicting crashes. Vitaliti is currently being reviewed by Health Canada for this purpose, and approvals are expected this year.

Meanwhile, the team at Sheridan is devising advanced solutions using the Vitaliti platform in three different areas.

First, it is creating a monitoring system for nursing stations. The super-sized computer screen enables nurses and other clinicians to view their patients in their beds, with a summary of their vital signs, all at once.

The patients and data appear on "tiles" on the screen. The system provides real-time monitoring of vital signs, including blood pressure, heart rate, oxygen and body temperature. It also crunches the data, and provides easy-to-read, colour-coded diagnoses and alerts that show when the patient may be running into trouble.

Physicians can agree or disagree with the diagnosis and sign off or modify the suggested treatment. They can write directly onto the screen, which features handwriting recognition, and cross out a diagnosis they differ with, and add their own conclusions and notes.



Sheridan's Magdin Stoica demonstrates the patient monitoring and display system for nursing stations.

The system even detects patient coughs, converts the sounds into a waveform, and sends the data to the company's cloud for diagnosis. The AI in the cloud analyzes the waveform, and sends back a diagnosis – such as pneumonia, tuberculosis or influenza.

The diagnosis is weighted – for example, the Cloud DX system may decide that the waveform indicates a 90 percent probability of pneumonia, but only a 15 percent possibility of influenza. The physician can agree with the diagnosis or override it – simply using handwriting on the big monitor to add his or her own diagnosis or notes.

The system is designed to save time for clinicians and to keep a closer eye on patients. "There is a tremendous amount of information being collected in hospitals, but the data can be overwhelming," said Stoica. "Computers can analyze the data, 24 hours a day, and never get tired."

A second project is to make the data available on mobile platforms, like tablet computers. "If a nurse or doctor is having lunch in the cafeteria, they can still monitor their patients," said Stoica. "They will be able to see the same breakdown of data and alerts.

A third project is perhaps the most ambitious. Using the Microsoft HoloLens, a headset with glasses, clinicians can make their rounds, and chat with patients, while simultaneously receiving a feed with the patient's vital signs appearing in the headset glasses.

This means physicians won't need to bring special diagnostic equipment to the bedside, and they won't need to check the different logs made on monitors or in nursing notes. It will all appear automatically on their glasses, as they look at the patient.

The goal, noted Stoica, is again to save time and trouble for the physician, while providing real-time, accurate data.

Just like the nursing station monitoring board, which provides suggested diagnoses based on data-crunching done in the cloud, the HoloLens will also present a diagnosis and possible treatment, again saving time for the physician.

Right now, the HoloLens seems a bit heavy and unwieldy for a doctor to comfortably wear and make the rounds. But Stoica pointed out that the current set of glasses dates from 2015, and a newer, lighter model is expected to be announced this year.

"It will probably be easy to flip them up and down," said Stoica.

Cloud DX was co-founded by Dr. Sonny Kohli, an ICU physician at the Oakville Trafalgar Memorial Hospital, in Oakville, Ont. Dr. Kohli also serves as medical director of Cloud DX. He notes that, "In the not-so-distant future, we believe that automated, hands-free, mixed reality displays like the Microsoft HoloLens will enable doctors to quickly triage patients and decide on treatment options faster.

Survey shows benefits of patient portal in mental health

CONTINUED FROM PAGE 8

puter or electronic device with Internet connectivity

• The ability to show, print, and share pertinent information with health care providers at other facilities, in support of maintaining continuity of care.

Ontario Shores supports the OpenNotes movement, which advocates for patient access to all personal health information. Using Meditech's portal, Ontario Shores makes reports available to patients within three days of entry, providing key information from physicians, allied health, and outpatient clinicians.

Proxy users – patients' substitute decision makers, legal guardians, or anyone else to whom a patient has provided consent – have access to the same information as patients.

To promote use of the portal to patients and staff, Ontario Shores organized training facilitated by peer support specialists and an engagement coordinator to represent both perspectives – that of the patient and of the clinician.

Peer support specialists are staff members who have lived experience with mental health issues. They promote the portal to patients and conduct training sessions.

The engagement coordinator – an RN – was a temporary position funded by Canada Health Infoway (CHI) during the portal launch. The coordinator promoted the portal's benefits to both staff and patients.

Ontario Shores depended on the engagement coordinator to encourage enrollment and noticed a drop-off when the temporary position ended. To increase enrollment and strengthen the portal's sustainability, Ontario Shores built clinician prompts into the documentation for admissions and treatment reviews, encouraging providers to offer portal enrollment to patients.

Ontario Shores supports the Open Notes movement, which advocates for patient access to all personal information.

Patient Activation and Recovery: The concept of patient activation refers to "a patient's knowledge, skills, ability, and willingness to manage his or her own health and care," and is an essential component of patient engagement. Ontario Shores measures activation using the Mental Health Recovery Measure (MHRM), a patient self-reporting tool with eight distinct domains:

• Overcoming Stuckness
• Self-Empowerment
• Learning and Self-Redefinition
• Basic Functioning
• Overall Well-Being
• New Potentials
• Spirituality
• Advocacy/Enrichment.

During the study, patient scores in these domains were monitored along with their cumulative score. The cumulative score was used to gauge patient activation, while individual domain scores were used to assess recovery.

The results showed that Ontario Shores patients using the portal self-reported significantly higher scores for both activation and recovery than they self-reported before using the portal.

Portal users' total MHRM scores improved by over 16 percent. Users' self-perceptions of recovery across all categories improved significantly.

Portal users' scores improved in seven out of eight MHRM domains. Patients using the portal indicated improvement in nearly every category.

Ontario Shores is working with Meditech to move their patient self-assessment process online, enabling patients to complete their surveys via the portal. Additionally, they continue to examine various service delivery models that leverage technology to expand treatment options and reduce wait times using evidence-based virtual treatments, as a complement to their existing treatment.

Online scheduling for clinics can reduce costs, restore profitability

BY JERRY ZEIDENBERG

TORONTO – Family physicians may appear well-paid for their work, but their primary care clinics are often in the red or struggling to hit break-even. So says Keith Chung, CEO of Veribook, which has created a solution that's currently being used to improve the financial position of dozens of clinics across Canada.

"Many clinics are in bad shape, and some are even running at a loss," said Chung. "Their costs are rising, and fees have been reduced."

One of the sore spots for primary care clinics is the cost of scheduling appointments, as patients can tie up the receptionist's time with phone calls about new appointments, changes and cancellations.

In the aggregate, scheduling an appointment by phone costs between $1 and $5 each. In total, they typically amount to 25 percent of the cost of running a clinic.

And that's where Veribook comes in, with its online appointment scheduling system that can quickly cut these costs by 70 percent, says Chung.

At the two-site Magenta Health clinics in Toronto, which have implemented Veribook, patient adoption of the online system has reached 95 percent.

"That fixes the losses," said Chung.

As a result, the Magenta Health clinics are in the black, and they actually run without dedicated receptionists. Staff at the clinics take phone calls when needed and help assist patients over the phone, but those calls are relatively few.

"Staff are doing much more value-added work," said Chung. When they're on the phones, he noted, "They're spending more time on follow-ups and referrals."

For its work in re-engineering the clinics' workflow and producing cost-savings, Magenta Health was given a first-place award in 2017 in the Canada Health Infoway ImageNation Leading Practice Challenge.

The award was also given in recognition of the benefits for patients. By using the online system, patients can schedule appointments at times that are most convenient.

"They don't have to wait to call the clinic during business hours," commented Ben Shah, Director of Business Development for Veribook. "A parent may have a sick child at 2 in the morning, and might be thinking about visiting an ER – where they'll wait for the next five hours to see a doctor.

"But the parent can log onto her local clinic's scheduling system at 2 am, and see that there's an appointment available at 9 am. It's worth waiting for that."

Shah, who is also a physician by training, observed that most of the patients using Veribook do so outside regular business hours.

Moreover, appointments can be made from any platform – desktop computer, tablet or smartphone.

And automated reminders are sent to patients, so they don't forget about their appointments.

Of course, online scheduling isn't new for medical clinics. However, Veribook has experience in online scheduling in many other industries and started applying its expertise to physician clinics in 2014. What is new is the intelligence it has brought to the process.

The system knows the work-habits and preferences of the various doctors working in a clinic. For example, some physicians like to reserve time slots for urgent medical matters, so the system will take this into account. Similarly, for pediatric appointments where a nurse is needed, the online system will automatically spread these appointments out throughout the day to reduce delays.

The rules-based system can also be programmed, for example, to intelligently include catch up time, to minimize wait times for patients and to reduce physician stress.

It's all customizable, said Chung. "It maps onto a physician's organizational workflow," he said. "A system shouldn't be one size fits all."

Added Shah: "Not every physician offers the same services, and different services can be available at different times. The system recognizes this."

The 5 essentials of health technology adoption

BY SHANNON MALOVEC, PRINCIPAL, PATIENT ENGAGEMENT, TELUS HEALTH

Technology can help us do amazing things. But ultimately it's people who make or break it: by embracing technology – or giving it the cold shoulder. With healthcare technology demonstrating real impact on engaging patients, improving health and lowering costs, it's worth the effort to hit it out of the park. From our experience in small to large-scale health technology projects in clinic, regional and provincial settings, we've distilled the five essentials for technology solutions that patients and clinicians love and use, and that deliver on their long-term promise.

1 Foster closer relationships between patients and providers

Patients used to be the object of clinical care. But it's different now. We know that, as owners of our bodies, we not only have the most at stake, we can also have the most impact on our own health.

So when patients say that a technology helps build trust with their doctors, nurses and pharmacists, and that it makes them feel like valuable members of their own healthcare team, it's a sign that better health outcomes are not far behind.

> **"The personal health record resulted in an increased sense of partnership with my health care provider."**
>
> – Saskatchewan personal health record pilot program participant

Because engagement is the most impactful element of any health solution, don't miss the opportunity to bring patients and providers closer together, whether through collaboration, communication or co-monitoring.

2 Ensure ease of use and convenience for all

If technology is complicated, slow or hard to use, people won't use it: simple as that. Usability masters like Apple and Google have set the bar high with everyday technology. Why would patients or clinicians tolerate clunky healthcare tools?

Patients and clinicians need to feel that the technology makes their lives easier in some way. Does it offer a more convenient and efficient way to do ordinary things like refill a prescription, communicate about a health problem or book an appointment? Then they're in.

Every step of the way must be fast and intuitive, from enrolment to daily interaction through mobile anytime, anywhere access. So put patients and providers at the heart of the process by gathering input on tasks and usability. And consult, test, consult and test again to get the workflows right.

> **Clinicians in two B.C. Health Authorities (Island and Interior) reported 100% satisfaction with the ease of use of their remote patient monitoring solution.**

3 Provide complete, accurate, up-to-date information

If the data's wrong, out-of-date, or it's just a narrow slice, patients won't see the value of coming back.

For a complete patient picture, data must come from multiple sources like clinical systems, provincial assets, and patient-maintained data. To be accurate, all that data must be properly integrated. To be current, aggregation and integration must be constant.

When you can offer access to complete, accurate and up-to-date health information such as medications, current conditions, vaccinations records or lab results, both patients and providers see the same holistic healthcare picture. Everyone's more informed and appointment time is better spent.

> **"Access to my results prior to a medical appointment means more value during the appointment."**
>
> – Saskatchewan personal health record pilot program participant

4 Offer extraordinary, valuable service

Give users a reason to keep coming back to your tool. Appointment reminders? Flu shot alerts? Online learning opportunities for managing a chronic condition? The ability to share your own health metrics with your care team? Always-current dashboards for providers to better understand their patient population as a whole?

Valuable extras can be the enticement people need to engage over the long term.

> **Clinics using the EMR portal notice an increase in logins after sending out flu shot alerts or breast cancer screening awareness messages.**

5 Ensure complete security

Health information is highly personal, and people rightly worry about it being used in ways they didn't intend. If you let them worry, they won't trust your system, and adoption will be low.

Systems that prove beyond a shadow of a doubt that health information is private and secure – and systems that make it easy for people to control access permission – are more likely to be accepted into everyday life and work.

It's critical to take solutions through rigorous privacy and security assessments. You may need, for example, to let patients in mental health chat forums engage anonymously or allow patients and providers alike to treat sensitive information with discretion.

Adoption drives empowerment

With global research showing that less engaged patients cost the health system between 8 and 21 percent more than engaged patients,[1] it's clear that engagement is the foundation of our bigger health goals: better outcomes at lower cost.

By keeping these five essentials top of mind in all healthcare solution projects, you'll see stronger adoption and healthier patient engagement.

> **For heart failure patients engaged in a home health monitoring program at B.C. Island Health:**
>
> **- Emergency visits dropped by 82%**
> **- Hospital admissions dropped by 90%**
> **- Hospital stays were 98% shorter.**

[1] Hibbard J H, Greene J, Overton V (2013) 'Patients with lower activation associated with higher costs; delivery systems should know their patients' "scores".' Health Affairs, 32, no (2013):

Patient engagement solutions show great promise to drive down health costs while improving health outcomes and patient experiences.
To reach Shannon and the Patient Engagement team at TELUS Health, email patientengagement@telus.com

Humber River Hospital enhances patient-focused care with robots

BY DIANNE CRAIG

At first glance, the four-foot tall robot gesturing, talking and engaging visitors just inside the south entrance to Humber River Hospital appears to be a simple greeter, placed there to welcome and charm anyone who walks by. But Pepper is so much more than that, and 'his' potential use for many more applications in a hospital setting is seemingly endless.

Developed by Tokyo-based SoftBank Robotics, Pepper is the first humanoid robot that can move naturally, avoid obstacles, identify sounds and recharge independently.

The robot reads emotions by analyzing voice, facial expressions and vocabulary, and with its machine-learning capabilities, it can learn over time. Designed to project a friendly, engaging 'personality', Pepper is ideally suited for customer-facing, or in the case of a hospital setting, visitor and patient-facing roles.

It's not surprising that Humber River was the first hospital in North America to acquire Pepper, as it's the continent's first digital hospital. With that distinction, there is naturally a focus to see how it will maintain its leadership. "You always want to be doing more," said Barbara Collins, president and CEO of Humber River Hospital.

"We were looking for applications in healthcare and setting a budget for artificial intelligence. We already had a flat robot that delivered supplies. Staff wondered if we could ever have anything else," she said, referring to the idea of having a different, more humanoid robot.

They looked at available options and started talking with SoftBank about five months ago. "Pepper was very affordable and had the most capabilities," recalled Collins. "Patient-focused care is really important to us. We needed one robot for the kids, and we ended up with two Peppers," she says, noting that one is in the lobby, and one is going to be dedicated to interacting with pediatric patients.

Barbara Collins, president and CEO (at left), tries out the new Pepper robot with a group of patients.

The Pepper dedicated to children may accompany them to the OR, to relieve anxiety while helping to keep them calm, engaging them and playing games with them.

Currently, the hospital is looking at adapting Pepper for use in triage. "People come in, and may be nervous, or don't know why they are waiting. Pepper could remind them about not eating or drinking before a test, show them how to fill out a form, and provide information," said Collins.

Another application for Pepper currently under consideration at Humber River Hospital is to use him to assist Alzheimer's patients. "Pepper can dance and exercise – great for an adult with Alzheimer's," observed Collins. It could also give reminders, like, "Don't forget to take your pills".

Collins said SoftBank will ensure Pepper evolves along with its technology. "We have five years of upgrades. They come to us automatically," she said.

Pepper can respond to emotions and takes commands, either verbally or through its touch-screen tablet. Eventually, with evolving voice capabilities, Pepper may not need the touch screen at all.

According to Bob Edwards, Director of Retail for Humber River Hospital, customization of Pepper is an ongoing process. Both Collins and Edwards project there are many potential applications for Pepper, and say they are in the early stages of considering new ways to customize the devices.

At the moment, Pepper's 'dedicated stories' are its key content. "If you ask it to tell you a story it will tell you about the portals of care at the hospital," said Edwards. The hospital is set up like an airport, so the robot might say, 'Go to Portal C for the Bariatric Clinic'.

Pepper also provides information, like where other departments and units are located, such as the one for dialysis, and where the washrooms, gift shop, and food court are.

The hospital's second Pepper robot, dedicated to being with children, will be used frequently in the pre-op area. "The robot there can entertain children before operations. It will meet the child and family in the operating room, or even go down the hall with them. It will entertain them, do a dance, take a selfie or play a virtual instrument," said Edwards. Under the 'Do something fun' selection, playing a virtual instrument is one of the options.

The robot stretches out its arms in front about two feet apart, and the child can actually play the invisible virtual keyboard suspended between the robot's hands by hitting the air anywhere in that space and hearing the corresponding notes played. Children observed playing this keyboard are delighted to hear the sounds.

Another valuable way the hospital's second Pepper, dedicated to children, is going to be used, is to comfort kids who are in isolation. A robot companion is ideal in an isolation room where human visitors may pose a risk of infection, noted Collins.

Pepper is one of several robots, and robotics-related products and services, AI technology and other offerings produced by SoftBank. The company currently offers two humanoid robotics platforms. In addition to Pepper, they offer NAO, a much smaller robot used primarily in educational settings. Pepper was launched in October, 2014 in Japan, and in the U.S. in 2016.

"When you're thinking about robots, you're thinking about the form factor, and how it engages with people," said Steve Carlin, Chief Strategy Officer for SoftBank Robotics America in San Francisco. He feels Pepper is particularly well-suited for a hospital environment. "Pepper is so inviting, engaging. It can interact with patients, allay fears, and provide companionship."

One thing that sets Pepper apart is its capacity for emotional recognition, so it can adapt to the mood of the person engaging with it. "Pepper finds facial points and compares those points. For example, it sees the corners of your mouth go up, or go down, and can tell if you are happy or sad," says Carlin.

A lot of work went into ensuring that Pepper could engage well with people and have relatable qualities. At first glance it is clear the robot has a friendly, non-threatening appearance, an appealing, friendly voice and gentle movements. It also has an ability to find common ground with people. For example, in response to a song choice by a child interacting with Pepper at the hospital, it says, "I love that tune!"

Pepper recognizes voice and facial expressions. It can avoid obstacles, identify sounds and recharge independently.

Carlin says the four foot-tall Pepper reflects a decision to make it big enough, but not imposing. Its facial features were designed to be human-like, but not too human-like, because the brain can read that as a little creepy. "You can't fool the brain. The eyes are large and expressive, anime-like, and the arms are about communication," said Carlin.

Pepper has three cameras: 2 HD cameras and one 3D depth sensor – to "see" and interact with people. It also has 20 engines in its head, arms and back to control precise movements. A 10-inch touchscreen tablet is used to convey information and encourage input.

There is one camera in the forehead, to 'see' you, one in the mouth, to detect obstacles, and one in the right eye, similar to a Kinect X-Box sensor, to detect motion. The three cameras can be used in unison, to search for faces, for example, or to lock into a face, said Carlin. SoftBank is currently working to enhance the conversational UX (user experience) with Pepper. "Every app is designed around being able to speak to Pepper," said Carlin. "We've been working with Google and other companies on a dialogue-flow chatbot."

UHN spin-off creates software for DI

TORONTO – Acumyn, a Toronto-based healthcare technology firm spun out of the University Health Network, has announced the release of AQUA Radiology, said to be the world's first clinic-wide automated quality assurance (QA) software platform for diagnostic imaging devices.

AQUA Radiology is a platform that allows clinics to standardize QA processes, automate regulatory tests, and access real-time data across all diagnostic imaging devices, regardless of manufacturer or site location.

Available immediately, AQUA Radiology delivers a unified and time-saving solution to manage compliance to American College of Radiology (ACR) accreditation requirements and clinic-specific policies.

AQUA Radiology was developed in collaboration with world-class pilot sites at Rush University Medical Center in Chicago, Princess Margaret Cancer Center in Toronto, and Life Saving Imaging Technologies (LISIT), a Japan-based medical physics contractor.

"To develop a product alongside the technologists and operations managers that will benefit most from its use is fundamental to the way we choose to create products at Acumyn," said Dr. Daniel Letourneau, Chief Technology Officer of Acumyn and himself a veteran of hospital and clinical environments as a medical physicist. "Optimized for efficiency and accuracy, image-based QA tests can now be completed in seconds, without compromising any compliance requirements."

The platform offers on-premise or cloud-based implementation options. AQUA Radiology is available as an annual subscription with four pricing tiers based on number of devices the software monitors.

Its key features include:

- Automated daily and annual image performance tests for CT and MRI
- Out-of-box policies that meet ACR accreditation requirements for CT and MRI
- Scalable software to allow expansion to new departments and sites
- Flexibility to add any modality

VALUE-BASED VALIDATION OF AI IN MEDICAL IMAGING

Dubai Health Authority Achieves Success in the Validation of AI for Chest X-Ray Screening

Anjum M. Ahmed
Global Director Imaging Information Systems
AGFA HealthCare

Augmented Intelligence and Machine Learning offer outstanding potential to redesign the delivery of healthcare around the world. In partnership with Agfa HealthCare three years ago, the Dubai Health Authority recognized the potential of Machine Learning Algorithms and Augmented Intelligence-enabled workflows in medical imaging. With a strategic goal of achieving workflow automation and fast access to diagnostic imaging results, an approach to enable Augmented Intelligence in medical imaging was devised to consider the application of Augmented Intelligence in Chest X-Ray screening.

WHAT IS AUGMENTED INTELLIGENCE?

Augmented Intelligence is the intersection of machine learning and advanced applications, where clinical knowledge and medical data converge on a single platform. The potential benefits of Augmented Intelligence (AI) are realized when it is used in the context of workflows and systems that healthcare practitioners operate and interact with. Unlike Artificial Intelligence, which tries to replicate human intelligence, Augmented Intelligence works with and amplifies human intelligence.

Together, the Dubai Health Authority (DHA) and Agfa HealthCare created an innovative approach for validating AI-enabled medical imaging in the automation of X-Ray screening for diseases like tuberculosis. The partners solidified the arrangement with the signing of a Memorandum of Understanding (MoU) at the Arab Health Conference 2018.

The MoU has led to the first Augmented Intelligence (AI) validation in the United Arab Emirates based on Chest X-Ray. This government/industry MoU will enable key benefits of Artificial Intelligence, and will support the Dubai Health Authority's goal of incorporating the latest technological advancements in the medical field for improved efficiencies and enhanced patient-centric care.

"We perform nearly 5,000 Chest X-Rays every day across the 20 Medical Fitness Centers in Dubai. We want to improve turnaround times, accommodate more exams, increase volume and capacity and ensure we spend more time in clinical review instead of sorting out daily exam worklists. That's where AI will help us to be more productive, serve our communities better and improve client satisfaction," said Dr. Loai Osman Said, Specialist Radiologist, Medical Fitness Center, Dubai Health Authority.

ENTERPRISE IMAGING STRATEGY – BUILDING AN IMAGING DATA LAKE.

The DHA has 20 medical fitness centers across the emirate of Dubai for issuance and renewal of visas.

20 MEDICAL FITNESS CENTERS

2.000.000 VISITORS

1.000.000 CHEST X-RAY EXAMS EACH YEAR

1 AI ALGORITHM ACROSS ALL SITES

The DHA is currently validating the use of AI technology with Agfa HealthCare and plans to implement this technology across a few medical fitness centers for continuing validation. Subsequently, the DHA will assess the feasibility of expanding this technology across all of its 20 medical fitness centers. The total number of people who visited the DHA-run medical fitness centres during 2017 for new and renewal visas were 2,126,066. A medical fitness test is a mandatory requirement for all expats in the UAE. It is required for a residency, employment or education visa.

VALUE-BASED CARE

Value-based care is all about providing cost effective quality care and helping improve outcomes. With this approach in mind, the Dubai Health Authority and Agfa HealthCare began exploring the use of AI technology across 20 Medical Fitness Centers in Dubai, in 2015. Based on current workflow gaps and the need to improve turn-around times, it was decided to validate AI-enabled automated Chest X-Ray screening workflow at the medical fitness centers.

The DHA provided Agfa HealthCare with anonymized Chest X-Ray samples, half of which were categorized as normal X-Rays, and remaining half with tuberculosis findings based on lab confirmation. Agfa HealthCare and VRVis Vienna analyzed these anonymized X-Rays between 2015 and 2016, and developed a workflow concept with a Machine Learning Algorithm.

After the development and lab testing phase, Agfa HealthCare and the Dubai Health Authority devised an onsite validation framework to test the AI algorithm for accuracy in Dubai. An onsite validation and testing workflow was designed to assure evidence was documented appropriately.

Two Radiologists were assigned by the DHA, during the Phase One onsite validation, to validate the AI Algorithm-generated results and provide feedback. Upon completion of the Phase One onsite validation early in January 2018, the AI Algorithm validation workflow designed by Agfa HealthCare correctly flagged tuberculosis findings with 90% accuracy, based on Chest X-Ray findings.

After completion of the Phase One onsite validation, the AI Algorithm was retrained and deployed again at one of the Medical Fitness Centers in Dubai. The AI Algorithm's sensitivity improved to 95% after completion of Phase One onsite validation, and the goal now is to further validate the AI Chest X-Ray Algorithm with input from DHA Radiologists.

"Based on the analysis of results so far, and how the AI Algorithm is performing, we will be able to significantly improve our reporting workflows. Currently, due to high exam volumes, standard reports can take up to seven days before they get signed off. With AI technology, cases that are flagged for a disease like tuberculosis would get followed up on the same day," said Dr. ElTag M. Ibrahim Mudawi, Specialist Radiologist,Medical Fitness Center, Dubai Health Authority.

If you are interested in reading the complete whitepaper, please contact anjum.ahmed@agfa.com

AGFA HealthCare

novari access to care integrated software platform™

See Your Patients Virtually Anywhere

For most Canadian primary care providers, seeing a patient always means literally sitting down with them in their office or clinic. It means, despite all the advances in telecommunications, getting two busy people together in the same room at the same time, regardless of how routine the visit may be. In this day and age, it almost seems quaint.

In other parts of the world, technology has been making unnecessary physical primary care visits for many routine matters often obsolete. Instead, routine visits for issues like prescription renewal, simple health questions, and chronic disease management are occuring securely over the web via laptop computers and mobile Android or Apple iOS devices. They are known as virtual visits and they are quickly becoming popular with providers, patients, and healthcare administrators everywhere they have been implemented. Now, with support from the Ontario Ministry of Health and Long-Term Care, Novari Health is working with the Ontario Telemedicine Network (OTN), as well as patients and primary care providers, to make this a reality for Canadians.

With the Novari eVisit™ system, primary care providers gain the freedom to conduct consultations with remote patients from the clinic, from home, or from any other appropriate setting. Likewise, patients can skip the drive to the clinic and see their provider from home, work, or wherever they happen to be. The system is already in use in the Central West Local Health Integration Network, north-west of Toronto, with hopes to expand availability to other regions soon.

With audio, video, and secure messaging capabilities, the Novari eVisit™ system provides a robust telepresence that allows the primary care provider to work efficiently from virtually anywhere. The system complies with all privacy legislation, uses strong encryption to protect all communications, and secures the data in state-of-the-art Microsoft Azure data centres here in Canada, so there is never any need for concern about privacy or security. And because the system is cloud-based, it can scale easily to serve a population or health network of any size.

This technology lets primary care providers put the clinic in their pockets and take it with them. It lets the entire health region be the waiting room. It connects providers and patients together at times and places that are convenient to both. In all, it has the potential to completely transform the idea of what it means to see a patient. And it's ready to go today.

Why Does 21st Century Health Care Still Rely On 20th Century Telecommunications?

Even the tiniest mom and pop operation is online today, taking advantage of all the options and efficiencies that modern software and telecommunications offer, and yet the backbone of the referral process in Canadian health care is the same as it was in 1980: the fax machine.

As it stands today in much of Canada, when a patient is referred to a specialist by their primary care provider, an odyssey of waiting and uncertainty begins. The care provider sends a referral request to the specialist by fax, without any real-time information about that specialist's work load compared to other specialists in the region. It can take months for the referring physician to find out if the referral has been accepted. All the while, the patient's health may be deteriorating, the primary care physician's office is becoming overloaded with avoidable repeat visits, specialist wait lists are growing, and there is a lack of both transparency and communication throughout the entire system.

In the era of smartphones, cloud computing, and high speed internet, the digital transformation is revolutionizing the way we do things. The Novari eRequest™ module streamlines the entire referral process into a real-time two-way communication system that provides transparency and vital information to everyone every step of the way. Already deployed throughout a number of LHINs in Ontario, the system is saving time for primary care providers, balancing patient loads among specialists, and helping patients get the specialized care they need faster than ever before.

When a patient visits her primary care provider for a referral, her physician can immediately see a list of appropriate specialists with their respective wait times and travel distances. There is even the option, where implemented, of sending the referral to a central hub for automatic load balancing across available providers. When the Novari eReferral is sent off, the physician is able to see, at any time, the status of the referral, whether it has been received, accepted, declined, or scheduled. If there is any information missing in the referral, or if the patient has been referred inappropriately, the software raises flags so that the problem can be dealt with promptly up front. Soon, the patient is seeing an appropriate specialist, without any unnecessarily wasted time by health care professionals.

Or, it may turn out that the patient doesn't need to see a specialist personally at all. Perhaps her health concerns could be addressed more quickly by a clinical conversation between the specialist and her primary care provider. In these instances, the software provides robust options for a secure eConsult, allowing a two-way clinical conversation that can provide maximum benefit to the patient while saving everyone's time.

This is the automated air traffic control system that Canada's health care referral process desperately needs. It's time to clear the fax machine off the desk and leave the 1980s behind.

Software Can Be The Great Enabler For Shortening Surgical Wait Times

It's well known in the Canadian health care community that this country has some of the longest surgical wait times among developed nations of similar economic standing. For more than 15 years, reducing wait times has been a national priority supported by diverse efforts at the federal, provincial, regional, and hospital level. And yet, despite some localized improvements, surgical wait times across the country remain unacceptably long.

While there is no single silver bullet that can solve this problem on its own, technological advancements definitely have the potential to help. The Novari ATC™ module provides solutions for paperless wait list management, eBooking, OR utilization, and pre-op standardization, creating greater efficiency at every step of the surgical journey. A colour-coded wait list provides an at-a-glance overview that allows surgeons and hospital staff to clearly see all waiting patients and easily schedule them in a way that ensures provincial wait time targets are achieved. The drag-and-drop interface makes it simple to book patients for surgery paperlessly. The system also provides metrics that can be used to optimize local, regional, and provincial resource allocation.

Using modern web-based access to care software allows for the streamlining of time and resources more efficiently than could ever be achieved by traditional paper-based wait list management. With the software guiding the process, no patient need ever be left behind, and no OR need ever go underutilized. The system is already working marvels in LHINs, health regions, and hospitals across the country, and the results speak for themselves. Not only do patients receive their necessary surgeries sooner, but the system allows scarce resources to be directed to the areas where they can be of the most benefit.

In a system with limited throughput like an operating room, it's not just about maximizing utilization but about scheduling the right patient at the right time. Software that can aid in patient prioritization is a powerful tool

to make sure that the right patients are being booked at the right times to secure the best health outcomes while also meeting provincial wait time targets.

Vertical electronic integration from the surgeon's office all the way to the operating room also ensures that scheduling requests do not exceed available OR time, preventing frustration among both patients and health care providers. Automated electronic communication across this entire route does away with the need for telephone tag while also eliminating the risk of miscommunication and missed connections. This integration extends further to include automatic wait time reporting, allowing wait time coordinators and administrators to spend less time managing reports and more time finding new ways to reduce the wait.

A multipronged approach will of course be required if we are truly going to bring surgical wait times in Canada to the level where we would like to see them, but the right software solution can act as a powerful enabler that makes all other efforts and initiatives dramatically more impactful.

Regional Primary Care Relationship Management Should Be Easy. Ask Any Other Industry.

The Ontario Ministry of Health and Long-Term Care recently mandated the 14 Local Health Integration Networks (LHINs) to take an active role in the planning of the delivery of primary care. With hundreds to thousands of primary care providers in each LHIN, managing all those relationships is a daunting task, but a necessary one for the planning of quality primary care.

So how can a LHIN maintain relationships with—and up-to-date records on—so many primary care providers? This was the question faced by the Missisauga Halton LHIN, and the search for a solution brought them to Novari Health. The Novari Provider Relationship Management™ (PRM) module, developed in partnership with the Mississauga Halton LHIN, is a cloud-based system that draws from the learnings of relationship management software in the business world. It combines a powerful database with a suite of communication tools to allow LHIN staff to have all the information they need at their fingertips.

Today, if a Missisauga Halton LHIN team member needs to know which French-speaking primary care providers in their region are accepting new patients, they can not only see a complete list at a glance, but they can also view detailed profiles of each provider, and even quickly broadcast a query or notice to all of them at once. When the LHIN launches a new outreach campaign, the system makes it simple to track who has been contacted and who has not. And, if a team member fields a phone call from a primary care provider and then wants to follow up weeks later but can't remember who called, there is no frantic search for a post-it note. The information is in the cloud.

Though the direct advantages are most visible within the LHIN offices, anything that makes the LHIN operate more efficiently is a benefit to primary care providers and patients. The system allows for more timely communications, less duplication of effort, and an assurance that accurate information is being used for service planning.

Solutions like this one have transformed relationship management in almost every other industry. It's health care's turn.

The Novari Provider Relationship Management module has since been adopted by two additional Ontario LHINs: Central West and Central East.

By D.F. McCourt

SickKids pharmacy automation transforms medication management

BY JUSTIN FAIOLA

TORONTO – When a patient is admitted to a hospital and administered medication, they depend on their healthcare team to order, prepare and administer the right medication in the correct dosage exactly when they need it.

This process may seem straightforward to the patient, but with close to half a million medication orders per year and millions of doses dispensed, staff at The Hospital for Sick Children (SickKids) know the process is in fact quite complex.

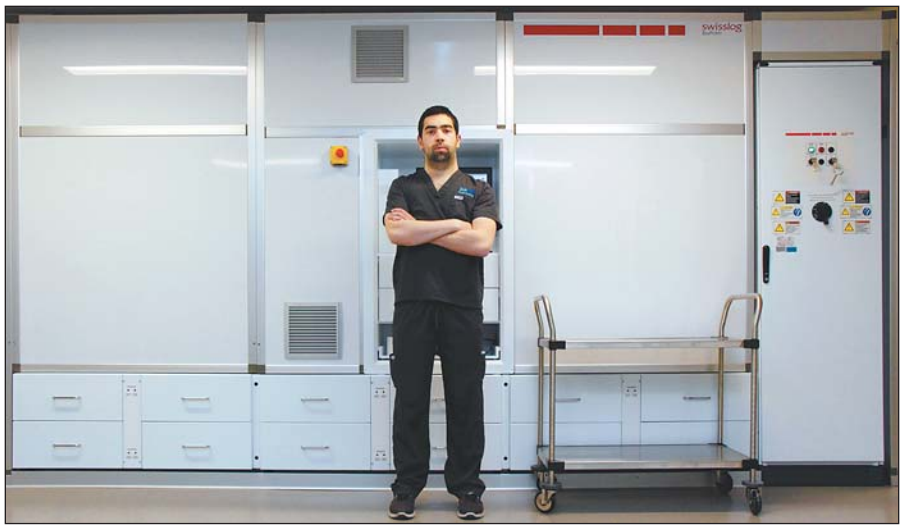
Through a $30 million, multi-year, multi-project program called Program Dose, SickKids is transforming its complicated, manual medication management process into a modern, medication management system. This new system leverages technology and the unique knowledge and skills of hospital staff to streamline pharmacy workflows and deliver safer, more efficient, high-quality care.

"When we launched this transformation of our medication management process and technologies five years ago, it was the single largest investment in patient safety undertaken by SickKids," said Marilyn Monk, Executive Vice-President, Clinical Services and Program Dose Executive Sponsor.

One of the key objectives of Program Dose is to enhance patient safety by automating pharmacy dispensing services. Automated dispensing cabinets (ADCs) were rolled out across SickKids to ensure all medications, including high-risk medications such as narcotics, could be securely stored and properly dispensed by nurses in patient care areas.

Similarly, Anesthesia Workstations (AWS) – systems designed for secure storage and point-of-care access to anesthesia medications and supplies – were implemented in every operating room, making SickKids one of the first paediatric hospitals in Canada to achieve this milestone.

The AWS and ADCs both come equipped with a labelling system that improves patient safety by reducing medication labelling errors, as well as barcoding technology to ensure that the right drug is dispensed.



Justin Robillard, Registered Pharmacy Technician at SickKids, stands in front of a BoxPicker in the clean room.

Members of the SickKids Program Dose team at the official opening of the clean room in March.

The cornerstone of SickKids' pharmacy services transformation has been the recent construction of an 11,000 square-foot sterile compounding clean room – a highly controlled environment that leverages an integrated workflow where the latest technology and aseptic techniques are combined to ensure the integrity of compounding products, such as chemotherapy and other IV medications.

"The opening of the clean room is one of the most exciting milestones of this transformative journey," says Joshua Hamid, Pharmacist, SickKids. "Centralizing most of our medication preparation activities in the clean room provides a more efficient workflow for staff and a much safer practice for our patients."

In the clean room, pharmacy staff use a BoxPicker, a high-density medication storage and retrieval system to manage inventory and barcode scanning to facilitate more accurate selection of medications – the first of its kind in Canada to be implemented in a clean room.

In addition, a new IV workflow management system also provides pharmacy technicians with a "guided digital recipe book" to prepare parenteral compounds, error-free, step-by-step.

Using a combination of barcode verification and gravimetric (weight-based) measure, technicians are able to ensure the right drug, concentration and correct volume are selected.

Pharmacists are then able to verify that all products are compounded accurately through a remote verification feature that takes advantage of an overhead camera that records a picture of every compounding step. Each of these new features has increased efficiencies and reduces potential critical errors when compounding IVs and hazardous mixtures.

The clean room meets the latest Ontario provincial pharmacy regulatory standards, United States Pharmacopeia (USP) 797 and 800, and the National Association of Pharmacy Regulatory Authorities standards that specify criteria for sterile compounding and safe handling of chemotherapy and other hazardous drugs.

While leveraging new technologies has been crucial, other ingredients have contributed to the recipe that has made this multi-year transformation of pharmacy services a success.

LEAN methodologies, including Value Stream Mapping and optimization approaches using Discrete Event Simulation were used to redefine pharmacy dispensing workflows to further support the implementation of just-in-time delivery and reduce the amount of wasted medication.

These techniques have allowed SickKids to reduce its pharmacy inventory by 15 percent, while simultaneously increasing the number of unique medications available closer to or at point-of-care.

Pharmacy technicians are also now spending on average 81 minutes less per day checking medication orders that have been modified and filled.

Another critical success factor to this transformation was the establishment of a program governance structure and framework to ensure the successful delivery of the 17+ projects which made up Program Dose.

"At SickKids, delivering the best, safest and most efficient patient care is at the heart of our values," said Ihtisham Qureshi, Program Dose Director. "With a stellar team and framework, we were consistently able to deliver our projects on time, on budget and in a high quality way. Program Dose's success is rooted in the dedication and close collaboration between our Pharmacy, Nursing, Anesthesia, IMT, Facilities Development, Plant Operations and Process Improvement teams."

"With the implementation of Epic, our new hospital information system and barcode medication administration in summer 2018, SickKids will implement the final component needed to achieve closed loop medication management," said Jimmy Fung, Director, Pharmacy. "Together, we are ensuring that our new medication management system supports the very best care and outcomes for our patients, enabled by state-of-the-art facilities and technology solutions."

Interested in learning more about Program Dose and SickKids' transformation of pharmacy services? Contact program.dose@sickkids.ca.

Study leads to a dramatic drop in surgical site infections

MONTREAL – A pioneering team from the infection prevention and control service, infectious diseases unit, surgical teams and pharmacy have significantly impacted the healthcare environment for surgical patients at the McGill University Health Centre (MUHC).

The team has slashed the number of infections by more than half in cardiac and transplant surgeries and they expect to keep trending in that direction until the MUHC is positioned as a Canadian leader in limiting SSIs.

They are well on their way, and they have already begun to share their advances with institutions from across Canada.

Dr. Charles Frenette, Director of Infection Control, MUHC adult sites, and the four-person team is using a variety of measures to battle surgical site infections (SSIs), including long-term data analytics, a remodeling of surgical protocols, and a revision of surgical prophylaxis to achieve its goals.

The team has already reduced the number of infections by more than half in cardiac and transplant surgeries.

SSIs are a by-product of surgery and these infections can lead to complications such as increased chances of morbidity, mortality, C. difficile infections and longer hospital stays.

The team is made up of Daniel Thiron, Pharmacist; Yveta Leharova, Research Coordinator, Infection Control; Connie Patterson, Infection Control Professional; Sylvie Carle, Associate Head of Pharmacy Education; and Dr. Frenette.

"There has been a substantial drop in SSIs, which has kept patients from unnecessary stays and has saved the MUHC millions of dollars. This benefits the patients, the hospital, and society, and is highly cost effective as the money can be used for other patients," said Dr. Frenette. Anique Decary from the MUHC also reached out to the Université de Montréal's Daniel Thiron, who worked as the pharmacist involved in improving prophylaxis.

Limiting SSIs in solid organ transplants

CONTINUED ON PAGE 31

Just Discharged... Now What?

For millions of aging Canadians, getting help in the community after being discharged from hospital can be a challenge. It is critical that patient care is transitioned and coordinated from the hospital into the community.

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ORION HEALTH

Lumify turns Android tablets and phones into ultrasound systems

Earlier this year, frontline physicians in Canada started using the Lumify ultrasound system – a point-of-care ultrasound solution technology from Philips that consists of transducers that can be plugged into Android smartphones or tablets.

Users can download the Lumify app from the cloud into their Android devices, attach a transducer, and they're ready to go.

It's extremely portable, as there's minimal equipment to carry around. "All of the processing is done in the probes," commented Sharon Mulvagh, a cardiologist at the QE II Health Sciences Center, in Halifax. "This system is revolutionary in so many ways."

Dr. Mulvagh has returned to Canada after a long and successful career at the Mayo Clinic, in Rochester, Minn. While there, she gained a great deal of experience with various forms of portable ultrasound, as well as with traditional ultrasound platforms.

She has been testing the Lumify system in Halifax with both in-patients and ambulatory patients in her clinics.

What's especially striking about the Lumify technology, she said, is the quality of its images. "The resolution is comparable to full-sized ultrasound," said Dr. Mulvagh. She has been using Lumify transducers with an Android tablet, instead of a phone, to take advantage of the display on a larger but still portable screen, which the medical residents appreciate seeing during bedside teaching sessions for point-of-care ultrasound.

The system offers a number of probes and can be used for a wide array of exams. For her part, Dr. Mulvagh has been using low- and high-frequency probes, which are excellent for cardiac, lung and vascular imaging, respectively.

Another breakthrough from Lumify, she said, is its exceptional connectivity. "You can interface to any PACS, so there's archivability when you need it." This is something that hasn't always been available with previous types of point-of-care ultrasound.

She noted that archiving isn't always needed – if the point-of-care ultrasound is being used to augment the role of a stethoscope for an initial exam, transferring the pictures to a PACS may not be required, just as stethoscope sounds wouldn't be transferred to an archive.

However, if you're conducting an exam in the Emergency Department, you'd most likely want a record of the findings..

As well, if you're examining a patient with a complicated problem, and you wanted to share images with colleagues, you might also want to transfer them to the hospital PACS.

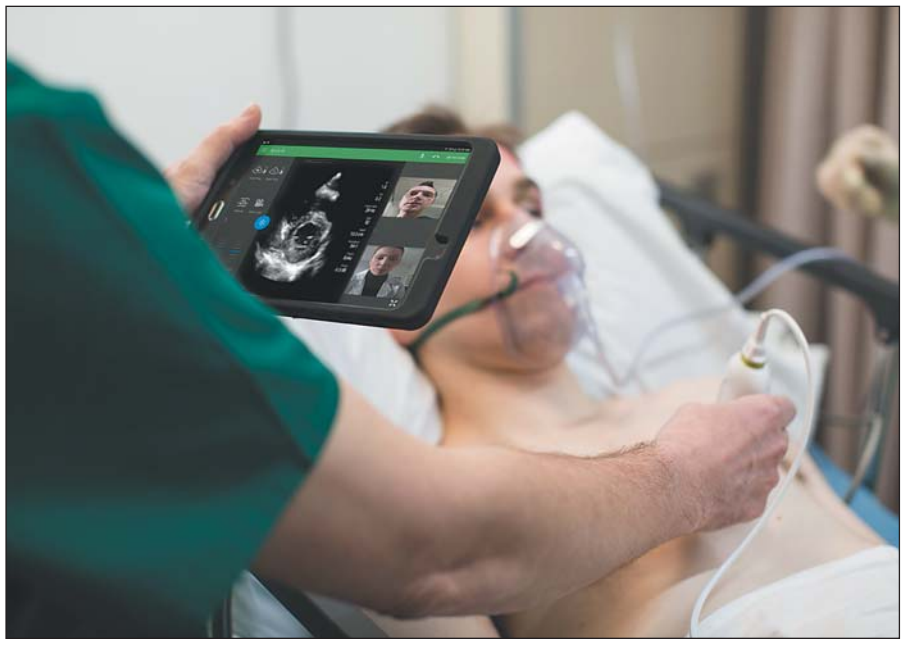
And by using a tablet, Dr. Mulvagh is easily able to type in notes about exams or access the records of patients – another feature that's not so easily accomplished using other forms of point-of-care ultrasound.

She observed that a system like Lumify acts as an extension of the traditional stethoscope. She emphasized the word "extension" rather than replacement should be used, as most doctors will defend the use of the stethoscope – which is still a very useful device.

Using an Android tablet or phone, physicians can easily make notes and call up records during an ultrasound exam.

However, there are advantages to point-of-care ultrasound that stethoscopes can't offer. For example, with ultrasound, you can actually visualize the pathology in a patient.

When patients are presenting with problems like shortness of breath, you can use point-of-care ultrasound to actually see if they have leaky valves, volume overload or aortic stenosis. "You can gain so much information," said Dr. Mulvagh. "Seeing is believing."



Clinicians plug a transducer into their Android tablets or phones to create a portable ultrasound system.

Moreover, using a low-cost – but high-quality – ultrasound system like Lumify at the point of care, you can often screen out patients who might otherwise be routinely sent for a formal echocardiography exam.

That could reduce the wait lists for echo exams in provinces like Nova Scotia, where the waits are quite long, she said. "You can improve the quality of care, and efficiency of delivery, by prioritizing access to those who will benefit the most from big-ticket imaging devices."

A skilled sonographer can also determine at the point-of-care which type of exam would be most useful for the patient as a next step– for example, whether a formal echo study is needed, or if a CT scan would be more helpful.

Dr. Mulvagh noted that medical residents she works with love point-of-care ultrasound, but some of her colleagues are more set in their traditional ways. She feels that education about the use and value of handheld ultrasound should begin in medical schools.

Patients are also beneficiaries of the technology – through the quality of the diagnosis it provides, and also via patient education. "Patients are very impressed," she said. "We can show them at the bedside, say, that the walls of their hearts are thickened, and that's why they need to take their meds. It really hits home with them then."

"And when we show them the colour Doppler flow on the Lumify, they're knocked out."

With Reacts, Lumify becomes an integrated tele-ultrasound solution

MONTREAL – The Philips Lumify portable ultrasound system now includes virtual collaboration capabilities, thanks to a partnership with Innovative Imaging Technologies (IIT), of Montreal. The Philips Lumify solution, available in Canada, turns any compatible Android smart device or tablet into a high-resolution ultrasound system .

Integration of the Reacts technology, developed by Montreal-based IIT, now enables live sharing of the Philips Lumify ultrasound stream, as well as the bi-directional sharing of audio, webcam video streaming and interactive virtual pointers.

That means a person at a remote location can launch a Reacts session and begin a remote face-to-face conversation on their Lumify ultrasound system, then flip the camera on their smart device to show the ultrasound probe position and share the Lumify ultrasound stream.

This results in both parties simultaneously viewing the live ultrasound image and probe positioning, while discussing and interacting through the Reacts platform. In this way, an expert sonographer at a distance can coach and educate the person carrying out the exam. He or she can even use virtual pointers to highlight areas of interest.

"Tele-ultrasound allows remote sharing of ultrasound videos or images between parties who are in separate locations. This is usually performed by combining a traditional ultrasound system with some form of videoconferencing system or software combined with a computer and a video converter to broadcast the ultrasound videos or images," said Dr. Yanick Beaulieu, CEO of IIT and a creator of the Reacts platform. "Now, it's all integrated into one solution that fits into your pocket."

"The intuitive, easy-to-use Lumify system, with the Reacts solution built right in, makes it much easier to do tele-ultrasound," said Dr. Beaulieu, who also works as a cardiologist and critical care physician in Montreal.

Dr. Beaulieu added that Lumify with Reacts is ideal for real-time remote ultrasound education, supervision, and assistance.

As Reacts is built right into the system, clinicians can conduct 'anywhere, anytime' ultrasound education.

Many doctors, he pointed out, want to improve their ultrasound skills. "But there's a bottleneck – they don't want to spend every weekend traveling and going to workshops to learn and practice."

Using tele-ultrasound, however, they can communicate with a remote expert or colleague any day of the week. "It's anytime, anywhere training."

Other possible uses include:

- A professor can go on virtual ultrasound rounds with students, helping them learn anatomy and probe positioning quickly and efficiently, unrestricted by location.
- A midwife in a remote location can call upon an obstetrician who is miles away to receive perspective and guidance, discussing the ultrasound exam as if they were in the same room.
- In acute care, Lumify with Reacts allows an emergency medical technician in an ambulance to stream the live ultrasound exam and discuss a patient's condition with an emergency department physician, expediting appropriate care delivery upon arrival.

The Reacts interactive collaboration platform, integrated with the Philips Lumify mobile ultrasound system, is available globally everywhere Lumify is sold, including Canada.

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Building rigor into cybersecurity

A blueprint for healthcare organizations

Medical identity information is worth about $50 on the street, while a stolen social security or credit card number only brings in about $1, according to statistics cited by the Federal Bureau of Investigations. Couple the allure of this valuable information with the fact that the healthcare industry has struggled to implement data-protection strategies.

What do you get? The kind of vulnerability that cybercriminals love to prey on. Not surprisingly, 66 percent of organizations had experienced a security incident with 70 percent of these organizations reporting disruption to their IT systems, according to a recent HIMSS Cybersecurity Survey. What's more, individual cyberattacks have affected as many as 78 million records.

Highly skilled threats. Perhaps most troubling: there's not much relief in sight, as the frequency and sophistication of attacks continue to escalate. "It is not simply the kind next door trying to hack into healthcare systems anymore. It is someone who is highly skilled or it is an organized effort," said Lee Kim, JD, director of privacy and security at HIMSS. "So, our threats have definitely become more sophisticated and severe."

In addition, according to an analysis of data from the Microsoft Security Intelligence Report from Tim Rains, director of security at Microsoft, ransomware represents less risk than other types of malware. However, he points out that the rapid evolution of ransomware suggests that the risk could rise in the future. As a result, healthcare organizations must up their security game.

The zero-trust strategy. Instead of taking a passive approach to data security – assuming an "it will never happen to me" stance – healthcare organizations must instead adopt a "zero trust" strategy. "We have grown so dependent on doing things electronically, the ability to have our computers up and running is almost akin to breathing or having access to water. So, organizations need to more proactively plan for around-the-clock access to data," Kim said.

They need to mount a more impenetrable defense against cyberattacks. Healthcare organizations should inspect everything from internal and external networks to people to processes. In addition, it's important to ensure that business associates, trading partners and other third parties are aligned with organizational security strategies. Even more important, organizations must mount a zealous offense – stopping cyberattacks before they hit.

"Healthcare organizations need to start implementing strategic and tactical data protection strategies before an attack has a chance to materialize," said Leslie Sistla, CISO, Microsoft Worldwide Health. "Usually organizations don't know if they have an intruder on their network. They need to go on the offensive and understand what normal behavior looks like and start to look for suspicious behavior. They can start to look for anomalies such as suspicious messaging or someone who is logged in from a different mobile device or users accessing servers they don't normally access."

To support these aggressive game plans, organizations must rely heavily on:

- Data encryption when data is in transit and at rest
- Increased user education and awareness
- Tools that automate and enforce encryption
- Vigilant shutdown of shadow IT throughout the organization
- Management of encryption keys
- Utilization of advanced analytics and threat protection

The more you know, the better. According to a recent HIMSS Cybersecurity Survey, 51 percent of security incidents are identified by an organization's internal security team and 50 percent by an internal staff member who is not part of the security team. As the first line of defense against cyberattacks, staff members need to be well informed when it comes to data protection. But that isn't happening.

In fact, HIMSS survey respondents did not express much confidence in their organization's abilities to detect security incidents. Only a small percentage indicated that their organizations were highly prepared to detect zero day attacks (20.2 percent), negligent insider attacks (20.5 percent), malicious insider attacks (21.5 percent) and advanced persistent threat analytics (27.6 percent).

The primacy of education. That's why education is so important. "When it comes to the use of mobile devices and data, staff members need to understand what is appropriate and not appropriate," said Craig Eidelman, a mobility specialist with Microsoft Health and Life Sciences. "It's important to ensure that all employees understand just how critical security is but still realize that they can leverage mobile devices when they need to get critical information to take care of patients."

How to stop hating your electronic medical record system

Some physicians are using remote scribes to input the data.

BY DR. SUNNY VIKRUM MALHOTRA

Outpatient practices are often flooded with patients, but there are only so many hours in a day to see them, causing long patient wait-times and frustration. Increasing the number of physicians or mid-level employees often doesn't work for financial reasons, because practices are already under pressure.

That's why telemedicine use is on the rise. It's making vast strides toward increased efficiency, so physicians and healthcare providers can see more patients each day, and patients can receive more thorough, high-touch care.

Telemedicine takes many forms. It may mean "seeing" patients remotely over the Internet via video conferencing, mostly checking in on patients with chronic diseases such as diabetes or seeing someone experiencing a common issue such as a cold, rash, or cough. What a relief for them not to have to leave home when they're feeling ill.

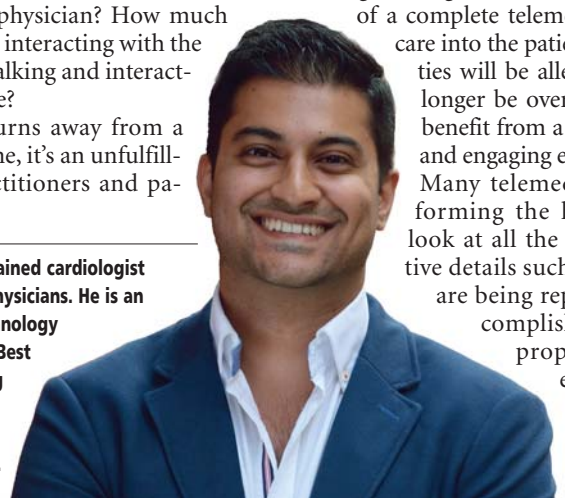
Or, it could mean applying innovations such as Augmedix (www.augmedix.com), a scalable, secure service that uses smartglass technology to securely capture physician/patient interactions and deploys a remote scribe to capture the outcomes of the visit in an electronic medical records (EMR) system. Physicians later review and sign-off on the notes.

Technologies such as these can reduce costs, clinical space, and overhead – all while improving the patient experience, ensuring service consistency, and allowing outpatient practices to treat more patients.

Documenting medical outcomes through smartglass technologies and "escribes" is an especially compelling use case for telemedicine. Remember the last time you visited a physician? How much time did he or she spend interacting with the computer/EMR versus talking and interacting with you face-to-face?

> **Patients and healthcare professionals invoke a Supreme Court of Canada decision that stated, "access to a waiting list is not access to healthcare."**

When a physician turns away from a patient for computer time, it's an unfulfilling experience for practitioners and patients alike.



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 2015. Twitter: @drsunnymalhotra

"The transition to the EMR for outpatient practices has been difficult due to extensive, time-consuming data entry, and an inability to engage with patients during a visit," says Pelu Tran, president and co-founder of Augmedix. "We enable healthcare providers to interact with the patient and forget about the computer because they can rely on a skilled scribe who is knowledgeable in medical terminology as a partner who completes EMR data entry for them."

Although the use of EMRs can seem burdensome at first, the issue of data entry and data utilization is very important. In the near future, data will be used to integrate diagnoses and at-home management as part of a complete telemedicine network that brings care into the patient's home. Outpatient facilities will be alleviated because they will no longer be overburdened, and patients will benefit from a far more swift, personalized, and engaging experience from the caregiver.

Many telemedicine advances are transforming the healthcare landscape. Just look at all the new ways that administrative details such as data entry into an EMR are being replaced. Jobs can now be accomplished by people with the appropriate skill sets, allowing everyone to do their best work, reducing overwork in outpatient facilities, and improving patient outcomes.

What the new Canada-EU Trade Agreement means for hospitals

BY DENIS CHAMBERLAND

Hospitals are now in the trade business. On September 21, 2017, the Canada-European Union Comprehensive Economic and Trade Agreement (CETA) came into force (on a provisional basis, as it still needs to be approved by all member of the European Union (EU)).

The agreement, which includes 30 chapters of rules defining trade between Canada and the EU, regulates trade in goods and services, sets an investor-state dispute settlement system, impacts intellectual property rights for pharmaceutical drugs and sets rules for government procurement.

CETA creates a free-trade zone allowing Canadian businesses guaranteed access to a market of more than 500 million consumers, including access to EU government procurement which is valued at over CAD $3.3-trillion annually. The reverse is also true: EU businesses now have access to the Canadian market, and to the North American Free Trade (NAFTA) environment.

Unlike previous trade agreements, under Chapter 19 CETA opens up competition to the government procurement activities of the so-called third tier of government, such as municipalities, school boards, universities and hospitals.

Now a hospital considering a specific procurement needs to ask whether the procurement being contemplated is a "covered procurement" under CETA. Not all procurements are covered.

Various annexes to CETA set the procurement value thresholds of goods, services and construction services applicable to a particular class of procuring entity (i.e., hospitals). The thresholds for procurement are valued in special drawing rights (SDRs), which is an international reserve asset created by the International Monetary Fund based on a cluster of currencies.

The SDRs are converted into local currency and the thresholds are adjusted at regular intervals by Global Affairs Canada. The thresholds currently applicable to hospitals are $237,700 for goods and services and $9.1 million for construction (note that the thresholds vary as the conversion rate changes).

These are high thresholds when compared to those set out in the Canadian Free Trade Agreement (to be discussed in the next column).

Aside from the thresholds, CETA's procurement rules do not apply to everything. Many exceptions and exemptions exist.

For example, under Article 19.2, on limited tendering, procurements related to "the protection of patents, copyrights or other exclusive rights" are excepted, as are procurements that "would cause significant inconvenience or substantial duplication of costs" for the hospital. It's not enough to casually claim an exception. The party claiming it must find a sound basis for it, one that could withstand a hard-headed auditor's gaze, as well as the scrutiny of the courts.

Denis Chamberland

Under CETA, procuring entities may also limit conditions for participation in a procurement process. Such conditions can be imposed provided the conditions are essential to ensuring that a supplier has the legal and financial capabilities and the commercial and technical abilities to undertake the work.

As well, supplier registration systems are allowed provided they are not set up for the purpose of creating unnecessary obstacles to participation. Selective tendering and multi-use lists are generally permissible, subject to some requirements.

Under CETA, procuring entities must publish notices of intended procurement that must include prescribed detailed information, be free-of-charge, and subject to a single point of access. Procuring entities are also encouraged to publish a notice of future procurement plans once annually.

Where there is a challenge to a procurement, under CETA the procuring entity and the disappointed bidder are encouraged to re-

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Denmark, a northern nation, offers lessons in remote and virtual care

Healthcare Denmark has released a White Paper about the Scandinavian country's approach to telehealth and virtual healthcare, titled "Denmark – a Telehealth Nation." The full paper can be found at: http://healthcaredenmark.dk/media/1625194/HCD-Telehealth-white-paper-v1-single-0318.pdf

Like many other countries, Denmark has an ageing population and a growing number of chronic patients. More and more people are in need of healthcare, which places an increasing strain on public finances. Telehealth solutions may help the healthcare system to meet this challenge in a way that also improves the quality of care.

Telehealth is not just about technology; it requires organisational change. It may act as a catalyst for new routines and workflows, which put the patient at the centre of treatment.

Instead of admitting the patient to the system, the system is deployed to the patient. In general, patients are assigned a more active role in their own treatment: They learn more about their conditions, improve their self-care skills and are able to influence their own health situations.

At the same time, telehealth solutions reduce the number and length of hospitalisations, enhancing the financial viability of the healthcare system. Denmark has been working strategically with telehealth for years. At the core of these efforts are a number of small and large-scale telehealth projects carried out across the Danish healthcare sector.

The most successful concepts are selected for further trials and development, preparing them for national dissemination.

TeleCare North: The TeleCare North project has implemented home monitoring to support patients suffering from COPD (chronic obstructive pulmonary disease). The project has established new cross-sector roles and procedures to support the region-wide implementation of home monitoring. This has paved the way for a new integrated care model, which allows the concept to be expanded to other patient groups.

Since 2013, approximately 1,400 COPD patients in the North Denmark Region have accepted the offer of home monitoring.

Research shows that patients with severe COPD experienced improved quality of life through the telehealth program, and the number and length of hospitalizations were reduced by 11% and 20% respectively. Building on the positive results for COPD patients, the offer of home monitoring will now be expanded to include heart failure patients as well.

The Virtual Hospital: The virtual hospital concept allows patients to receive treatment at home and enjoy the same quality of care as they would in hospital. It saves them the trouble of going to the hospital for control visits or treatment sessions, and frees up hospital resources at the same time.

Bispebjerg Hospital in Copenhagen has implemented a telehealth service for wound patients that has increased efficiency and patient satisfaction. Specialised municipal home nurses are responsible for the treatment, which is coordinated by a wound healing centre at the hospital.

The results of the project have inspired a nationwide telehealth solution for the treatment of wounds. At Rigshospitalet in Copenhagen, the Chemo at Home project uses a redesigned workflow to offer patients higher-quality treatment without increasing expenditure.

At Aarhus University Hospital, the Department of Obstetrics and Gynaecology has implemented a telehealth solution allowing women with pregnancy complications to be monitored at home. The number of outpatient visits has been reduced, staff spend 75% less time on patient monitoring, and the number of inpatient days for women with pregnancy complications has been reduced by 44%.

Odense University Hospital has imple-

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Patient reported outcomes (PROs) being deployed to improve data collection

Customized patient questionnaires can collect better and more thorough information.

BY DIANNE DANIEL

Some call it the dreaded clipboard. You arrive at your initial appointment with a medical specialist and your first task is to fill out a series of intake forms. Often, you find yourself sitting in a busy waiting area, relying on memory, and the tendency is to rush or even skip over answers. You quietly think to yourself: 'No one is going to look at this anyway.'

What if those same questions were emailed to you weeks in advance and you could take time filling them in from the comfort of home? What if, instead of generic questions on paper, you were presented with a computer tablet and the opportunity to click through a series of questions tailored specifically for you? Would you be inclined to provide better information?

Dr. Sean Wharton, internal medicine doctor and medical director of the Wharton Medical Clinic in southern Ontario, believes you would.

From the start, his multidisciplinary approach to weight and diabetes management has centred on efficient note-taking, including patient reported outcomes (PROs). Each visit to a Wharton clinic begins with a discussion of personal goals and outcome objectives.

Some questions are carefully structured to provide clear data points for future research, while others are based on collecting firsthand patient information – such as whether patients are able to bend to tie shoes or feel comfortable in their clothes.

When the clinic launched in 2008, PROs were loosely captured by clinicians during patient visits using an electronic medical record (EMR). More recently, the clinic implemented an integrated PRO platform, from InputHealth Systems Inc., to collect patient intake data in a more consistent and usable manner.

ILLUSTRATION: LINDA WEISS

"Before, patients often skipped over those questions, questions we know are very valuable," said Wharton Medical Clinic research coordinator Rebecca Christensen. "Now we've made it easier to capture. We're able to get deeper information about our patients and better understand what their goals and hopes for the program are."

The new "visit one package" is sent to first-time patients through a secure link prior to their visit. In addition to obtaining a comprehensive weight history, it also includes open-ended questions intended to capture personal experience. Once the forms are completed and returned, the clinic uses a natural language output option provided by InputHealth to create a visit-one note that serves as the starting point for the initial in-person appointment.

"We use it to create the majority of a visit-one note in a patient's own words," explained Christensen. "They don't have to hand over these forms that they're carrying around. They know it's been received by us … it's going directly into our EMR and we're able to make sure it's held in the strictest of confidence."

The new process is providing the foundation for a much broader PRO strategy in the future. Dr. Wharton said the intent is to capture patient information in an automated way at every visit, ultimately leading to more accurate and complete note-taking and a better measure of outcomes.

"If we can get better notes that we're proud of, that relate to what happened in the actual visit and the interpretation is accurate and we're proud of them, then those things can be given to patients," he said. "There's less chance of litigation, there's more appropriateness and everybody is on the same page. That's a very tall order."

Dr. Puneet Seth, chief medical officer at InputHealth, believes PROs are entering a renaissance stage. Whereas patient-reported data used to be seen as an added value, it's now viewed as an "absolute necessity for the healthcare system moving forward," he said.

Patient reported outcomes have been around for more than 40 years in the form of structured ways to

Canadian hip and knee replacement patients invited to the PROM

Hip and knee replacement surgeries will be among the first to benefit from a common approach to collecting and reporting patient-reported outcome measures or PROMs, following a coordinated effort led by the Canadian Institute for Health Information (CIHI) to advance PROMs information across Canada.

Last fall, CIHI and the Canadian Joint Replacement Registry Advisory Committee, comprised of representatives from the Canadian Arthroplasty Society and Canadian Orthopaedic Association, agreed on a standard minimum data set for obtaining patient-reported outcomes, including the use of pre-surgery and post-surgery questionnaires to better gauge the change in patient health status following a hip or knee replacement.

The effort supports Canada's push for value-based healthcare delivery because it provides more timely and accurate PROMs data, which can be integrated with costing data, patient-reported experience measures (PREMs) and other clinical outcome measures to determine which interventions are providing the best patient outcomes for the lowest cost, said Greg Webster, director of Acute and Ambulatory Care Information Services (AACIS) at CIHI.

"CIHI's focus is on advancing a common approach to PROMs across Canada, as this is the most efficient way to provide the most valuable and comparable data. We're using proven PROMs tools rather than developing new PROMs. The momentum for PROMs is increasing and CIHI is working with others to align and accelerate progress," explained Webster.

Hip and knee replacements are a logical starting point, he added, because the clinical community is already engaged in improving outcomes through the Canadian Joint Replacement Registry, operated by CIHI in collaboration with the Canadian Orthopaedic Association.

Some orthopaedic surgeons are already using PROMs like the Oxford Hip Score (OHS), Oxford Knee Score(OKS) or WOMAC (Western Ontario and McMaster Universities Osteoarthritis Index) to assess individual patients using brief standardized questionnaires focused on pain and functioning.

The new standard minimum data set uses the OHS & OKS and adds a smaller, more generic tool called the EQ-5D-5L, designed to measure a patient's general health and quality of life characteristics.

> **Hip and knee replacements were a logical starting point, because of related work occurring in this area.**

The idea is that patients complete the brief questionnaires within eight to 10 weeks prior to surgery and then provide follow-up information one year after surgery – all of which can take place online using web, kiosks or tablets.

"You can then measure improvements for those patients and do risk adjustments to see if similar patients receiving similar surgeries are experiencing similar improvements in their pain and functioning," said Webster, adding that the move from paper-based to digital data collection is making it "faster and cheaper" to obtain standardized PROMs data.

In Ontario, for example, the Ministry of Health and Long-Term Care is working with Cancer Care Ontario to create an infrastructure to support electronic data collection, from patients receiving hip and knee replacement surgeries.

The initiative involves adapting kiosks and tablets to allow patients to securely provide information in a clinical setting. Replacing paper with electronic forms means the information can be quickly fed into electronic medical records, allowing for more informed discussions between surgeons and their patients. The PROMs data from this initiative will be provided to CIHI and the Ministry for analysis and reporting.

collect information. What's changed is the advent of mobile technology and new ways to connect with patients electronically – leading to the concept of the electronic PRO or ePRO.

InputHealth's philosophy is that patient engagement needs to be a bidirectional relationship. If you're going to ask patients to log into their computers or use their phones every day to report outcomes, they need to understand why they're doing it and feel that they are receiving something in return.

In other words, the more personal the connection, the better the patient engagement.

When a family doctor refers a patient to a specialist, the sooner that specialist engages with the patient, the less apprehensive he or she will be. Using an ePRO platform, a specialist can connect ahead of a first visit, send a brief introduction to his or her services, request patient information and let a patient know what to expect, for example.

"That small gesture of reaching out to a person can be a very transformative patient experience," said Dr. Seth. "All of a sudden, you've developed this human connection. It's coming directly from your clinical provider and if you have an automated means for being able to do this, it can really provide a win-win for all parties involved."

The idea, he added, is to move away from paper-locked pieces of information to a digital approach. To do it effectively, however, requires good design. It's not a matter of taking an existing paper survey and automating it, but designing an ePRO from the start to take advantage of digital technology.

InputHealth's platform is like a blank canvas. Organizations use the software to build their own forms, incorporating dependency logic and branching trees to build intelligent forms tailored to patient-specific populations.

For example, if a patient responds that they are experiencing elbow pain, they will be asked questions about where the pain is radiating on their arm, what makes it worse, what makes it better and whether it's on the inside or outside. Similarly, a male patient won't be presented with questions about his menstrual cycle and a female patient won't be asked about her prostate health.

Researcher Dr. Cheryl Forchuk, Mental Health group leader at Lawson Health Research Institute in London, Ont., is investigating InputHealth's ePRO platform as a means to support communication between care providers and clients in the mental health field.

Based on the findings of an earlier study, which showed that using smartphones to facilitate online communication resulted in a 30 percent reduction in outpatient visits, her group is partnering with InputHealth to make the strategy more personal.

"It's very much a case of one size doesn't fit all, so we're trying to look at incorporating differences for different sub-populations," she said.

One group that didn't respond well to the smartphone study were seniors. Whereas younger patients preferred texting, older patients wanted to use larger devices, type less and have the opportunity for face-to-face interactions.

Using InputHealth's technology, researchers designed questionnaires for Google Chromebooks and enabled virtual visits to take place. Feedback from the study indicated that once they were presented with a more appropriate interface, elderly patients were willing to supply more information.

The goal of the research is to alleviate bottlenecks in the mental health system by strengthening community-based supports and services. An ePRO approach provides a means for patients to maintain communication with a care provider without the need to visit an outpatient clinic. Fewer visits are required, but the accessibility is greater.

Facilitating communication is key, she added. There are hundreds of smartphone apps available for free that can monitor moods, for example, but only a handful have been evaluated. Patients who are at risk for problems with mood and depression who use such apps in isolation, without an avenue to talk to somebody, may end up at even greater risk.

"We know from some of our work with depression that introspection without communication can actually increase depression," said Dr. Forchuk. "We want to monitor what's going on, but do it in a way that involves communication rather than doing it as a solitary activity or dealing with Dr. Google."

Connected health information saves time and money for Canadians

BY MICHAEL GREEN

Recognize this? You make an appointment to see your doctor. The day arrives, and you tell your boss and colleagues that you'll be away from work for about three hours. You travel to the doctor's office, spend some time in the waiting room, see the doctor, then travel back to work.

If your doctor is missing information, you may need to repeat a test or book a follow-up appointment. If you have a chronic condition, you might experience this several times a year.

The time adds up. So does the lost productivity for your employer. Your healthcare providers and our health system also experience time and productivity losses when information is incomplete or unavailable.

The solution? At least part of it is to connect health information electronically so providers can access and share it. According to a new pan-Canadian study commissioned by Canada Health Infoway (Infoway), the growing use of connected health information – the information exchanged using interoperable electronic health records (iEHRs) and complementary solutions for sharing information between providers and organizations – is producing significant financial and time-saving benefits for patients, providers, our health system and our economy.

Connected Health Information in Canada: A Benefits Evaluation Study, found that the greatest benefits are in four areas:

- Reduced duplication of diagnostic testing;
- More effective use of inpatient settings;
- More effective use of emergency departments; and
- More effective ambulatory (outpatient) interactions.

Using an established benefits evaluation framework developed by Infoway, as well as a standardized methodology for evaluating the national effects of digital health, the study estimated current benefits of:

- 18 million hours a year in time savings for patients (i.e., less time taken off work to go to appointments);
- 5.9 million hours a year in time savings for providers (i.e., freeing them up to see more patients);
- $1 billion a year in health system value (i.e., money that can be reallocated for other health care priorities); and
- $189 million a year in economic productivity gains (i.e., through time NOT lost from missing work).

Sandra Wallace of Ottawa, Ontario, has been saving time as a result of connected health information. Her daughter, Camryn, has a number of health challenges that require frequent appointments.

"It's fantastic to be able to sit in a clinic appointment now with the doctor and see all the data and medications, everything that she's on is right there in front of us. That's just a fantastic change, it makes everything flow so much quicker in appointments today," Wallace said.

Healthcare providers like Dr. Tunji Fatoye of Winnipeg, Manitoba, couldn't agree more.

"Rather than waiting while a clerk calls around to labs or other clinics or hospitals to have information sent, I can now log on and confirm my patients' health information with them right in the examination room," he said.

"I can see what blood tests they had done at another site without waiting for phone calls or faxes. I can confirm which medications a patient had filled without making another phone call to the pharmacy or interrupting a clinic nurse to confirm the information."

Added Dr. Fatoye: "You can't imagine how much time is saved on any given day and how much more efficiently the clinic runs."

Patients and providers, and by extension, our health system and our economy, are experiencing these benefits because of investments made by Infoway and the provinces and territories in the foundational elements of an iEHR – patient and

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OntarioMD offers new training course for online privacy and security

BY KATHERINE TUDOR

There is no shortage of Canadian news headlines about hackers getting into government and healthcare provider websites to gain access to personal information and patient health information. These headlines are a constant reminder of the stark reality that cybercrime is not going anywhere.

You may think that cybercrime committed to access private information only came along with the advent of the Internet. In fact, security incidents and privacy breaches are nothing new. Before the widespread use of the Internet, electronic medical records (EMRs) or other information systems, practice staff could snoop in paper charts and no one was the wiser.

Not to be dismayed, there are ways to protect your practice and confidential patient data from security incidents and privacy breaches regardless of how you collect patient information. With over 15,000 physicians and nurse practitioners in Ontario using EMRs, there is more focus than ever on protecting patient data in electronic systems.

The OntarioMD Privacy and Security Training Module was developed to provide convenient privacy and security training for Ontario physicians and healthcare professionals who use EMRs. There are a few good tips for paper chart users as well," said Sarah Hutchison, CEO, OntarioMD.

"It's the most comprehensive online privacy and security training for physicians and their staff available in Ontario," she added. "It has been reviewed and endorsed by the College of Physicians and Surgeons of Ontario, the Canadian Medical Protective Association, the Ontario Medical Association and eHealth Ontario.

"No other privacy and security training module can provide attestation that you have successfully completed the training to enable access to digital health assets."

Under the Personal Health Information Protection Act (PHIPA), physicians are health information custodians (HICs). As HICs, physicians have an obligation to protect Personal Health Information on an ongoing basis. The OntarioMD Privacy and Security Training Module covers topics such as safeguarding personal information from security incidents leading to privacy breaches, and how to comply with obligations under PHIPA.

The training is available to registered users of OntarioMD.ca. Physicians and nurses can become registered for the site and get a username and password to access the training module.

Once you have a username and password, you can simply log in and launch the module. Physicians and nurses who are registered users can sponsor any staff who could benefit from the training.

The OntarioMD Privacy and Security Training Module has been certified as a Self-Learning Program by the College of Family Physicians of Canada for two Mainpro+ credits.

The training covers:

- the importance of privacy and security, and your legal and professional obligations
- personal health information and ownership of medical records
- Ontario's Electronic Health Record (EHR) systems and your obligations as a user of such systems
- consent and consent directives
- ways to safeguard personal health information
- developing policies for acceptable use of personal health data and EHR systems
- system and network controls that must be in place before you access EHR systems
- how to manage relationships with electronic service providers
- identifying and appropriately responding to security incidents and privacy breaches

"Privacy and Security go hand in hand with any digital health solution" said family physician, Dr. Thérèse Hodgson. "The comprehensiveness of the OntarioMD Privacy and Security Training Module allowed me to ensure that my staff would be well-educated in privacy and security."

Improvement in quality expected from mobile technology at bedside

A worldwide survey of 1,500 clinicians, IT decision-makers and patients found that 72 percent believe mobile devices are improving the quality of patient care. They agree the technology gives clinicians actionable intelligence at the bedside with the effect of increasing time with patients and reducing errors.

Zebra Technologies Corp., a market leader in rugged mobile computers, barcode scanners and barcode printers, sponsored the survey, which was conducted in 2017.

The report, called The Future of Healthcare: 2022 Hospital Vision Study, offers a perspective from the front-line of patient care. It also highlights the changes that clinical mobility is expected to have on global health services within the next five years.

Zebra's 2022 Hospital Vision Study identified the rising adoption of clinical mobility – the use of mobile devices such as handheld mobile computers, tablets, cordless barcode scanners and mobile printers – in hospitals around the world.

According to survey respondents, nearly all hospitals estimate that mobile devices will be used at the bedside by nurses (97 percent) and physicians (98 percent) by 2022, but also increasingly by other members of the care team – such as pharmacists, lab technicians, radiologists, and patient transport professionals.

The study also highlighted how patients perceive the rise of clinical mobility with nearly eight-in-ten survey respondents feeling positive about mobile tools being used to improve their care.

Key findings: Clinical mobility is rapidly becoming the global standard for patient care: Zebra's 2022 Hospital Vision Study identified the rising adoption of clinical mobile solutions across all disciplines by 2022. This growth includes areas where mobility is already widely used (bedside nurses rising from 65 to 95 percent), as well as an increase in other areas such as pharmacist and pharmacy technicians (from 42 to 96 percent), lab technicians (from 52 to 96 percent), and ICU nurses (from 38 to 93 percent).

The study highlights a reduction in preventable errors as a key benefit. Surveyed nursing managers and IT decision-makers expect clinical mobility to reduce errors in areas including medication administration (61 percent) and specimen collection labeling (52 percent).

Mobile technologies allow clinical staff to spend more time at a patient's bedside: By 2022, 91 percent of nurses are expected to access electronic health records (EHRs), medical and drug databases (92 percent), and lab diagnostic results (88 percent) using a mobile device, reducing time that must be spent away from patients.

Communications are expected to improve due to rising clinical mobility adoption: Nearly seven-in-ten of surveyed nurse managers credit clinical mobility with improving staff communication and collaboration, as well as the quality of patient care.

At the same time, 64 percent of surveyed IT decision-makers identify nurse-to-physician communications as a top area for improvement.

Clinical mobility will be augmented with real-time location information to streamline workflows: Real-Time Location Systems (RTLS) will be used to locate everything from equipment, supplies and pharmaceuticals to patients and staff. This visibility will allow administrators to improve bed availability, staff workflow, and safety.

Faster data streams, integrated through handheld mobile technologies, are expected to improve detection and notification of life-threatening conditions. By 2022, 98 percent of surveyed IT decision-makers expect predictive analytics and early notification for life- threatening conditions, such as sepsis and hospital-acquired infection, will be sent to clinicians' mobile devices.

As well, patients are aware of the benefits of clinical mobility and becoming more active participants in the delivery of their healthcare. The majority of surveyed patients (77 percent) are pleased with clinician usage of mobile technologies to improve the quality of their care.

Infoway study

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provider registries, laboratory and drug information systems, diagnostic imaging repositories, and clinical reports and immunizations. As providers began using these systems, Infoway commissioned pan-Canadian benefits evaluation studies to provide insights into the value for Canadians and our health system.

The findings for individual foundational elements were significant, but we always knew that the true value would be unlocked when these elements were connected and being used by vast numbers of providers.

That's exactly what's happening. Over the past decade, there has been significant growth in the number of providers who are able to access connected health information.

As of January 2017, an estimated 301,000 (more than half of the 500,000 estimated potential users) were accessing one or more sources (e.g., laboratory tests, diagnostic imaging) to retrieve patient information.

More than 162,000 of these providers were actively accessing two or more clinical information sources. In addition, we know that 85 percent of primary care physicians report using electronic medical records in 2017, enabling them to access various systems right from their desktops.

Integration with other clinical systems, such as hospital information systems and pharmacy management systems, has also had a huge impact.

We believe the findings in our new study are likely conservative, due mainly to the lack of available data to quantify value in some areas. We also believe that the value of connected health information will increase significantly as solutions are enhanced with new features and functionalities, and as these solutions are more fully integrated into point-of-care systems and clinical practices.

The study estimates that, at full adoption, we could see benefits of:

- 76 million hours a year in time savings for patients (compared with 18 million currently);
- 15 million hours a year in time savings for providers (compared with 5.9 million currently);
- $3.9 billion a year in health system value (compared with $1 billion currently); and
- $732 million a year in economic productivity gains (compared with $189 million currently).

The true value of EMRs are unlocked when the elements are connected and used by large numbers of providers.

As Canada continues to transition from creating the platform for digitizing and sharing patient information, to making the best use of connected health information, our health system will be more efficient, effective and sustainable, and patients will have a better experience and better outcomes. Patients and providers are optimistic.

"The technology used in digital health can improve the care that patients receive, like wait times and quality of service," said Monique Boiteau on Laval, Quebec. "We as patients feel that we are being looked after."

Dr. Darcy Marciniuk of Saskatoon, Saskatchewan, agrees.

"We used to have many medical records in various doctors' offices and other healthcare professionals, hospitals, institutions, and we're starting to see a seamless integration of those records so that everybody involved in the care of a patient has access and availability to that same information," he said.

"It's much more efficient. It breaks down barriers and I think it's going to improve patient care."

Michael Green is President and CEO of Canada Health Infoway. Connect with him on Twitter @MGreenonHealth.

Study leads to a dramatic drop in SSIs

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has improved with liver infection rates dropping 200 percent, thanks to new measures that include a change of prophylaxis, better timing and using chlorhexidine washes before the operation. Not one infection resulted from renal transplants in 2016.

According to Dr. Frenette, cardiac surgery used to tally almost 100 infections per year, with each infection adding $75,000 in hospital stays. That number has been cut by half.

"We went from over 10 percent of patients having infections to around five percent. But there's still room to improve," said Dr. Frenette. "We think we can decrease by another two to three percent, which would be in line with the best rates in the world." The team credits MUHC staff for helping make this ambitious plan a reality.

"It's very important to have a team of surgeons who are open to feedback and recommendations. We have been able to achieve this and it makes a big difference," said Yveta, a trained nurse clinician who is one of the team's Infection Control Consultants. "We collected, we analyzed and we recommended – but if we do not receive collaboration, then we will not make a difference."

Yveta points to improvements in training and educating young surgeons who also happened to come of age during the timeline of their study, which began in 2011. That added experience translated into improved results inside the operating room.

"I'm personally satisfied to make a difference, to feel appreciated, and to see that our work is being rewarded," said Infection Control's Connie Patterson, who works side-by-side with Yveta and Anique.

Healthcare Denmark offers lessons in remote and virtual care

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mented a telehealth service offering home support to families with pre-term babies. Instead of starting their new family life with a lengthy stay in unfamiliar hospital surroundings, the solution allows families to be discharged as soon as the baby is in no clinical danger.

Telepsychiatry: For patients with a mental disorder, timely access to mental health services is often of vital importance. Telepsychiatry can provide them with faster and more flexible access to mental healthcare services, as well as the opportunity to be more directly engaged in their own treatment.

The Region of Southern Denmark has established a Centre for Telepsychiatry to empower patients and improve outcomes and service delivery through the use of telehealth. The Internet Psychiatric Clinic gives citizens with mild to moderate depression or anxiety fast access to evidence-based treatment and guidance, without the need for a referral from their GP.

Based on the positive results, it has been decided to implement the solution in all five Danish regions. The Centre for Telepsychiatry has also implemented home-based video consultations, providing easier access to psychiatric care.

Home-based video consultations also support joint decision making between patients, mental healthcare providers and other healthcare professionals.

A national infrastructure for telehealth data: Denmark's implementation of large-scale telehealth solutions between 2011 and 2015 has revealed that telehealth requires a new approach to data and data sharing. This has led to new initiatives and a sustained focus on standardisation and further development of the Danish healthcare system's IT infrastructure in order to support telehealth on a national level.

Denmark was the first country in the world to adopt the Continua Health Alliance standard as the national standard for telehealth devices. It is now the backbone of a robust framework for implementing telehealth nationwide.

Denmark was the first country in the world to adopt the Continua Health Alliance standard for telehealth.

Compliance and prevention: Telehealth has the potential to inspire and motivate citizens to engage in their own health in a new way. It may increase their awareness of risk factors and facilitate close cooperation between patients, providers and professionals of the healthcare system. At the Municipality of Esbjerg, telehealth is used to promote population health. Telehealth and preventive services have been designed to motivate chronic patients to adopt a healthy lifestyle and improve their compliance with treatment.

At the Municipality of Holstebro, a study has documented how a telehealth solution supporting home blood pressure measurement has reduced the reporting bias normally associated with the detection of hypertension. The study not only revealed that many patients were being treated on the basis of an inaccurate diagnosis. It also identified a number of citizens with undiagnosed hypertension.

Odense University Hospital is collaborating with the national health authorities on a project that will make screening for colorectal cancer more efficient. Since 2014, all Danish citizens between the ages of 50 and 74 have been offered screening for colorectal cancer – either a colonoscopy, which is a highly accurate, but invasive procedure, or a stool test, which is non-invasive, but much less accurate.

A new "camera pill" technology allows colonoscopy diagnostics to be carried out in the patient's own home, significantly reducing the risk and discomfort associated with conventional screening methods. Some of Denmark's most promising and successful telehealth concepts are described in further detail in the full White Paper – along with the potential or documented gains for the patients as well as the healthcare system as a whole.

Chamberland

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solve their differences through consultation. For the many cases where a pleasant chat won't suffice, CETA states that the parties should appeal to a "designated administrative or judicial authority".

To date no such administrative or judicial authority has been set up, though we understand there is the possibility that some provinces may establish a bid dispute resolution procedure.

If the pattern of complaints that emerged after the establishment of the bid-dispute resolution forum at the federal level in the late 1990s is any indication, we should expect hospital procurement to loom larger in the future. It is widely accepted that bid protest procedures make public procurement more robust and increase value to taxpayers.

The new obligations – procedural, administrative and technical – which CETA imposes on hospitals are generally consistent with those flowing from the Canadian Free Trade Agreement (CFTA), but they are not similar in all respects, and they are voluminous. No effort was made here to provide a detailed or comprehensive overview.

It is widely accepted that bid protest procedures make procurement more robust and of increased value.

So as hospitals bravely launch themselves into the business of trade, care must be taken to comply with both CETA and the CFTA, as well as the Broader Public Sector Procurement Directive which continues to apply to hospitals.

Denis Chamberland is a commercial lawyer with extensive procurement, technology and trade law experience in the healthcare sector in Canada and Europe. He works with many hospitals on a variety of projects, including helping hospitals understand and implement the requirements of the new trade agreements. He can be reached at dac@chamberland-lawcorp.com.

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