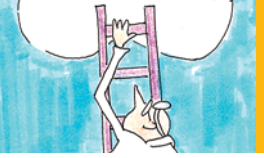

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Publications Mail Agreement #40018238

CANADIAN
Healthcare Technology

CANADA'S MAGAZINE FOR MANAGERS AND USERS OF INFORMATION SYSTEMS IN HEALTHCARE | VOL. 20, NO. 6 | SEPTEMBER 2015

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PHOTO: COURTESY OF MACKENZIE HEALTH

Mackenzie Health continues to innovate

Mackenzie Health, in Richmond Hill, Ont., has launched the second phase of its innovation lab. Pictured at the announcement (l to r): Tom Corr, CEO, Ontario Centres of Excellence; Altaf Stationwala, CEO, Mackenzie Health; Reza Moridi, Minister of Research and Innovation; John Chen, CEO, BlackBerry; Mike Monteith, CEO, ThoughtWire; Bernadette Wightman, President, Cisco Canada. **SEE STORY ON PAGE 4.**

HUGO produces huge gains in patient safety

BY JERRY ZEIDENBERG

One year after going live, a project to improve patient safety at 10 hospitals in southwestern Ontario has reduced the number of adverse drug events by 35 percent, an astonishing achievement. "And two of the hospitals have reduced their ADEs by 50 percent," added Dr. Robin Walker, Integrated Vice President of Medical Affairs and Medical Education at London Health Sciences Centre and St. Joseph's Health Care London.

Dr. Walker and Glen Kearns, integrated VP of diagnostic services and CIO at the two hospitals, gave a presentation on the HUGO project at the eHealth conference in Toronto last June. HUGO is short for Healthcare Undergoing Optimization, and the project was rolled out to the 10 hospitals and 14 sites in rapid fashion, in just six months. The final go-live was in May 2014.

All of the hospitals are using Cerner's clinical information system. As Cerner Canada's president, Jim Shave, put it, "There is one standard electronic health record serving more than 1 million people in the region."

> **Adverse drug events at 10 hospitals in southwestern Ontario fell by 35 percent.**

Other partners in the project include the Listowel Wingham Hospitals Alliance, the Alexandra Hospital in Ingersoll, the Middlesex Hospital Alliance, the St. Thomas Elgin General Hospital, the Woodstock Hospital and Tillsonburg District Memorial Hospital.

Kearns described an incident at one of the hospitals several years ago, before HUGO was implemented, in which a pediatric patient was given the wrong dose of a drug and nearly died. It was the occurrence of such heart-rending accidents that spurred the effort to improve everyday care through the use of computerized tools.

The $32 million project brought advanced systems to each of the participating hospitals, including Computerized Physician Order Entry (CPOE), electronic medication administration record (eMar), closed loop medication administration, including barcoding, and electronic medication reconciliation.

The digital tools replace the traditional hand-written orders of care providers with

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HUGO project reduces number of adverse drug events by 35 percent

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computerized order entry by the provider (CPOE) eliminating potential transcription errors made by misreading the notorious scribbling of clinicians. Time is also saved, as pharmacists and nurses spend less time tracking down doctors to check their orders.

The whole process of ordering at the 10 hospitals has been made smoother through the use of computers, observed Kearns. "Ordering in the paper-based world involved 24 different steps," he said. "With automation, that has been reduced to eight steps, all with a double-check built in."

For example, the system will alert clinicians, at the time of ordering, when patients have allergies or when they already take medications that may produce drug-drug interactions. Prior to CPOE these alerts only occurred once the orders were transcribed by pharmacy, which may have occurred after the patient already received the medication.

Moreover, barcode checks at the bedside ensure the right medication is being given to the right patient at the correct time.

Not only has there been a dramatic improvement in patient safety, but certain processes have also become more effective, particularly through the use of order sets – the 'best practices' that are agreed upon by hospitals when it comes to tests and therapies. Before HUGO, said Dr. Walker, "When you were admitting a baby, you could write 30 orders. It could easily give you writer's cramp. Order sets for complex inpatients can be a real time-saver."

Order sets also incorporate agreed-upon best practices, which reduce the "variation in medical practice" that results in inconsistent outcomes and varying quality of care. "Consistent care turns out to be higher quality care," said Dr. Walker. "We're going to introduce more evidence-based care in the future, as we've just scratched the surface."

HUGO was a large-scale project that involved a core team of 40 information management professionals, as well as 1,000 "super-users" who together trained more than 6,000 clinicians. And in moving from paper-based orders to electronic ordering and checking, it involved a significant shift in the way clinicians were used to working. "It's the biggest practice change I've experienced in my career," said Dr. Walker.

Doctors can even place orders remotely. "We have an oncologist who likes to stay in close touch with his patients," said Dr. Walker. "He's able to place orders even when he's at his cottage in Huntsville."

Kearns pointed out that HUGO has already resulted in major improvements for patients, but it has not been without challenges through the implementation process.

> **The region's hospitals are now at Level 5 or better in the HIMSS Analytics EMRAM scale, and want to continue to progress.**

For one thing, the team underestimated the recovery time needed by staff members as they launched HUGO at one site and moved on to the next. Fourteen sites were brought to the go-live state in just six months, which left little time for the implementation team to rest up and recover. Kearns and Dr. Walker noted that staff members were exhausted with this schedule, and if they were to do it again in the future, they'd build in more resting time.

At the same time, they cautioned those who are planning similar projects not to train their clinical users too early. Memory-retention of the training provided rapidly diminished if it was not sufficiently close to the go-live date. Indeed, some of the HUGO sites had to re-train their clinical users after launching.

As well, more active engagement of residents and medical students in the core governance and planning of the project may have helped avoid some early challenges with the impact of the project on their workflow.

Kearns added that physicians are sometimes too busy to ask for help, even if they're floundering with a new system. "You need to be proactive, to identify them and offer additional help," he said. Identifying individual physicians who might be expected to be early resistors of change and addressing these concerns proactively can mitigate the risk of critical events following go-live.

As an incentive, Dr. Walker said the hospitals will in the future provide better remuneration for physicians who participate in training programs.

Kearns said the region's hospitals are now at Level Five or higher in the HIMSS Analytics EMRAM scale, and want to continue to progress. He noted that a good deal is still on paper, and that work needs to be done to computerize clinical documentation.

"How will that unfold?" asked Kearns. "We have this work scoped out, and plan to automate all processes not yet digitalized." For example, data from smart pumps will automatically populate the patient's electronic record. "For the immediate future, we have identified eight distinct projects which are about to kick-off with a goal to optimize our system in preparation for electronic clinical documentation," he said.

Coming in November: Hospital Innovators

The November edition of CHT will feature our annual 'Hospitals of the Future' section, a special report on Canada's most forward-thinking facilities. This year, we will profile how new hospitals have designed intelligence into their facilities from the ground up. We pay special attention to the Humber River Regional Hospital in Toronto, as well as the new Women's College Hospital, and the McGill University Health Centre.

CANADIAN Healthcare Technology

CANADA'S MAGAZINE FOR MANAGERS AND USERS OF INFORMATION TECHNOLOGY IN HEALTHCARE

Volume 20, Number 6 September 2015

Address all correspondence to Canadian Healthcare Technology, 1118 Centre Street, Suite 207, Thornhill ON L4J 7R9 Canada. Telephone: (905) 709-2330. Fax: (905) 709-2258. Internet: www.canhealth.com. E-mail: info2@canhealth.com. Canadian Healthcare Technology will publish eight issues in 2015. Feature schedule and advertising kits available upon request. Canadian Healthcare Technology is sent free of charge to physicians and managers in hospitals, clinics and nursing homes. All others: $67.80 per year ($60 + $7.80 HST). Registration number 899059430 RT.

Send all requests for permission to Jerry Zeidenberg, Publisher. **Publications Mail Agreement No. 40018238.** Return undeliverable Canadian addresses to Canadian Healthcare Technology, 1118 Centre Street, Suite 207, Thornhill ON L4J 7R9. E-mail: jerryz@canhealth.com. **ISSN 1486-7133**.

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Mackenzie Health launches the second phase of its Innovation Unit

BY JERRY ZEIDENBERG

RICHMOND HILL, ONT. – Mackenzie Health has announced the second phase of its Innovation Unit, a living laboratory with 34-beds that is about to implement and test smart messaging and clinical alerting, in conjunction with partners BlackBerry, Cisco and Thoughtwire.

The innovative hospital also announced the launch of its Mackenzie Innovation Institute (Mi2 – pronounced Mi squared), which will manage the innovation unit.

Mi2 has benefited from a $350,000 award from the Ontario Centres of Excellence, given earlier this year, along with contributions from the partners that have boosted the amount invested in the project to over $1 million in cash, equipment, software and services.

In the first phase of the project, announced in 2014, the hospital installed and tested technologies such as smart beds that could determine whether a patient was leaving the bed, smart badges that can determine the location of nurses and other clinicians, and a hand-washing tracking system to deliver safer patient care.

Phase two of the project, which went live in August, focuses on a smart mobile clinical messaging and alerting system. Leveraging the Internet of Things (IoT), it electronically links medical devices such as bedside pumps and monitors to caregivers, while using intelligent rules to optimize the routing of messages among doctors and nurses and to also prevent 'alert fatigue'.

Caregivers will be able to quickly assess whether or not the system is useful, and to suggest improvements; as well, the project will benefit from a formal study by academic researchers at the University of Toronto.

Mackenzie Health president Altaf Stationwala, speaking at a launch event in June, said that Mi2 is all about improving the quality of care, and ensuring the hospital is making the right technology investments.

In the past, he said, "We were not feeling that we were making the best technology investments. We introduced all kinds of technology, but our nurses weren't able to spend the time they needed with patients."

Mackenzie Health's Altaf Stationwala, BlackBerry's John Chen, and writer Simon Hally at the launch event.

Instead, they were doing documentation, running from one part of the hospital to another to check the readings from devices or to look up information at workstations.

Mackenzie Health's worries about workflow and technology investments were brought to the fore when it started planning a sister hospital, Mackenzie Health Vaughan, which will be built nearby and is to be completed in 2019. "Eighty percent of the rooms in the new hospital will be private, for better infection control," said Stationwala, adding that the distances that doctors and nurses travel to reach patients will also increase. "That means our staff will have to be on rollerblades to deliver care," he quipped.

Hospital management realized that better communications could solve the problem, and decided to test the solutions. "It's a practical solution to provide information where the nurses and doctors are, and to provide it on their phones," said Stationwala.

He observed that two of the major problems in healthcare today are the duplication of services that occur, and the constant delays in getting the right information to caregivers. Patients are constantly asked for the same information over and over again; and because information isn't always readily available, clinicians tend to repeat tests.

"If you can improve these two factors, you can reduce costs and improve outcomes," he said. "Who can argue with that?"

The new system will bring the information that's needed right to the BlackBerry smartphones used by the nurses and other caregivers. "Staff are not stationary," he said. "They're constantly moving. And they need information wherever they are, in order to make timely decisions." BlackBerry phones were chosen because of the high degree of security they offer.

BlackBerry CEO John Chen participated in the launch event in June, and said that healthcare is a key market for the company as it puts its corporate turnaround into effect. "We want to be the worldwide leader in privacy and security. You quickly realize that the verticals that need this are the regulated industries – government, healthcare and financials."

As part of its commitment to the healthcare sector, BlackBerry is partnering with Mackenzie Health in a bid to create new and innovative solutions. "Will it be a replicable solution?," he asked. "That's what we will find out, and that's the risk we are taking."

The knowledge that is gained in the innovation unit will be used not only in the rest of the hospital, but at the new Mackenzie Health Vaughan facility; as well, hospital leaders hope the knowledge will be disseminated to other facilities across Canada.

"We're taking the lessons that are learned from this project and providing them to the architects working on the new hospital," said Tiziana Rivera, chief nursing executive. "The design of the new hospital, in Vaughan, will benefit from what we've learned here about technology and workflow."

Rivera added that the hospital will be sharing the information with all other hospitals who are interested. "It's publicly funded research," she said. "It should be used to benefit everyone."

Not only will clinicians receive alerts from medical devices on their BlackBerry phones, but they will also have access to electronic patient records. This will give care-givers an unprecedented amount of information, all at the point-of-care or anywhere they may be in the hospital.

"It's unique," said Rivera. "Nobody else in the country is doing this."

The smart features of the system, supplied by ThoughtWire through its Ambiant platform, will help clinicians deal with problems like alert fatigue and determining which patient to see first. "The system prioritizes the alarms and tells you who should be attended to first," commented Mike Monteith, CEO of Toronto-based ThoughtWire.

He observed that the system will also rollover the alerts and calls to other clinicians, if an alert or patient problem is not dealt with in a given period of time. Interestingly, it is able to contact the closest clinician, through the use of real-time location systems (RTLS).

"We want everything moving more efficiently," he said. Not only will clinicians be providing feedback on features that should be added, or applications that should be tweaked, but researchers at the University of Toronto will be modelling the data to come up with improvements.

"They will be running simulations," said Rivera. "They're going to model our workflows, and they will see if things can be advanced by doing them in different ways."

CIO Dianne Salois-Swallow added that the whole project is being conducted in a spirit of open collaboration and cooperation. "We see the companies who are working with us as more than vendors, they are our partners."

She said the hospital's CMIO, Dr. Aviv Gladman, along with Chief Nursing Executive Rivera, have been key to the project. So too have been CEO Stationwala and Chief Financial Officer Richard Tam. Together, said Salois-Swallow, they have injected an energy into re-engineering the hospital and healthcare, in general, that wasn't there before.

At the MedEdge conference, a separate event held in Richmond Hill in June, Dr. Gladman said the hospital is essentially building "an Internet of Healthcare Things". In addition to the hospital, "we can do it in homes and the community, too."

Healthtech Consultants announces two key appointments

TORONTO – Healthtech Consultants, the leading Canadian provider of information management services to the healthcare sector, has announced two executive appointments. Gordon Curl has been appointed to Associate Vice President, Sales and Business Development, while Terri LeFort has been appointed to the position of Partner.

Ed Campbell, Vice President of Healthtech Consultants, is pleased to announce the appointment of Gordon Curl as Associate Vice President, Sales and Business Development. Mr. Curl brings over 30 years of progressive Canadian Healthcare experience in a range of Senior and Executive roles. His leadership will allow Healthtech to further enhance business growth while providing an increased level of customer focus and responsiveness. Healthtech Consultants have driven real results in Canadian Healthcare for 32 years.

Terri LeFort

Gord Curl

Susanne Flett, President of Healthtech Consultants, is pleased to announce the appointment of Terri LeFort to the position of Partner. Terri has increased her areas of responsibility every year of her 14 year tenure at Healthtech. With this appointment, Healthtech looks to Terri to continue her leadership and to be a driving force in our business expansion and our client delivery. We are pleased to have a Canadian Healthcare leader such as Terri and we look forward to our continued success.

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Synoptic reporting helps surgeons improve workflow, communications

In 2006, Cancer Surgery Alberta implemented WebSMR, a web-based synoptic reporting system developed by Softworks Group, to replace narrative dictation as the method for producing operative reports.

Synoptic reporting uses structured templates to standardize and digitize the medical reporting process. Compared to dictated and narrative reporting, synoptic reporting is far more consistent and comprehensive. This makes synoptic reports more reliable for fellow clinicians, more useful for population-level research, and more auditable for quality assurance and ongoing education.

CSA and Softworks Group developed over 50 surgical reporting templates by working closely with surgeons who specialize in each procedure. This ensured that each synoptic checklist prompts clinicians to report on the critical details of a procedure, such as which incision methods were chosen and why. Templates also include free text fields so that surgeons can make clarifying notes on particularly complex cases.

Previously, surgeons reported by dictating their summary of an operation. This dictation would then have to be transcribed and reviewed. Dictations often included patient demographic information that was already available elsewhere, yet the reports frequently lacked the routine information that helps to evaluate procedures and measure outcomes.

When reviewing thyroidectomy reporting in particular, CSA found that their dictated operative reports rarely contained all of the data required for MACIS cancer staging, a best practice for thyroid cancer surgery. Less than one-third of the reviewed reports clearly documented tumor size and the presence or absence of invasion.

Dr. Walley Temple believes that synoptic reporting will become a best practice for all medical professions.

By developing synoptic templates with mandatory data fields, CSA was able to ensure that 100 percent of their thyroid surgery reports contain the data necessary for a MACIS prognostic score. Softworks Group built a cancer staging calculator into the reporting template, meaning a prognosis can now be calculated immediately.

CSA's mandate is to have reports distributed throughout care teams within 48 hours.

One greatest advantages of synoptic reporting is its educational potential.

CSA's breast cancer surgery template was designed to capture and influence surgical decision making. This template prompts clinicians to consider breast conservation and provide specific rationale when choosing mastectomy instead. CSA found that synoptic operative reporting was associated with an overall increase in breast conservation over time.

"Synoptic reporting is such a valuable tool for building and translating knowledge," says CSA's clinical director, Dr. Walley Temple. "I believe, in the coming years, synoptic reporting will become the best practice for all medical professions. So I'm proud that Cancer Surgery Alberta is at the forefront of this progress."

Abigail Termulo, project manager with Cancer Surgery Alberta, notes that the Canadian Partnership Against Cancer has built on Alberta's success in synoptic reporting and has supported implementations in four more provinces. Care teams across the country have built knowledge through synoptic reporting and have come together to develop pan-Canadian templates, improving cancer surveillance and control.

Now, CSA is in the process of implementing Synoptec, a successor software developed by Softworks Group, the same firm that first developed WebSMR. Synoptec is still built for synoptic reporting, but it incorporates several improvements recommended by cancer care teams.

"Clinicians wanted Synoptec to help them clearly communicate the context for procedures," says Monica Lane, software implementation specialist for CSA. "So now there's a comprehensive view of a patient's medical history, how a surgery fits in their overall treatment plan, and reporting templates that know what information care team's need."

Logging into Synoptec, clinicians are presented an overview of their open cases, specifying necessary next steps. The re-

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SharePoint makes policy management more efficient at RVH

BARRIE, ONT. – The Royal Victoria Regional Health Centre (RVH) in Barrie, Ont., has an ambitious plan to achieve HIMSS Level 7 by 2020, and as part of the strategy, the 319-bed organization is utilizing SharePoint as its Enterprise Content Management System (ECM). SharePoint is a web application framework and platform developed by Microsoft which integrates intranet, content management, and document management.

With regard to document management, the need was for an accurate and reliable centralized document management system. The search for this system brought in feedback from policy teams at hospitals across Canada, with an overwhelming endorsement for SharePoint.

The specific requirement for centralization had both formal and informal origins. Formally, it was a requirement of Accreditation Canada, which evaluates healthcare facilities on a four-year cycle. Their Leadership Standard 4.11 (under Planning and Design Services) requires that the organization's policies and procedures for all key functions, operations, and systems in the organization are documented, authorized, implemented, and up to date.

Informally, RVH employees expressed a need for a centralized system to their own leaders. Specifically, the housing of policies in multiple locations on shared folders and on the intranet created duplication of documents, inhibited effective tracking of out-of-date documents and made searching for documents difficult.

There was risk of a frontline user finding and applying the wrong, outdated document, or not finding one at all, particularly during an emergency. This was unacceptable at RVH, where Safety Is Our Promise.

RVH went live with an electronic policy management system, the RVH Policies and Documents site, in February 2015. Accessed via one click on the already-familiar RVH Intranet homepage, it houses all policies and procedures for both clinical and administrative, all bylaws, all emergency and contingency plans, all medical directives, and all preprinted order sets.

Employees can search for any of the over 1,700 documents by title or key words, making it infinitely easier and faster to locate their desired documents. The feedback from the frontline users in particular has been extremely positive.

The process to create, review and approve policies and procedures in a single system that uses workflows to connect the right employees at the right time, all within the SharePoint platform, creates efficiencies for RVH staff.

The system will auto-publish and distribute policies and procedures from a centralized location and will send notifications to employees when a new policy is published. Leaders can then track that employees have read and acknowledged policies from a real-time dashboard.

With regard to reviewing existing documents, policy authors and owners will be able to update their documents via the software's document management feature to track the updates. This feature has enabled policy authors and owners to seek stakeholder feedback then identify and initiate the appropriate endorsement and approval process for their documents.

> **Employees can search for over 1,700 documents by title or key word, making it easy to find what they need.**

Policy endorsers and approvers have the ability to view and endorse or approve the document from a central location rather than via multiple emails with multiple versions of attached documents, as was the previous process. This has further improved efficiency and ensures the document moves seamlessly through the entire process.

RVH's plan is to gradually move all of the documents that exist on the organization's shared folders to SharePoint in order to eliminate duplication and to improve efficiency. SharePoint is highly searchable and users have already been trained to search documents as they would in applications such as Google.

"We have big plans for SharePoint at RVH," says Sisamone Phanthasomchit, director of informatics and technology services at RVH. "Having an online Policies and Documents page is just the beginning. We have used SharePoint to redevelop our internet website, and in the future all content at RVH will be on SharePoint. Our vision is that by having content in one place, we can build our SharePoint site into a one-stop-shop for staff and a robust search tool for all data housed at RVH."

As a platform, SharePoint can be an effective tool to integrate other software and operating systems. Plans for the utilization of this platform at RVH include the development of electronic business forms, business intelligence, and a leadership report portal.

Ben Petersen, chief financial officer at

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New Oakville Hospital pioneers intelligent workflow using connected systems

The new hospital leverages technology as an enabler of higher efficiency and effectiveness.

BY ROSIE LOMBARDI

Intelligent building design can improve how a hospital operates in new and significant ways. The newly constructed Oakville hospital, one of a trio of sites managed by Halton Health Services (HHS) in Ontario, was designed with a mega-network – a central brain – that interconnects all systems: clinical, environmental, security, communications, and more.

This will give the hospital an incredible amount of control over systems and devices, as with today's technology, virtually any hospital device and service can be infused with intelligence to create novel solutions – including integrated alarms, smart beds and persistent computing.

Building the intelligence: After four years of construction, the building for the Oakville Hospital is now completed. HHS is preparing it for use by testing systems; patients and staff will occupy the building when it officially opens in December 2015.

"This is the most technologically advanced hospital that we've built in recent history – and we completed it two weeks ahead of schedule," says Stephen Foster, Director of ICT Services at builder EllisDon Corp., adding that the company has more intelligent hospital projects in the works.

The Oakville Hospital has paved the way for future intelligent hospital construction in Ontario, as the government is now supporting interoperability between systems in their design, says Vert Rayner, Chief ICT Architect for Redevelopment at HHS.

"Historically, the network was not considered in scope and was excluded from the Ministry of Health's funding envelope for new hospital builds. We persuaded the Ministry that the network itself is part of the building because it's the brain that runs everything. So our network was included in the base funding, but we also invested $30 million in our internal IT plan for the technology that would run on it."

The hospital is equipped with all the advanced systems needed to create a unified workflow, says Foster. "It has a complete Cisco medical-grade network, with a Cisco VOIP wireless solution throughout. There's a real-time location tracking system (RTLS) that can track infant abduction, patient wandering, wireless duress, and equipment with three-meter accuracy. It has a visual signage solution with over 250 large monitors installed throughout the site to display hospital and visitor content. Staff members are equipped with Cisco 7925 wireless handheld devices that allow them to communicate with both systems and people."

The technology that allows over 20 disparate systems to talk to each other intelligently is the enterprise service bus (ESB), which captures all the alerts and alarms generated by these systems, and shuttles them to the right destinations as defined by staff.

However, Rayner warns that ESB is a concept, and not an actual product yet, and that HHS had to select and cobble together several components to create its ESB. "We use best-in-class solutions for our HL7 interfaces and biomedical equipment integration."

At the core is Connexall, an alarm management and event notification software platform, provided by Toronto-based GlobeStar Systems. With over 1,100 implementations globally, Connexall has helped these facilities improve communication, breaking down the silos that usually exist in hospitals – resulting in better and safer patient care. "A key feature of Connexall is that it's vendor-neutral and device-agnostic and will work with and leverage virtually any system, so a hospital is not constrained in its choices," says Yihan Zhang, VP of Engineering at Connexall.

"We take the data from many different systems, consolidate it, add business intelligence, and link the systems together to empower our single user interface. When there's a trigger, say a patient presses their nurse call button from the bed, Connexall acts based on the pre-programmed workflow decided by hospital staff: who it should alert, on what devices, how should it escalate, and so on.

Vert Rayner, Chief ICT Architect for Redevelopment at HHS, and Stephen Foster, Director of ICT Services at EllisDon Corp.

"This applies to events or alarms from other hospital systems, such as building automation, infant abduction, etc.," explains Zhang.

Connexall is completely customizable to a hospital's needs and GlobeStar staff worked with the Oakville team to determine how to best utilize the Connexall platform in the new hospital. The options with Connexall are limitless and will continue to be so with the pioneering efforts of the Connexall R&D team.

Intelligent decision-making: Eliciting those decisions from staff and vendors was a massive undertaking, requiring multiple meetings with stakeholders from different hospital departments over the course of six months.

For example, in a legacy building, an infant abduction alarm typically goes to security systems and personnel. In an intelligent building, an all-points alarm could, in theory, be issued to every device and monitor instantaneously throughout the hospital.

All stakeholders need to be engaged to decide who the right parties are to receive alerts and how to handle them. To that end, Foster says a series of meetings were set up to get those decisions and configure systems to user requirements. The Connexall team met first with all of EllisDon's vendors involved in the project.

"We first had to sort out what alarms and alerts were available to hospital staff from almost 20 systems, and we consolidated those into a list. Then we set up meetings with hospital staff in every functional unit to prioritize the ones that were important and how they wanted to handle them. Then we boiled those down to a manageable number so staff don't suffer from alarm fatigue," says Zhang.

In preparation for the opening of the Oakville Hospital, HHS conducted a pilot project at Georgetown, a legacy sister-site that was retro-fitted with Connexall to test the system. "Over the past year, we worked with Georgetown staff to determine the best way to set up and use alerts," says Foster.

However, the Georgetown facility doesn't have the RTLS and other advanced systems that will be operating at Oakville, says Rayner. To ensure the systems are tested thoroughly by Oakville's staff, HHS has a robust operational readiness program in place. "We take people through and show them how the technology works. We have a few months where we can bring people on-site and train them so they can hit the ground running for Oakville's official opening in December."

Fine-tuning the system once it goes live is inevitable, but it will be easy to manage by Oakville's internal staff, says Foster. "Staff may have asked for

alarms or escalation times they find unhelpful once they're actually in a live environment. The system is user-friendly and will allow them to make those changes on the fly as required."

"Connexall provides an online portal to facilitate both system fixes and training," says Zhang. "Connexall provides highly customized training services to help hospital staff use, administer, change and grow the system. We also offer 'train the trainer' sessions for nurse educators so they can teach new staff. We are here to help, every step of the way."

The hospital of the future: Intelligent hospitals function at a much higher level of efficiency, says Rayner. "What distinguishes a new hospital from a legacy facility are the capabilities and workflow you can embed right into the design."

For example, Oakville's EHR system is designed for "Follow Me" computing, which reduces logging on and off repeatedly when clinical staff do their rounds. "You get persistent computing sessions, so you can walk around from one device to another, tap your ID badge and your session is recalled. If you're in a patient's record, you'll still be in it if you go to another device or computer. This is estimated to save doctors about 30 minutes a day."

The nurse call system doesn't just send an alert to a console, it sends an alert right to a nurse's smartphone via Connexall, and they can speak directly to patients to find out what they need. An escalation sequence is in place if the call isn't answered right away, says Rayner. "The alert goes first to the assigned nurse, then after two minutes, it goes to a buddy nurse, and after four minutes, it goes to all nurses in the unit. We developed those specs based on what frontline people told us worked best for them in practice."

Intelligent buildings also make smart beds that can communicate with mobiles a reality, he says. "A Hill-Rom smart bed has about 30 different alarms that react to different forces: a patient exits, a bed railing is down, the angle of the bed is wrong, and so on. When a patient who shouldn't be up gets out of the bed, it sends an alarm to the nurse's smartphone."

"Connexall is proud to have joined forces with EllisDon and partners to create a holistic solution with the Connexall platform for Oakville Hospital that will serve not only their current requirements, but future ones as well," says Zhang.

In addition to boosting patient satisfaction, the visitor experience is also enhanced with way-finding signage on monitors.

Wandering patients are easily found by Oakville's locating system, since they're all equipped with RFID tags when they're admitted to the hospital. "Our real-time locating system is part of our building's wireless network."

Use of RFID tags for people and equipment will grow in the future as more intelligent hospitals with RTLS are built, says Rayner. "You can introduce some big operational improvements both in terms of efficiency and patient care just by knowing where everything and everybody is all the time. If I had to pick one thing to invest in now to get a lot of mileage in the future, it would be locating systems."

To improve patient safety, the hospital has already implemented positive patient safety identification (PPID), in which barcoded identification information is added to wristbands when patients are admitted. "Staff don't have to re-key ID data, which reduces errors substantially. So all medication administration, lab collections and capture of vital signs in our EHR will be based on positive patient identification."

Rayner believes hospital operations will change dramatically over the next 10 years as intelligent infrastructures become commonplace. "It's the basis for all kinds of new workflows that we haven't even dreamed of yet. What we achieve on opening day at Oakville is just the beginning of a deeper transformation."

However, IT leaders at hospitals that are contemplating new construction need to perform their own due diligence to ensure they get the right infrastructure to grow in the future. "I got a lot of information at the Intelligent Hospital Pavilion at the HIMSS Conference, and from other organizations building new hospitals. The great thing about hospitals is that they share information freely. Building a new hospital only happens once every 60 years for most organizations, and it's very important that you talk to others who have been through it before," says Rayner.

Hospital deploys state-of-the-art nursing carts with touch screens

BY NEIL ZEIDENBERG

Woodstock Hospital, a newly constructed 178-bed hospital near London, in southwestern Ontario, has recently enjoyed a successful deployment of state-of-the-art nursing carts from Rubbermaid Healthcare (www.rubbermaid-healthcare.com). In early 2014, after a brief six-week trial, a fleet of 50 carts were put to work full-time. Woodstock Hospital is one of six sites in Canada using the CareLink carts.

"The main reason for upgrading to a better nursing cart corresponded with the fact that we're a new hospital, and we had a desire to go digital and to do everything online," said Cindy Smart, director, acute patient care at Woodstock Hospital.

There's a unique feature that differentiates the cart from most others: CareLink features a seven-inch, built-in touch screen that helps with operating the cart and providing security for patient meds.

At the bedside, nurses enter a unique PIN and only then will the medication cabinet unlock. They then scan barcodes of both the patient's armband and the medication about to be administered to ensure they match. This best-practice ensures safer administration of patient meds and can lead to a significant reduction in the rate of medication errors. "It helps confirm the right patient, right medication, and correct dose," said Smart.

CareLink is customizable and users can set it to their preferred height, whether sitting or standing. Once a user's preferences are saved, a nurse can log-in to any CareLink in the fleet with their PIN, and the cart automatically moves up or down according to those set preferences. Nurses really like them because they can be customized according to how they work.

"From an I.T. perspective, CareLink is completely wireless and you can update the software through Rubbermaid's secure web portal. It means we can log-in and see our entire complement of carts, configure each one individually and push updates to each cart without having to physically touch them," said Kevin Somerville, IT manager, Woodstock Hospital.

And cart use is auditable. When a user enters their unique PIN, "We can track the location of each and every cart, which ones are used most and least; which cart has a problem or is low on battery power; who used the cart, and which patients he/she saw as well as the outcome of the patient visit," said Somerville.

Moreover, as Steve Torbett, senior manager, product marketing at Rubbermaid, explained, carts aren't typically assigned to any particular user, so problems with a cart may not even be reported because it means filling out forms or notifying I.T.

"Potentially, there could be three or four carts out of service, and I.T. is completely unaware of it. However, our fleet management solution will identify problems with carts so something can be done to get them back into service. More importantly, it can help you understand where carts are being deployed, and where they're needed most.

"Having that data available to I.T. ensures the right number of carts available for deployment and that they're all in good working order."

Woodstock Hospital has implemented a fleet of 50 CareLink carts, with 7-inch, built-in touch-screens.

Other features include various lighting options so nurses avoid turning on room lights and waking patients; and a battery gauge with calculated run-time and charge time. The battery provides approximately 10-hours of use, and a full charge takes about 90-minutes. It can then be wheeled around the hospital with no cord attached. "Battery power is really dependent on how the cart is being used and the conservation settings," said Torbett. "Compare it to a car, and how efficient you drive. CareLink is the same."

CareLink is designed with N-Stride steer-assist technology, meaning the cart has a trigger-operated locking caster, which makes it easy to move straight with little resistance – nurses can steer the cart with one hand, if necessary. This can greatly reduce or eliminate the physical strain nurses have experienced in the past from pushing fully loaded carts through hallways.

It is currently being used in the OR, in-patient units, ICU, emergency, and out-patient clinics, as well as for nurse training. Users at Woodstock Hospital say there's no comparison between the previous-generation mobile nursing cart and CareLink. "Nurses just love them as they're very portable and user-friendly," said Smart. "There's no issue with steering it – it will go right to the patient bedside. It's truly the Cadillac of mobile nursing carts, really state-of-the-art."

Synoptic reporting helps improve workflow

CONTINUED FROM PAGE 6

porting process, too, has been streamlined, and requires fewer mouse clicks.

CSA's new synoptic reporting tool also provides a patient portal to engage patients in the evaluation of surgical outcomes. Patients are able to submit post-operative quality of life reports and learn if their recovery path is typical. If their quality of life score is low, an alert is triggered for a nurse navigator to follow up.

CSA has also been able to more responsively customize their reporting templates, using branching logic to hide inapplicable questions so that surgeons are only presented with the questions relevant to their current case. When reporting, clinicians can upload and annotate images for added clarity, further improving care team communication.

"Surgeons are incredibly knowledgeable about overall care," says Dr. Temple. "But a decade ago, when narrative reporting was the norm, it was difficult for surgeons to transfer this knowledge. With Synoptec, surgeons can keep the whole care team on the same page."

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Healthcare interoperability in Canada: Perfection, the enemy of the good?

BY KEN STEVENS

In October 2014, as co-chair of the ITAC Interoperability and Standards Committee, I presented opening comments for an ITAC Health workshop on Interoperability. Below is the text of my opening comments.

The Problem: I'm a software developer that got into healthcare about 10 years ago. When I joined healthcare, I was surprised by a number of things I saw. Things like:

- Records are stored on paper and exchanged using paper fax.
- The software behind the desk looks like it was written in the 1980s or 1990s.
- The endless transcribing and repeated oral communication at every encounter. In a week a patient can repeat their entire medical history to multiple clinicians and dump out their bag of drugs for every one of them.
- Data exchange, if it happens at all, is often extracted directly from the EMR database and looks like lines of pipe-delimited text from my Dad's generation.

In short: Why hasn't technology revolutionized healthcare like it has every other industry? Canadian healthcare is still stuck back in the last century. Not much has changed in the last 10 years.

Healthcare IT in Canada is behind the rest of the world by most measures. Even the U.S., which seems committed to doing everything the hard way, is years ahead of Canada when it comes to healthcare IT. How did we get here? How can we fix it?

How did we get here? You can't blame Canada for lack of trying. We have invested billions of dollars into major e-health initiatives across the country. There has been a decade-long project to introduce new healthcare interoperability standards across Canada, following a pan-Canadian EHR blueprint that aims to collect everyone's data into centralized EHR repositories. We were promised that everyone would have a shared electronic health record accessible by all providers by 2015. We didn't make it. What happened?

If I were to pick one overarching theme it would be this: Perfection is the enemy of the Good.

I've seen so many projects derailed by monstrous privacy and consent models. Too often we have held up perfectly secure and functional e-health initiatives for fear of the security being not quite perfect enough. These delays cost lives. Particularly when you consider that the bulk of our healthcare costs are for patients in the final years of their life, patients who care more about the coordination of their care than their personal privacy.

Another issue I've seen holding Canada back is our fantasy that each province is a unique flower, requiring completely different infrastructure, standards committees and EHR programs. Get OVER yourselves. We would all save a heck of a lot of money if the provinces just got together and presented Canada to healthcare system vendors as a single market, rather than as a balkanized mess of tiny self-important misfits.

From a software developer's perspective, I can tell you one issue that's delayed Canada's e-health agenda is the quality of our interoperability standards. I've heard people say, "I don't care what message standard you use to move your data around – the technology is irrelevant – the interoperability standard isn't the problem."

To this, I say 'hogwash!' There are good APIs and there are bad APIs. The 'P' in 'API' stands for 'Programmer.' If you want to know whether an API is any good, just ask an experienced programmer. When Canada picked the HL7v3 standard, they clearly skipped this step. If it costs 10 times as much effort to implement your API over the previous API, there is a problem with your API.

Ken Stevens

How can we fix it? Vendors are the custodians of the most experienced technical minds in Canada. We need to bring these minds together and take on this problem. We can't afford to continue complaining and expecting government to figure this out for us. We need serious software engineers at the table to get this job done.

Now it's easy to say that. But what can we practically do to move this forward? I recommend three things:

- Establish something in Canada akin to the IHE working groups in the U.S. A focal point for vendor input on the direction interoperability standards will take in Canada. This needs to happen at the national level.
- We need to leverage infrastructure already deployed and we need to leverage standards that have already been successfully implemented in other jurisdictions. This will mean moving forward with a plurality of standards, such as IHE XDS, CDA, HL7v2 and HL7v3, and potentially even FHIR.
- Strive for simple, clear and unambiguous interoperability standards. It's not enough to say you broadly support a standard like HL7v2. You need to have very specific conformance profiles to go along with it that ensure my HL7v2 messages have exactly the same Z segments and use exactly the same vocabulary as your HL7v2 messages.

A bit more on the last point. Along with each standard, we need to have, at a minimum, content specifications and vocabulary bindings.

And by this I don't mean 400-page word documents that system integrators are expected to read through and implement. I mean MACHINE READABLE software artifacts that completely specify the structure of how the data will be represented in bytes over the wire and how field values will be unambiguously interpreted.

Representing your specs in a machine readable format accelerates interoperability tooling enormously. It's the difference between building robots, and building robots that are able to build other robots.

Ken Stevens is VP Healthcare, Intelliware, and Co-Chair Interoperability and Standards Committee, ITAC Health.

SharePoint improves efficiency at RVH

CONTINUED FROM PAGE 6

RVH says, "RVH is taking a focused approach when introducing technology solutions to support the delivery of care. Leveraging existing technology is always the first option for us – especially when it meets all of our requirements and future goals. The successful implementation of an electronic policy management system is a good example of using what we have to enhance patient care."

For its part, RVH is a regional health centre in Barrie, Ontario, located 80 kilometres north of Toronto. As the largest hospital in the region of Simcoe Muskoka, RVH's team of over 350 physicians, 2,500 employees and 900 volunteers provides exceptional care and specialty services to almost half a million residents, including cancer care, stroke services, orthopaedics, intensive care, mental health and interventional radiology. RVH is focused on delivering high-quality, safe care that puts patients and their families first.

After an expansion in 2012, RVH doubled in size, growing to 319 beds, added $70 million in state-of-the-art technology, developed specialty services not found anywhere else in our region and welcomed 600 new, highly-skilled employees. The $450-million expansion means distance is no longer a factor in residents receiving lifesaving cancer treatment, thanks to the opening of RVH's Simcoe Muskoka Regional Cancer Centre.

Christie Innomed and Fujifilm introduce Synapse VNA to Canada

Fujifilm's acquisition of TeraMedica has produced a software developer called Fujifilm TeraMedica, Inc., that "is at the forefront of the Vendor Neutral Archive market," says Jim Morgan, vice president of medical informatics at Fujifilm Medical Systems U.S.A., Inc. "Together, we will be able to deliver medical informatics solutions that acquire, analyze, interpret and present patient data in ways that are meaningful for providers in the most challenging environments."

Those solutions are being offered to Canadian hospitals, health regions and medical providers through Christie Innomed Inc., which has offices across the country.

For its part, Stamford, Conn.-based Fujifilm is a market leader in PACS – picture, archiving and communications systems. These are used by cardiology, radiology and other hospital departments to capture and record the data generated by X-rays, ultrasounds, MRIs and other kinds of medical tests. TeraMedica is a pioneer in vendor-neutral archiving (VNA) technology that can store, organize and share departmental PACS data from across a medical enterprise.

"Fujifilm recognizes that VNA technology is becoming more important to the market," says Morgan. "Healthcare institutions and market shifts have created larger networks of facilities. Large hospital groups are coming together, disparate PAC systems are more common, and the use of electronic medical records has created central repositories of textual information. But what hospitals also want is to create a single repository for all their imaging data, in addition to other items like lab reports."

For customers the VNA value proposition provides two important sets of benefits:

• Central data management and infrastructure rationalization. A VNA enables hospitals and health systems to centrally manage data that normally resides in separate systems belonging to dozens of different departments, according to Jim Prekop, president and CEO of Fujifilm TeraMedica. This allows providers "to build a more efficient data centre that makes use of common infrastructure with petabyte-class storage and petabyte-class rates, as opposed to having to invest in and maintain numerous disparate systems," Prekop explains.

• Holistic patient care and improved clinical outcomes. Hospitals and medical centres have invested heavily in electronic medical record (EMR) systems. VNA technology lets them tap that data and generate "a complete longitudinal view of the patient," Prekop says. "A physician can scan the inventory of studies that have been done, the reports that are available and all the relevant clinical content that doesn't fit into the rows and columns of a database." Since patient care may span more than one organization, each with its own way of viewing patient data, a VNA facilitates pay for performance and similar models that require an integrated approach.

TeraMedica first developed its VNA system back in 2001 working with the Mayo Clinic, which was the firm's primary research partner and first major customer. To accommodate Mayo's needs, TeraMedica's information management solution was built to accommodate extreme volumes of data and the most complex data management requirements.

Since then, the company has deployed systems for even larger customers like the public health system in New South Wales, Australia, where a TeraMedica VNA manages data for over 7 million patients and 200 facilities across numerous local government health districts. The software developer was also named the VNA/Image Archive KLAS Category Leader for 2014 as part of the Best in KLAS Report from KLAS Research.

A little over two years ago, TeraMedica entered into a highly productive partnership with Fujifilm. The diagnostic imaging and medical informatics solutions provider recognized that vendor-neutral archiving was becoming more important

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The password problem: Solve it and make your systems more secure

BY DAVE WEBB

David Ting was sitting in the doctors' lounge of a hospital in the Midwest U.S. when he noticed a man cursing at a computer station, pounding the keys with obvious frustration. Ting, co-founder and CTO of healthcare IT security company Imprivata, asked what the problem was.

The irate computer-user turned out to be a specialist who consulted at half a dozen area hospitals. For each hospital, he had a different user ID and password – too many to remember. Since the doctors' lounge was relatively secure, he'd simply written his password on the wall near the station.

"Then," he told Ting, "the unthinkable happened." The lounge had been redecorated and the decorators had repainted over the specialist's password.

What makes passwords effective – complexity and frequent change – also makes them hard to remember. That spawns workarounds like Post-it notes, scraps of paper pinned to cubicle walls, even passwords written in felt-tip marker on the bezels of computer monitors (one reason, Ting says, that monitors are now predominantly black rather than beige).

Vince Ranieri, technical infrastructure manager with Mackenzie Health – formerly York Central Hospital, just north of Toronto – can talk about password perils from experience. The hospital had a culture of shared passwords and sticky notes, but with more clinical systems and new technology coming online, the hospital revved up its security. Each system, clinical or financial, required a different login, passwords of different complexity and different expiry times.

"When individual user accounts were introduced along with user logins to different applications, this caused a 50 percent increase in support calls (daytime and after hours) due to staff forgetting passwords," Ranieri says. Users were frustrated, session timeouts hampered productivity, and reporting and audit processes became inefficient.

Doctors may have to access five to seven systems in a single patient cycle, says Ting. It's tedious, and worse, it's time spent that has nothing to do with treating the patient. But beyond tedium and frustration, a password security regime can have other consequences.

"Privacy is at the heart of maintaining and securing patient information." Ting says. Using "group memory" or written-down passwords offers a major risk of exposure to hackers. There's also the risk of phishing attacks, whether online or by phone, that can prompt users to give away their passwords. In enterprise simulations, 15 to 25 percent of users can be convinced to cough up the information.

"Passwords are basically anachronisms," Ting says – there are much more effective and efficient ways to secure systems.

Biometric devices like fingerprint or iris scanners, near-field communications (NFC) chips and facilities cards are particularly effective. RSA tokens – devices created by a division of EMC Corp. – offer two-factor authentication. Two-factor authentication involves a combination of something the user has – in this case, a token that generates a password dependent on the time of day and area of access – and something the user knows, a personal identification number. Combining the two creates a unique access code for every time the user tries to get into the system.

Ting says that with the ubiquity of mobile devices, wearable security technology is evolving, and beaconing technology, which detects and communicates with mobile devices, can provide "geofencing" security; only greenlit devices in the proximity of the systems can allow access.

> **Doctors may have to access five to seven systems in a single patient cycle, time that has nothing to do with patient care.**

In 2006, Mackenzie Health introduced Imprivata OneSign to enable single sign-on (SSO). SSO provides a persistent login, verified by a biometric device (in Mackenzie's case, a fingerprint reader) or network password that provides access to any application without having to login again.

"Imprivata was chosen at the time because it was an easy system to implement, along with a great interface to profile applications for SSO with minimal programming skills required," Ranieri says. "It also provided advanced features that are integral in assisting with SSO compliance."

Patient information in hospital, LTC centres and clinics is always at risk if a user leaves a device unattended while still logged in. In the worst case scenario, anyone can come by, peer through records and even make changes, if they so desire. And in subsequent audits, the activity will show up as the absentee user.

Some users may walk away from a monitor without logging out so they won't have to spend time logging back in.

Imprivata has produced a nice solution to this problem. With its Tap and Go technology, users can log into one computer with their access badges and a four-digit PIN. If the user moves to another device in the hospital, he simply taps the desktop, and the current state of the original computer moves to the new screen. Users have to reprise their PIN login every eight hours.

Mackenzie Health will be implementing Tap and Go in November. "This saves valuable time as staff don't need to wait for their profiles to load, nor do they have to log into each application again and pull up the correct patient information," says Ranieri. Clinicians are spending less time on authentication, in this way, and more time on patient care.

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Synapse VNA debuts to Canadian market

as hospitals and other healthcare providers sought a secure and cost-effective way of storing their images and other patient files.

The VNA developer was a good fit for Fujifilm, which was seeking a partner with advanced, highly scalable technology and extensive experience in the global market. TeraMedica, on the other hand, benefitted from Fujifilm's size, financial stability and strong global presence, which greatly increased the smaller firm's access to customers.

The companies proved to be a strong fit, and the two-year partnership laid the groundwork for the acquisition, which Morgan calls "synergistic," observing that Fujifilm was not previously active in the VNA space. Prekop echoes this sentiment, noting that TeraMedica represents a "non- redundant layer" in the Fujifilm architecture.

The Fujifilm TeraMedica vendor-neutral archive allows customers to access and present their data in a patient-centric manner. Included is an entire hierarchy of permissions, so every data element that's entered into the system incorporates metadata that describes what type of data it is, for how long it should be retained and which hospitals, physicians and individuals are allowed to access it. While other PACS, health information exchanges (HIEs) and information systems provide some of these features, none of them combine them all into a single centralized solution.

That solution will become even more robust as Fujifilm integrates its PACS with Fujifilm TeraMedica's VNA. For example, a dashboard will provide a graphical view of the PACS data that has been successfully entered into the VNA and can now be safely deleted from the PACS. The dashboard will include safeguards – such as comparing image, patient and exam counts – so operators can be reassured that the systems are in synch.

Security best practices: Strengthening your organization's immune system

BY PAUL LEWIS

When it comes to healthcare information, security and privacy should be top of mind. That's because healthcare data harbours all kinds of sensitive information. The danger is that this rich hub of valuable data can also be transformed by a cyber-criminal into an endless source of malicious possibilities.

Targeted institutions and patients must deal with the long-term effects of a breach of sensitive and very personal data. Unlike banking accounts, data related to healthcare, such as birth dates, rarely have the option to be 'cancelled' and are often used fraudulently for virtually forever. And that's not all – cyber criminals can broadcast doctors' reports, interfere with patient records, perform malicious hacking and inappropriately steal and use personal health information caused by insider threats.

Recent IDC reports recommend Canada's government and healthcare organizations invest in multi-pronged security and privacy strategies to fight against sophisticated attacks before it's too late. Leaders, of any enterprise for that matter, will need to ensure their security fits with their business and IT strategies, and is appropriately funded.

To combat the harmful risks of a breach, healthcare organizations require a diverse range of capabilities for managing IT vulnerabilities and detecting security threats. During the strategic planning process, consider these four principles to keep your organization's health in check:

Secure access of personal records and data: Cultivate a risk-aware culture and ensure systems requiring authorization align with the roles of existing members. While outsiders and unauthorized insiders, such as non-medical staff, certainly increase the level of risk, dangers also extend to staff with granted authorization that exceed their functional needs. For instance, a clinician may choose to access documents outside his or her area of specialization.

Implement rigorous networks: Access to public and private networks have become a tougher challenge to manage, especially with Bring-Your-Own-Device (BYOD) policies on the rise. It gives users the power to go beyond their traditional platforms and use their device of choice. For institutions, such as hospitals, where a changing flow of visitors and specialists is constant, how people use the network in a volatile user environment is crucial to consider during IT security planning. Good auditing practices are essential.

Monitor non-IT medical devices: Institutions have to clearly identify and control what its devices are responsible for, especially with all of today's mixed data. In fact, IBM research indicates that the average person is likely to generate more than one million gigabytes of health-related data in their lifetime – that's equivalent to 300 million books. It's crucial to verify all devices are coordinated and intact regardless of the tides of information crashing in. One example of this could be ensuring that a record containing a patient ID is not inadvertently sent to a server that allows access from mobile devices that could potentially leak confidential data.

Respond quickly to symptoms: Just as time is essential for restoring patients' health, the same applies to the health of your organization. The longer it takes to counter an attack, the more costly the outcome will be. More time for the attack to progress will allow infiltrators to escalate the issue. Immediate and impromptu responses for what appears to be spontaneous attacks also tend to require a hefty sum of money.

The key to prevention is having a quick and effective incident-response plan in place. Cyber security is imperative to instill among institutions, especially those that have a profound impact on the lives of their clients.

Paul C. Lewis is the Executive Consultant in IBM's North American Security Services leadership team.

VIEWPOINT

So you want to be a Doctorpreneur? How to make the transition

The road to being a doctorpreneur is different for everyone and occurs at different stages of life.

BY DR. SUNNY MALHOTRA

A new era of healthcare delivery has appeared with the latest generation of doctors over the past 15 years. We are seeing the emergence of 'doctorpreneurs' who are seeking to leverage skills outside of their typical day-to-day medical work. Many physicians are unhappy with the status quo, particularly with funding cuts to care and unsustainable healthcare delivery models around them.

At the same time, we are seeing a transition in healthcare delivery as health technology improves in cost, size and utility to maximize efficiencies and savings.

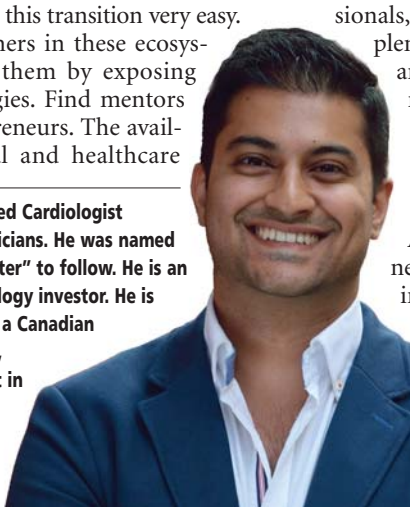
We are seeing the high levels of investments in healthcare, which represent a significant difference in the typical venture capital investing paradigm seen over the last 15 years. As healthcare startup valuations continue to rise quickly, Doctorpreneurs seek to break free of the confinement of their current workload and seek out other sources of income outside of their typical clinical practice.

How do we make that transition from being focused clinicians who have little exposure to the business world during and after training? The road back to being a doctorpreneur is different for everyone and occurs at different stages of life. Often times, one will seek to get formal business education while others will pursue an entrepreneurial venture with limited formal experience or training.

Healthcare entrepreneurs are being cultivated through incubators like MaRS, Highline, Blueprint Health and Y Combinator where education about being an entrepreneur is ubiquitous and easily accessible. Self-study is often one of the easiest methods of getting involved with healthcare entrepreneurship. Being in cities such as Toronto, New York, and San Francisco, where hubs and ecosystems of other like-minded entrepreneurs exist, can make this transition very easy.

Doctorpreneurs are seeking to leverage skills outside of their typical day-to-day medical work as they build medical technology companies and solutions.

To get started, seek others in these ecosystems and build links to them by exposing yourself to new technologies. Find mentors that are healthcare entrepreneurs. The availability of entrepreneurial and healthcare economics lectures through formal events and meetups, as well as online videos, will allow you to speed up the doctorpreneurial process.



Dr. Sunny Malhotra is a US trained Cardiologist working at AdvantageCare Physicians. He was named one of the top "Doctors on Twitter" to follow. He is an entrepreneur and health technology investor. He is the founder of Bookaclinic.com, a Canadian telemedicine practice in Ontario, Canada. He is the winner of Best in Healthcare – Notable Young Professional 2014 and the national Governor General's Caring Canadian Award 2015.

What do you do after creating a foundation of underlying knowledge for yourself? Coming up with an idea based on problems that you have experienced is your first and best bet. The likelihood that somebody else is having this problem can be high.

Now that you have the resources to work on an idea, you need to get out of the office and find out how to create a business model and to see if it is a viable plan. You will likely find that you will pivot multiple times to reach the ideal business model for your idea.

After confirming a sustainable business model, it is time to incorporate with the help of legal professionals, create project milestones, and start implementation with a strategically hired team around you. The process of lean improvement begins through iterative execution of business assumptions until you become sustainable and profitable. Thereafter, sustainability can lead to scalability and fund raising for growth.

As you reinvent yourself as a doctorpreneur, it's time to leave the stability and hop into the financial freedoms of healthcare entrepreneurship. As you gain the knowledge, utilize the resources and figure out a business model, you can be well on your way to initiating the long path of being a healthcare entrepreneur.

REBOOTING eHEALTH

Is there a canonical basis for what we do? (Part 2)

BY DOMINIC COVVEY

Surely we have a basis for what we do! Last issue, we proffered four assertions that build on the work of Chuck Friedman and articulated the conceptual foundations of Health Informatics and its eHealth applications. The initial contributions included:

• ASSERTION 0 – HUMAN LIMITATIONS: There is a need to supplement human (individual and group) thought and work processes to deliver better health care.

• ASSERTION 1 – HEALTH INFORMATICS OFFERS HELP: Health Informatics is a body of knowledge, skills and experiences that underpins activities in eHealth.

• ASSERTION 2 – UNDERSTANDING PROBLEMS FIRST: The fundamental contribution of Health Informatics (and its practice by eHealth professionals) is the understanding of problems related to human health and the health system.

• ASSERTION 3 – SOLUTIONS BASED ON UNDERSTOOD PROBLEMS: The understanding of problems is a continuing and progressively deepening process that practitioners attempt to address by various evolving solutions, often based on technology.

Here we will add several more and again invite your suggestions:

• ASSERTION 4 – HUMAN NEEDS MUST BE OUR EMPHASIS: The intensely human aspects of both health and the health system make it crucial to comprehensively understand the needs and desires of all impacted humans. Our understanding of the human component of the health system means that we need to mine areas like psychology, sociology, cognition, and organizational and human resources theory. We need to understand the challenges that humans face, the processes they perform or want to perform, the way they think and work, and so on. However, to find proper solutions, we need to understand the workings of the human mind and the interactions of people, extending even into areas like culture, belief systems, emotional preferences, and the like. We will only gradually learn how to address things this way, but our efforts must aspire towards engaging and addressing these deeper aspects of the human being.

• ASSERTION 5 – WE MUST ALSO BE TOOL EXPERTS: eHealth professionals must understand the nature of their tools, perhaps the most important of which are information systems, but also literally any tool, method or technique that can enable more optimal approaches to health and the operation of the health system. We are also technicians, but not bounded by computers, communications, software and algorithms. Think of an artisan. He or she may have a key tool, like a paintbrush or a sculptor's spatula. However, there are many other tools needed to transform a canvas into a beautiful scene or a blob of clay into a statue. As eHealth professionals, we must competently apply skills that we already have in our tool chest, like analyzing workflow or measuring economic impact. There are literally hundreds of these skills, many of which we must either be able to apply or know enough about them so we can get expert help.

Dominic Covvey

• ASSERTION 6 – WE MUST BE COMPETENT: eHealth professionals must embody the knowledge of and skills with both the techniques to understand problems and the tools necessary to solve these problems. In this sense, Chuck's fundamental theorem also applies to the eHealth professional who together with tools is greater than he or she would be solo. Being competent requires our acquisition of the knowledge, skills, experience, attitudes and val-

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Canada is participating in global effort to create outcomes standards

BY DR. PUNEET SETH

Value or outcome-driven care is an expression we often associate with healthcare delivery in the United States or in other countries with a predominantly private model of healthcare.

However, in recent years, the global healthcare community has begun to acknowledge the merits that this concept brings. Without identifying and focusing on the right outcomes, treatments can be administered that do not improve the lives of patients, and in turn can contribute to the seemingly uncontrollable rise in healthcare spending.

Outcomes additionally can help patients make informed decisions about their care, and furthermore, can provide for a standardized means of comparing services provided around the world.

Dr. Puneet Seth

This is the fundamental basis behind the creation of ICHOM, or the International Consortium for Health Outcome Measurement – a unique non-profit organization developed as an interdisciplinary collaboration between thought leaders and experts at the Institute for Strategy and Competitiveness at the Harvard Business School, The Boston Consulting Group and the Karolinska Institute in Stockholm, Sweden.

ICHOM's goal is to accelerate the development and implementation of health outcomes measurement at a global level. They have sought out to do this through the creation of an international working group model, whereby disease-specific groups are formed that include medical experts from different countries, in addition to patient representatives of the particular disease.

For example, in developing a standard set for low back pain, working group members from over a dozen sites across eight countries were involved, contributing 8-12 months of time voluntarily to produce the standard sets.

One may wonder what makes ICHOM unique from regional guidelines. I posed this question to Jacob Lippa, Project Leader at ICHOM. "There are a number of elements that distinguish us from similar efforts, but two stand out in my mind. The first is our focus on outcomes that matter to patients, which you see in our emphasis on measuring patient-reported outcomes over time – in some cases, annually for life.

"The second is our effort to standardize measurement internationally, " explained Mr. Lippa. "We have much to learn by looking outside our borders; standardizing outcomes measurement gives us a better understanding of what models of care are working best."

Numerous experts from across Canada have been contributing their time and expertise to these standard sets, including Dr. Frank Silver, director of Toronto West Stroke Network, and co-principal investigator of the Canadian Stroke Registry.

Dr. Silver is part of the ICHOM group that includes an international panel of experts in stroke who are working to develop the key outcomes in the condition. He explains why developing standard sets is important for healthcare in Canada: "One of the difficulties in comparing care and outcomes is that everyone is measuring things differently. Best practices across Canada will revolve around these standard sets, and we will benefit from being able to make comparisons between provinces and even other countries."

ICHOM has kept their sights on the future and taken the next step by developing a framework for technology standards in the electronic collection of outcome measurements. Further to this, they have created a network of software solutions, providing a turn-key opportunity for healthcare institutions and organizations

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LHSC and St. Joseph's see benefits transferring EHR to the cloud

Advantages include lower costs, faster access to data, more comprehensive approach to disaster planning.

BY DAVE WEBB

Once the groundwork was laid at London Health Sciences Centre and St. Joseph's Health Care London, migrating their core IT systems to the cloud was instantaneous. "It was like a NASA launch," said Glen Kearns, integrated vice-president of diagnostic services and CIO at the two organizations. It literally occurred with the flick of a switch. "Dave was the maker of the switch."

The Dave in question is David Schned, integrated director of infrastructure technology. And the switch in question moved the shared, Cerner health information system of LHSC and St. Joseph's Hospital, along with nine partner hospitals in southwestern Ontario, from in-house data centres to a cloud-based environment managed by Cerner Canada.

London Health Sciences accomplished the transition to the cloud in June.

"We're a multi-campus, multi-hospital organization," said Schned. The original solution not only serviced LHSC and St. Joseph's, but also supported the patient record needs of associated hospitals over "a good chunk of southwestern Ontario." Schned and Andrew Mes, integrated director, clinical informatics and clinical corporate solutions, provided the strategic leadership for the move to the cloud and started the planning in the Spring of 2013.

"We still have two data centres in the city of London, with other solutions supporting the organization for the business of treating patients," said Kearns.

The transition of the patient record system to the cloud was LHSC's first foray into exploring the viability of cloud-based solutions. "Taking our most relied-upon systems (and putting them into a cloud environment) says to us that for all other solutions, this is absolutely possible and sets us on a path to lay out that plan. We're leveraging access to those systems through those new data centres in a way that we basically look at as Software-as-a-Service."

The move sets the groundwork not only for the near future, with significant cost savings and other important benefits, but for future applications that require massive computing resources for analytics and personalized medicine.

A new approach: It is a new approach for delivering health information systems for Cerner Canada, said company president Jim Shave.

"This is our first in Canada, whereby Cerner has struck a relationship with a healthcare client to take over the data centre responsibilities for all of their clinical information systems," Shave said. "In the States, we've been doing it for at least a dozen years." Cerner has its own data centres in the U.S., and 450 hospitals work on the model that Cerner Canada replicated for LHSC and St. Joseph's.

"The traditional obstacle in Canada has been that we can't take advantage of those centres because we can't have cross-border storage of patient information and communication," Shave said.

He explained that for Canada, "We did not build a data centre. We acquired capacity through two robust, industrial-strength centres that were already here in Canada," from providers Q9 (a BCE company) and Sunguard. "Each is served by redundant telecommunications paths, and we have two of everything." That supports the disaster recovery element of a healthcare provider's strategy, something Shave said is underserved in the Canadian market.

Cerner Canada has aspired for some time to bring this model to market, Shave said, because dependence on electronic patient records increases with the adoption of new technologies. "The more sophisticated these clients get, in term of their IT adoption, the more there's a reliance on this technology to be available 24/7 with little to no outages, because there's no paper to go back to," Shave said.

ILLUSTRATION: LINDA WEISS

Shave characterizes LHSC's and St. Joseph's infrastructure as a private cloud. Unlike a public cloud environment – think Amazon, or, on a simpler, Software-as-a-Service level, Google Apps – private clouds don't share physical hardware among clients. (Hybrid clouds are growing in popularity, wherein some data and applications exist on a private cloud, while others are in a public cloud environment; it's particularly suitable for operations that have to scale to meet peak demands.)

Risk and reward: And the move to a cloud-based infrastructure can be resource-intensive. LHSC and St. Joseph's "flip of the switch" masks a huge effort, internally and externally, to make the transition. Two project leads – Nicole Arsenault on the technical side, and Dorothy Seiler on the applications and integration side – led 106 staff from 22 separate work teams across 394 separate work streams on the project, which consumed almost 11,000 IT hours.

Moving from a concurrent user model to a 15,000-unique-user model – where the hospital pays licenses for the number of users who have access, rather than the number of users on the system at any given time – has avoided $2 million in one-time and ongoing costs.

Not only that, but data, applications and user volumes are 100 percent recoverable in the event of a system failure, and transaction time has dropped 40 percent to an average of 0.31 seconds. "That is really significant when you look at the number of transactions that occur on a monthly basis" – about 85 million – said Schned.

The redundancy of the previous infrastructure had the ability to support 50 percent of LHSC's and St. Joseph's capacity and usability of services in the event of a catastrophic event. "In the new environment, the new infrastructure, we basically increased that to 100 per cent," said Schned. "Our business continuity plan is by far improved."

The business argument: Robert Fox is the director of healthcare transformation for networking giant Cisco Systems Inc.'s Canadian operations. He stresses he's not a technical guy; he came to Cisco after 20 years of working on capital expenditures – infrastructure, equipment, technology, and construction of facilities – at St. Michael's Hospital in Toronto, while consulting at other Greater Toronto Area (GTA) hospitals. He said he's seen the business arguments, and tried to make them, for moving critical health information systems to a cloud environment. (Cisco is the primary provider of "self-healing fibre ring" connectivity for LHSC, said Schned.)

"I've always asked why we can't move to a cloud environment," Fox said. "As the head of planning, development and capital, I was responsible for facilities, so I obviously wanted that real estate that the data centres all took up." Data centres don't cope well in a basement, where flooding and facilities issues happen. There was friction with the IT department, who wanted to take over higher levels of the hospital – levels Fox felt would be better used for patient care.

Fox's pitch to move to the cloud encountered the same resistance as it would at any enterprise. "The No. 1 thing you're going to get is around patient privacy, data security. And then the other discussions are around data sovereignty. All of that is always going to come up."

But deeper in the decision-making matrix, said Fox, is a fundamental question: Does it work?

"Hospitals have always generally been conservative organizations," Fox said. Risk-taking with patient outcomes is not an option, so a CIO who proposes something radically new takes on the risk if

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Panacea patient bedside system has been installed at 'digital hospital'

Panacea by i3, a patient bedside engagement solution, has been adopted by hospitals around the world. The use of off-the-shelf Microsoft technologies is a big reason why Peter Christopoulos believes the company has been able to go to market faster than others with features that competitors are not able to match.

"Our solution, Panacea, provides fast and accurate clinical information to medical professionals," said Christopoulos, president and founder of i3 Technologies. "When developing Panacea we chose to use Microsoft Azure and Visual Studio development tools which allowed our team to create, deliver and manage Panacea, a next generation solution for Windows devices."

Panacea replaces those old television sets that were bolted to the wall with a medical grade, Microsoft Windows touch device. Patients can read, watch movies, play games, phone home, control room settings such as temperature and lighting, order their meals or conduct a variety of other activities from the comfort of their bed. Because no patient information is ever stored on the device, patient privacy and security is protected.

But the device is dual purpose. The same solution offers doctors, nurses and clinicians access to review patients' charts, scans and test results, share information, discuss cases, and educate patients on their care plan without ever leaving the hospital room, easing workflow and improving efficiencies.

Panacea stations will be available at 724 bedside units at Toronto's new Humber River Regional Hospital.

Recognizing the effectiveness of Panacea, the new Humber River Hospital selected the Panacea Patient Bedside Engagement System as its point-of-care clinical and entertainment solution.

Humber River Hospital (HRH), which opens in October, is North America's first fully digital hospital. It utilizes the most current technologies available to enhance all aspects of quality care delivery, improving efficiency, accuracy, reliability and safety.

Panacea will be available on 724 bedside units and 524 footwall media centres. The devices will offer entertainment, including television, movies, books, radio, games and Skype. In addition, they will provide educational services such as surveys, patient information and weather reports. Clinical applications will also be available, including Meditech access with bedside charting, medication management with barcode scanning, and single sign-on for clinicians. (A fast, 5-second log-in has been achieved.) The system also supports menu ordering and room controls.

Lori Bonari, Manager of Business Development at i3, said that hospitals using Panacea have reported a time-reduction of 30 percent in administrative activities such as documentation. "They tell us that they are able to spend more time actually interacting with patients which improves attitudes and outcomes."

Other areas where hospitals have reported improvements include:

- Better Infection control - patients actually want to stay in bed, using the device for entertainment or to reach out and connect with family and friends, thereby reducing cross-contamination from public areas;
- Lowered re-admission rates – hospitals are using the device to educate patients and patient families about what to expect when the patient leaves the hospital and how to ensure continuity of care which has seen a reduction in patient re-admission;
- Less pain medication – nurses have reported that patients engaged in activities actually need less pain medication, which helps improve their recovery.

Hamilton Health Sciences helps hospitals eliminate software silos

BY MICHAEL MURPHY

If technologies can improve processes and the effectiveness of healthcare providers, why is the adoption of these technologies still lagging in the Canadian healthcare system?

Hospitals are deterred due to an assortment of issues, but primarily due to incompatible technology and budget cuts or freezes brought about by provincial governments.

However, all is not lost. The chokehold on funding has introduced an entrepreneurial-like spirit in Ontario hospitals. Hamilton Health Sciences (HHS) not only overcame financial IT limitations, but also discovered how to implement a new business model in the process.

The hospital was able to transform its IT department into a source of revenue as an IT-as-a-Service (ITaaS) provider, extending its technological abilities to service smaller healthcare facilities. This truly represents a step forward into the future of healthcare where government budgets no longer halt the progress in care that technology enables.

Like many hospitals, the IT department at HHS struggled when trying to upgrade technology. They needed to purchase technology that would enable clinical-wide apps with roaming capabilities across the hospital floor, but there was no additional budget to 'rip and replace' the technology.

As many CIOs know, sophisticated solutions can cost upwards of several hundreds of millions of dollars for a full infrastructure set-up.

By purchasing components of the Citrix Workspace Suite over time rather than buying an entire IT infrastructure base, HHS was able to implement the latest in cloud technology and desktop virtualization while maintaining secure interoperability between apps and the IT infrastructure. These individual virtualization and cloud solutions enabled HHS to not only pick and choose what they needed, when they needed it, but also helped impact their bottom line by saving on costs.

Most importantly, HHS has been able to improve patient care. Patient information is now available right at the bedside through mobile clinical portals, accessible through tablets and remote workstations.

Healthcare practitioners have immediate, direct access to patient data from anywhere within the hospital at any time, all while maintaining security and privacy. So not only are these technological upgrades helping to improve quality of care, they are giving more control back to the practitioners themselves.

Mobile solutions have presented IT departments with an unforeseen advantage by enabling them to extend their IT services outside of the hospital.

Hamilton Health Sciences was able to implement a mobile clinical environment and integrate their cloud IT infrastructure with the legacy software that was already in place. From this point, HHS's IT department launched a sustainable consulting team that began to service other hospitals and healthcare organizations.

Health Information Technology Services (HITS) is composed of 100 technology professionals and provides expertise in a variety of specialities from strategic planning and project management to application development and secure network design.

West Haldimand General Hospital (WHGH) is just one of the hospitals that took advantage of HHS's new ITaaS model. WHGH was in a situation where their IT infrastructure support, including after hours, all fell upon one internal resource. Despite the small size of the hospital, the IT department was becoming overwhelmed by the increasing demands of technological advancements and IT initiatives for patient care improvement.

Michael Murphy

WHGH chose to tap into the resources that HHS had available in order to find an effective way to remedy their issues. This partnership enabled WHGH to reduce operating costs by thousands of dollars in the first month alone by eliminating unnecessary contracts and migrating to the HITS standard.

Furthermore, this partnership has enabled a small hospital to have instant access to a wealth of IT resources including IT architects, security experts and experts specializing in various brand software. WHGH now has the ability to provide the required IT services for healthcare practitioners, and HHS is able to reinvest money toward other projects within the hospital.

ITaaS represents a way for provinces to eliminate healthcare silos and allows for a more affordable process of deploying new technology for healthcare providers. This new model has demonstrated that by pooling investments and extending services, everyone can benefit from driving economies of scale.

In an era where it can feel like the IT department gets the biggest budget squeeze, it's fundamental that new apps and solutions are integrated into whatever legacy systems are currently in place. This solution approach not only gives hospitals more freedom in their IT spending, but it also allows smaller care provider facilities the same abilities that larger ones have. Too often IT departments end up caught in the middle between hospital politics and budget constraints. It is essential now more than ever, that IT brings the control back to the department and valued-based care is once again made the focal point of budget considerations.

Michael Murphy is the vice-president and country manager of Citrix Canada (@CitrixCanada), a global company that enables mobile work styles, allowing people to work and collaborate from anywhere.

We must integrate patient portals and LTC into our health records

BY DR. CHRIS HOBSON

Almost 15 years ago the healthcare industry made its first grand step into the future with the successful introduction of provincial electronic health records (EHRs). Yes, EHRs serve as an essential enabling technical foundation for a fully integrated care system. The problem is that while they provide access to comprehensive data, which is an absolutely essential first step, they are not enough by themselves to actually drive the major changes needed in healthcare. What kind of changes do I mean to recommend? A fundamental shift to proactive management of long-term conditions, and not just reactive responses to acute patient demands.

If you think about it, many patients who don't have a chronic or long-term illness only require care in the moment – for example, they may require a prescription to manage a cold or a brace to secure a dislocated shoulder. However, studies have shown that the majority of a healthcare provider's time and costs relate to the care of patients with chronic diseases.

Too often the system functions in a reactive mode, dealing with acute patient issues as they flare up, rather than delivering a complete, fully coordinated, efficient and sustainable solution. A closely related problem is that of one-way communication from provider to patient as opposed to mutual understanding between patient and provider regarding the patient's problems and the best way to address them over the long haul.

The time has finally come for healthcare delivery to move into an integrated era in which all members of the multi disciplinary team work actively together to create benefits for the patient and, taken to its logical conclusion, a system that delivers on the goal of entire healthier populations.

The good news is that we are innovating towards a new generation of healthcare, one which sees patients become more actively involved in their care, and care outcomes are vastly improved. At the forefront is the critical alignment of technology and healthcare processes working together in order to deliver whole population health management.

So what should health IT experts be advising to achieve whole population health management? I recommend attention to care coordination within a complete solution that meets these four key continuity requirements:

• **Information Continuity:** In order to make the most appropriate and effective decisions, secure access and full availability of all relevant, past and present patient information is required. This typically means that a comprehensive EHR is used to acquire, aggregate and provide access to information from disparate data sources – including other care providers and coordinators.

Dr. Chris Hobson

• **Patient Care Plan:** Building on the technical foundation of a comprehensive EHR, care plans should enable collaboration among caregivers, rationalizing and agreeing on a single coherent plan with elements provided by all members of the multi-disciplinary care team (MDCT). This care team includes the patient and their advocates and respects their contribution toward development of a plan that makes sense to the patient and is achievable given the reality of their situation.

• **Care Delivery Continuity:** A care plan should be a living document – living in the sense that it changes and adapts to evolving patient-specific needs. A properly integrated delivery network with care coordination tools will allow for prioritization, coordination and timely execution of all services.

• **Patient Continuity:** As stated already, care delivery is no longer a one-way street: patients are now more engaged then ever in their healthcare and especially decision making. Patient portals, where patients can access their care plans and other essential information, allow patients and caregivers the right tools to support working together and agreeing on care plans that are more likely to be effective and joined by the patient.

Care coordination is simply not possible without having access to a high quality, comprehensive care plan. A care plan that takes advantage of all that technology can offer, affords both patients and healthcare practitioners the ability to interact meaningfully.

Paired with a powerful integration engine enabling acquisition and aggregation of complete data, the healthcare system can provide effective support for the care of individuals as well as managing entire populations.

Dr. Chris Hobson, MD MBA, is the Chief Medical Officer with Orion Health and a primary care practitioner and internist certified in healthcare informatics. For more information, visit www.orionhealth.com

Infoway leads new clinical interoperability Action Plan

The discussion around clinical interoperability in Canada is evolving. The ability to have patient information move freely between different providers and organizations, so that clinicians have the information they need, when and where they need it, has been considered critical for many years. What is different about the conversation today is that questions about interoperability that once centered on 'how', are now centered on 'when.'

"We know that interoperability represents the next frontier in Canadian healthcare, and there is no doubt that the industry is ready for this challenge," says Lynne Zucker, vice president, clinical systems integration for Canada Health Infoway. "Improving interoperability will result in more advanced uses of clinical information, and better, safer, patient experiences."

In an effort to speed Canada's journey towards interoperability, a national Clinical Interoperability Steering Committee was established in 2014. Composed of clinicians, health and e-health program leaders, vendors and other stakeholders, the committee developed a strategy to accelerate clinical interoperability in Canada. The roadmap to implementing that strategy is contained in an Action Plan that was released in early June.

"What this plan does is provide us with a collective opportunity to collaborate and make progress on shared priorities," says Committee co-chair and Infoway President and CEO Michael Green. "What has to happen now is that all of us – clinicians and health leaders who have a stake in interoperability – need to mobilize around the priorities that have been established."

The three clinical priorities set out in the Action Plan are as follows:

Medication management. The evidence suggests that improving medication management can increase patient safety by reducing the number of preventable medication errors. The Action Plan addresses two clinical priorities related to the sharing of medication information; e-prescribing and electronic hospital medication reconciliation.

Communicable disease management. The priority here is on immunization, specifically interoperability among physician office EMRs, public health immunization systems, and possibly community pharmacy systems.

Three clinical priorities have been set out: medication management, communicable disease, care coordination.

Coordination of care. While much of the early work will focus on establishing a common agreement on what properly constitutes coordination of care, consult management is one area in which efforts are already underway, and this holds real promise in terms of shortening wait times and improving the patient experience.

Prior to the release of the Action Plan, Canada Health Infoway established InfoCentral, an online collaboration platform designed to engage the entire industry around standards and clinical interoperability priorities. For example, the Public Health Surveillance community has been especially active and it currently supports two working groups – one associated with the immunization priority and one focused on communicable disease terminology standards.

"We've had a lot of feedback, and it has been overwhelmingly positive," says Green. "We know this is the right plan, and now what we need is for health and eHealth leaders to engage with us to make it all happen."

Finnie Flores, co-leader of the Coordination of Care community says the InfoCentral communities are a great way to get immersed in the subject of interoperability. "If you join a community, you are immediately connected to people who share your interest, but may have very useful different perspectives. These communities provide a space where you can share news, take advantage of education opportunities and connect with experts."

In addition to joining communities, stakeholders are urged to join the working groups that are being formed in order to tackle interoperability priorities. Three have already begun work on communicable disease, immunization interoperability and remote reporting for imaging.

Infoway's Lynne Zucker says it is critical that the people who deliver healthcare always have the information they need to do so, and that is what the Clinical Interoperability Action Plan is all about.

"The technology is not the problem anymore," she says. "We know we can do this. Now it's just a question of everybody getting on board, agreeing on the problems that need to be solved, and then doing the work needed to solve them. There are some 35 million Canadians who will thank us when we do."

Global effort to create outcomes standards

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to implement outcome-based practice.

Dr. Andrew Matthew, a psychologist at the Princess Margaret Cancer Centre in Toronto and part of the ICHOM panel developing standard sets for the management of advanced prostate cancer, commented on the value of electronic patient reported outcome measurements, or e-PROMs.

"When we collect information from patients using a paper and pencil, we only have the ability to look at the data retrospectively. Also, there is often a lot of concern regarding resources consumed manually entering the data into a database, and the errors that can be introduced with this additional step. Collecting information directly into an electronic database allows us to monitor patient experience, as well as respond to this in real-time."

The synergy between identifying the right metrics to collect for a given disease and identifying the right ways to collect this information may bring a much-needed revolution in the efficiency and accountability of healthcare. For more information on the Standard Sets, please visit: www.ichom.org/medical-conditions/.

Puneet Seth, MD, is Hospitalist, Lead at the Woodstock General Hospital in Woodstock, Ontario.

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Are mobile devices the weakest link in your healthcare environment?

BY MARK WILSON

It's clear that mobile device use in healthcare is on the rise, with more doctors and nurses now using mobile devices for clinical communications and collaboration. There are many benefits to mobility in healthcare, from increased productivity to better quality of patient care. But the trouble comes when clinicians use personal unsecured devices to communicate patient data, something that is becoming widespread.

BlackBerry recently conducted a global study of individuals responsible for governance, risk and compliance in healthcare organizations. It found that 52 percent of respondents reported the number of data breaches their organization has experienced, via mobile devices, has increased in the last year.

But despite the increase in data breaches, the survey showed a surprising lack of confidence from organizations in the security of their current mobility strategy. In fact, only one in four healthcare organizations surveyed are 'very confident' that their organization's data assets are fully protected from unauthorized access via mobile devices.

As the saying goes, you're only as strong as your weakest link. In one of the most startling statistics from the survey, 63 percent of respondents indicated that they believe mobile devices are the weakest link in their enterprise security framework.

That's not very reassuring when you know nurses and doctors are using personal smartphones to transmit clinical information. This underscores the delicate balance between the need for regulatory compliance and the needs of end users to access and transmit information in order to care for their patients.

The majority of survey respondents agreed – eight in 10 say that it's increasingly difficult to balance their business need for security and risk management with the needs of their end users when it comes to mobility.

It's vital that healthcare organizations find a way to do both, and that they provide a highly capable and secure mobile environment to their users that enables them to meet all legal requirements. So, where should the overworked healthcare IT professional start?

A healthcare organization's compliance program starts with a risk assessment identifying all issues that can impact the security and privacy of Protected Health Information (PHI) in a mobile device deployment. These risks can include:

Mark Wilson

• A lost or stolen device or unauthorized access to a device and its applications, for instance if someone steals a device and tries to access PHI and medical apps on the device, or tries to recover data-at-rest on device.

• Eavesdropping on unprotected communications such as unencrypted email to a healthcare contractor or third party, unprotected application data traffic over network, or unencrypted chat messages between doctors and patients.

• Accidental or malicious employee disclosure of PHI, for example if an employee cuts and pastes a patient diagnosis or other sensitive information into SMS or other P2P messaging app to send to a doctor or lab.

• Malware and untrusted applications which can scan and offload sensitive data into the cloud or to a command and control server.

To mitigate these risks, there is a need for more than just point solutions. As a healthcare organization, you need the breadth and peace of mind that only an end-to-end, multi-OS Enterprise Mobility Management solution can provide.

You need a solution that secures data at all points – controlling access to the data in transit and at rest on mobile devices.

Mark Wilson is Chief Evangelist, BlackBerry.

LHSC, St. Joseph's see benefits transferring EHR to the cloud

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anything goes wrong. It's a common discussion in a healthcare environment, whether it be IT, housekeeping, security, or facilities management – who is best equipped to manage, the hospital or an outsourced provider with subject-matter expertise and economies of scale? "That can create a value proposition in my mind for moving these services out of the hospital," Fox said.

Another issue is the ownership of the system, Fox said. Public sector contracts have to demonstrate the best value for taxpayers. In an open, competitive bidding market, it's rare for a contract to last more than five years, Fox said. What happens to the data and applications and systems if a contract changes hands? That's a big deal, said Fox, and it adds another element of risk.

The Internet of Things: The benefits don't stop there, for the individual healthcare provider or the industry as a whole, said Cisco's Fox. "I think in the healthcare sector we want to make sure that healthcare continues to partner with industry to create the best outcome for patient care. Industry has got fantastic innovation and inventions that have been created by significant investment in R&D, and working with other hospitals. Let's say we create a solution with Hospital A. Hospitals B through Z should also benefit from any of the discoveries or developments that we've created."

Hospitals also must recognize the sea change coming with new connected devices and networking technologies, Fox said. "The Internet of Healthcare Things is really going to become more pervasive as time goes on."

Startups and established companies are developing devices, therapeutics, wearables and sensors that can connect the patient to the cloud. That data flows into an analytics engine that can create workflow designs that optimize the care hospitals provide.

All this data traffic will create a need for better connectivity and scalable processing. How big does an IT department have to get to cope? Given the explosion of patient information systems, is a hospital the right environment to manage it? Doesn't partnering with private sector providers make more sense?

Those analytics are on the radar for LHSC and St. Joseph's. In addition to short-term goals of improving user experience, disaster recovery and cost avoidance, the hospitals are positioning themselves to leverage advanced analytics and mobile functionality as a more long-term goal, said Kearns. By pooling anonymized data with other health organizations, analytics can drive better clinical outcomes. And there's a major move to drive information into clinicians' hands wherever they are through whatever device they have.

"We have to integrate that into our strategy at every opportunity, and this was a thoughtful way to build it right into our infrastructure potential to move down that path," said Schned.

Analytics ties directly to the mobile movement. "We do have a vision as an organization to be able to provide real-time information and solutions at the bedside, at the point-of-care, that allow our providers to be predictive and proactive in terms of managing the health of our patients," said Kearns.

For that to work, patient data has to be consistent and completely electronic. While in the U.S., where healthcare organizations are much larger, there's a critical mass large enough to support that. By contrast, Canada's smaller healthcare organizations need to pool data on a consistent platform, Kearns said.

Standardization: At virtualization technology vendor VMware Canada, health industry leader Dave Pattenden sees a trend toward common platforms that could be better served with cloud computing.

Analytics are on the radar screens of the two hospitals, along with improving the user experience and cost-avoidance.

"In terms of the benefits of cloud, we see it helping with consolidation in terms of some of the shared services that are being created across the country," Pattenden said. "We're seeing regionalization out west, and we're seeing benefits in jurisdictions like Ontario. (Cloud computing) really helps take the cost out of their operating model, and helps extend their existing applications and their new applications out to mobile devices."

For his part, Fox said his utopian ideal is the ability to connect stakeholders in the healthcare system, whether it's clinician-to-clinician or a telehealthcare environment, where remote patients are connected to medical care. "It's an incredibly complex endeavour … having a commonality of service across the healthcare system would only make us more able to achieve that goal.

"Access and connecting healthcare clinicians across the system is absolutely critical, and the more accessible information is, by having computing power available from anywhere, is an enabler to that goal."

Dominic Covvey

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ues that are the intellectual substance that comprises Health Informatics. These competencies derive from the five footings of Health Informatics: the Health Sciences, Information and Computer Sciences, Management and Social Sciences, Technology and Implementation Science. Each makes crucial contributions and their many possible combinations become the transdisciplinary bases for what we must know, must be able to do, must be able to use in our thinking and must be able to apply in practice.

To make this thinking practical, you might consider applying it as you begin your next major undertaking. Ask yourself: How am I going to augment and empower the health system and the humans involved? What are the competencies I need to do that? Do I understand the real, valid and in-depth needs (not just the wants and simple stuff) of the system and the people? Am I aware of the true long haul required to fully address these needs and of the fact that my understanding of them will evolve as I proceed? Have I addressed and prepared myself to deepen my understanding on the human dimension of my work? Do I have or can I obtain and apply all the truly adequate tools needed to achieve the desired outcomes? Am I standing on the five footings of Health Informatics and can I assemble a competent team?

There are many more assertions that can evolve from this stream of thought. More importantly, however, are assertions you might offer. The challenge to you: put forward assertions from your perspective and experience. Send them to rebootingehealth@gmail.com. If willing, give us permission to use your name. In addition to continuing the list of assertions above, we will put yours forward and seek reactions. In addition, let's hear your critiques of the assertions above.

Ask yourself, How am I going to augment the healthcare system and empower the humans involved?

It will take time, but Chuck's fundamental theorem may provide the basis for a practical but formal expression of the nature of our field … especially if you contribute.

Many thanks again to Dr. Tom Rosenal for reading and commenting on these two articles.

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

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