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INSIDE:

PHOTO: COURTESY OF CAMH

CAMH promotes innovation with 'Dragon's Den'

CAMH, in Toronto, held an innovation day, complete with panels to assess the technologies produced by hospital teams. The 'Dragons', Dr. Catherine Zahn, president and CEO of CAMH, tech author and guru Don Tapscott, and Cisco Systems Canada president Rola Dagher, evaluated the proposals of six finalists chosen from 41 applicants. The top solution, a suicide safety plan app, was funded with $35,000. **SEE STORY ON PAGE 7.**

Hospitals are outsourcing and moving IT to the cloud

BY JERRY ZEIDENBERG

TORONTO – Demand for information from users inside hospitals – and from partners and patients logging into portals outside the facilities – is "becoming insatiable", as one healthcare executive at Microsoft's recent "Future Now" conference put it.

So how will hospitals manage the rocketing growth of servers and apps, as new systems are added to deliver the data, along with the privacy and security issues that are bound to crop up?

And it's not just computers that have to be tracked.

"What do you do when you're keeping track of 5,000 desktop computers, and you move to monitoring 100,000 sensors," asked Lydia Lee, Healthcare Lead at KPMG, and the former CIO of the University Health Network. She was the session's keynote speaker, and noted that every computerized device in hospitals is now being tied into a network – or soon will be.

"It's a quantum shift," said Lee. "You have to respond in a different way."

Dr. Sarah Muttitt, VP and CIO at the Hospital for Sick Children, commented on the fast expansion of systems at the medical centre, which will only grow further with construction of a new tower for patient care. As well, the hospital has a leading-edge research centre, and has also embarked on a

> **"We're looking to see what we can shift to the cloud," said Dr. Sarah Muttitt, CIO at SickKids.**

new initiative in artificial intelligence. "Data is pivotal, and reliability is critical," she said.

One of the solutions is to outsource some functions to industry experts. As one example, she noted, the hospital has outsourced its network management and security to Telus.

Now, it's also looking to the cloud as a way of managing the many servers and applications the hospital has spawned.

"We're looking to see what we can shift to the cloud," she said. "We don't want to be in the data centre business."

She said Sick Kids is now looking at every server, every blade, to see what could potentially be transferred to the cloud. "We're spending the next year figuring it out."

She noted that Sick Kids recently went live with the Epic electronic information system in all of its departments, which has had a big impact on the hospital. Now every user, in every department, can access information across the organization, in the same way.

"We were a siloed organization for decades," she said. "The new system has been transformational."

She said that access to information is now vastly improved. "What we're going to do with that information will also be transformational."

In particular, there's a big emphasis on improving performance through the use of analytics – something she credited the hospi-

To improve performance, hospitals outsource and move IT to the cloud

tal's previous CEO, Mike Apkon, with fostering. Dr. Apkon served as CEO at Sick-Kids for five years before leaving to become CEO at Tufts Medical Center in Boston.

"We've been putting in dashboards for every part of the business," said Muttitt. "We're looking at clinical, administrative, equipment, everything to optimize the organization." Everyone needs this information, she said, and use of the Azure cloud has been speeding up the process.

It's all in a bid to improve clinical outcomes, workflows and patient satisfaction. "We don't want patients to come downtown and not find a parking spot," she said. "Or to wait four hours for an appointment, or eight hours in the ED."

For its part, the Ottawa Hospital, which has also implemented Epic, just completed a big cloud project using Microsoft Azure. The organization, which is also hosting systems for several surrounding hospitals, has shifted its disaster recovery (DR) to the cloud.

By moving DR to the cloud, "We're saving $400,000 a year just for the Epic work-

load," said Jean-Claude Lemonde, IT Lead at the hospital

What's more, the Azure cloud offers recovery services; and if there is a disruption, service can be switched over within 30 minutes.

Lemonde said the organization looked at shifting its day-to-day Epic systems to the cloud, but there wasn't the cost savings available that occurred with DR.

"When we looked at the numbers, it would only have worked if we removed the whole IT team," said Lemonde. "But we still needed the team to manage the other systems we're using."

However, he said like technology in general, costs for the cloud may continue to drop over time, making it more viable to put the mainline systems into hosted systems like Azure, Google Cloud or Amazon Web Services.

He mentioned that in addition to the Ottawa Hospital and its partners that are all on the Epic system, the group will extend Epic to 250 primary care clinics on June 1st. It's going to be the first large-scale implementation in Canada of an Epic system that includes both acute and primary

Pictured at the Future Now conference: (l to r) Microsoft VP Jason Hermitage; The Ottawa Hospital's Jean-Claude Lemonde, Dr. Sarah Muttitt of The Hospital for Sick Children, and Mark Rajack of Niagara Health.

care providers, all in one integrated solution.

For his part, Lemonde doesn't think all of the hospital's systems will migrate to the cloud, even if prices make it enticing. "I don't think an organization should go fully into the cloud, because with outsourcing, you lose your own expertise." You'll always need some feet on the ground, he said, for problems that come up on the site.

As well, he doesn't believe in putting all of one's eggs in a single basket. "You might want to go with AWS and Microsoft," he said. "This is also an option." On the other hand, he acknowledges that using two or more cloud vendors complicates things. "Then you're using two massively different technologies."

Mark Rajack, Director of Innovation at Niagara Health Systems, discussed how his organization has been building links to community health providers, like Emergency Health Services. He also noted the interest among the public for access to their health records.

For these reasons, Niagara Health just rolled out a solution that helps with identity management. The Identos system helps determine the outside user is authorized to access the information that he or she wants.

"How do we know you are who you say you are," asked Rajack. "For example, when someone is calling us from their home?"

The new solution also works with mobile devices, which is increasingly the way people are accessing information of all kinds.

Overall, when it comes to innovation, Rajack said Niagara Health first looks at the problems its providers and patients are trying to solve. It then seeks out the best technology.

"What is the pain point that, for example, the imaging team needs help with?," he asked. The IT and innovation teams at the organization will then work with the clinicians to source the right technology.

On the topic of surprises, Sick Kids's Sarah Muttitt mentioned that her organization recently implemented a speech recognition solution for clinical documentation, along with Epic mobility tools for clinicians. "They both took off, with very little training from us," she said, observing that users took to these technologies naturally and largely on their own. "Sometimes, you don't know what you don't know."

Markham Stouffville Hospital first in Canada to use INFRAM model

BY JENNIFER RIDEOUT

As part of a plan to upgrade and modernize its IT infrastructure, Markham Stouffville Hospital, located north-east of Toronto, has become the first medical centre in Canada to make use of the INFRastructure Adoption Model (INFRAM).

Initially developed by the Cisco healthcare team in Australia and New Zealand, INFRAM has been officially adopted by the Healthcare Information and Management Systems Society (HIMSS) Analytics as the global model all health care organizations should adopt and follow when creating architectural infrastructure to support their Electronic Medical Records (EMR) and other technology rollouts.

Markham Stouffville Hospital began laying the groundwork for a major digital transformation more than two years ago, with a focus on two major priorities: patient care and future-proofing the hospital's IT systems.

"Much of the technology we had supporting our network was in need of a refresh," says Michael Cole, who came on-board in 2017 as the hospital's Chief Technology Officer. "For example, our wired and wireless infrastructure was end of life in many areas and end of support in others.

"A refresh was necessary not only to ensure stability and the improvement of our security posture, but also to enable ourselves, our providers and our patients with the foundation for the technology requirements needed now and for the foreseeable future."

In February 2017, the hospital announced one of its first digitization projects – a shared health information project with Newmarket's Southlake Regional Health Centre and Alliston's Stevenson Memorial Hospital. This new project will support seamless patient care across the three organizations by centralizing patient records and streamlining access for healthcare professionals, patients and their families.

Markham Stouffville has already moved its Meditech deployment into a new managed data centre in preparation for the alliance.

However, working with the hospital's IMIT (Information Management Information Technology) leadership team to continue making digitization a top priority, Cole quickly concluded that the new data centre implementation was not enough. The hospital needed a stronger, underlying infrastructure for its entire digital network.

Markham Stouffville engaged Cisco Canada to undertake a complete network assessment, with the ultimate intention of designing a full refresh of the hospital's wired and wireless network. Key to this assessment was the INFRastructure Adoption Model. For the assessment, VertitechIT, an IT consultant with a holistic view of IT strategies, worked closely with Cisco and the hospital, helping to lead the review and engagement model.

The INFRAM review takes organizations through a detailed process and assessment from an infrastructure perspective, focusing on five technology pillars: transport layer, data centre, unified communications and collaboration, mobility and security. It provides an infrastructure architecture roadmap that can be used to detail the organization's specific technology requirements based on what they already have in place, and where they want to go.

INFRAM is complementary to the HIMSS Analytics Electronic Medical Record Adoption Model (EMRAM) and its corresponding levels. Using it, healthcare organizations can improve care delivery, reduce cyber and infrastructure risk, and create a pathway for infrastructure development tied to business and clinical outcomes.

INFRAM can also help them achieve cost-savings throughout the upgrading process, while adopting EMR or when looking to drive efficiencies throughout their infrastructure. By increasing transparency in the assessment, evaluation and planning stages, it provides a more accurate picture of where resources should be allocated, reducing the risk of wasted investment.

"Cisco took an agnostic approach, regardless of technology involved, that basically says 'here's where you are' in order to give Markham Stouffville Hospital a baseline from an infrastructure perspective," says Rob Campagna, Regional VP of Ontario Public Sector, Cisco. "The power of INFRAM is that it can be mapped in such a way that organizations can create a strategic architectural roadmap from the technology perspective, focusing on how

Leading the INFRAM initiative at MSH: Maged Ghebrial, Sr. Consulting Systems Engineer, TELUS; Cynthia Esnard, Account Executive, Healthcare, TELUS; Michael Cole, Chief Technology and Privacy Officer, Markham Stouffville Hospital; Shanti Gidwani, National Director, Healthcare, Cisco Canada; Mark Leyser, Senior Sales Specialist, Security; Rob Capagna, Regional VP Sales, Ontario Public Sector, Cisco Canada.

Whether it's sports or healthcare, analytics can improve performance

BY NEIL ZEIDENBERG

Women's College Hospital (WCH) in Toronto is a fully ambulatory hospital focusing on short term patient stays, and day surgeries. By using data analytics and evidence-based medicine, they dramatically lowered patient discharge times for knee and hip replacement surgery.

"Now patients can go home on the same day they have surgery," said Jack Woodman, Chief Strategy & Quality Officer at Women's College Hospital. "That's a big improvement over the four to seven days patients used to spend in hospital."

In a February webinar by Health Quality Ontario titled, How Big Data Changed Sports and Will Revolutionize Your Health Care, Dr. Sacha Bhatia – cardiologist and director of the Institute for Health System Solutions and Virtual Care (WIHV) at Women's College Hospital – (and basketball mega fan) talked about how Big Data has already played a major role in sports performance, and how its use can make a difference in healthcare.

"Data analytics has been used in professional sports for a number of years to help improve individual and team performance," said Bhatia. "But it can also be used to help improve physician performance," and the healthcare team.

Since the early 2000s analytics has been used in sports to track the tendencies of its players, ball movement, shot selection, successes and failures. "By 2011, every team in the NBA was using it to help explain performance," said Dr. Bhatia.

As an example, "Analytics determined that the three-point shot (from beyond the arc) is the most efficient shot, and the worst shots are taken from under the basket." It was even used to highlight where on the court pro ballers LeBron James and Stephen Curry were most effective in their shot-making to help improve their game.

"A great sports franchise will always be great because it has great leadership. And in a hospital, great leadership leads to the best patient care. We need more data, not less. And we need to think of more ways to collect data so we can use it. However, you don't want to create data overload. Collect the data; analyze it and then think about how you're going to use it to improve patient care," said Bhatia.

In 2015, Atul Gawande – a surgeon and professor at Harvard Medical School, wrote an article for the New Yorker magazine about healthcare needing Pit Crews, not cowboys. Doctors are efficient independent caregivers, but can be even better if they performed more like pit crews – who operate as a team. Everybody on a pit crew has a specific job and they all

> "In a hospital, great leadership leads to the best patient care," says Women's College's Dr. Sacha Bhatia.

have to work together or it can seriously affect the outcome of a race.

A study by Health Quality Ontario determined as much as 30-percent of all diagnostic tests ordered in Ontario are unnecessary. It means many patients have tests with little or no benefit, and patients who really need these tests are delayed in getting them.

In the Choosing Wisely campaign, they sought to measure the overuse of care – e.g. the ordering of low-value tests which have little benefit for many patients. The study measured the ordering practices of nearly 2,400 high-volume physicians and found that about 20 percent of the physicians were responsible for ordering 40 percent of the tests.

Echo WISELY was a program that studied the impact of providing doctors with feedback on their echo ordering habits, and whether it could reduce unnecessary heart tests. It determined that educational tools and feedback can indeed improve the use of imaging and protect patients from potentially harmful testing.

Dr. Bhatia says that clinicians are already data driven – meaning they'll respond to the evidence. If you show them where they can improve and how, they'll change their approach. "You need to know what the problem is in order to fix it. Use the data to create a strategy, and then solve the problem," said Bhatia.

A data-driven approach to problem solving uses real-time stats to develop new models of care. The potential benefits are huge. It can lead to better outcomes, better doctors and lower healthcare costs.
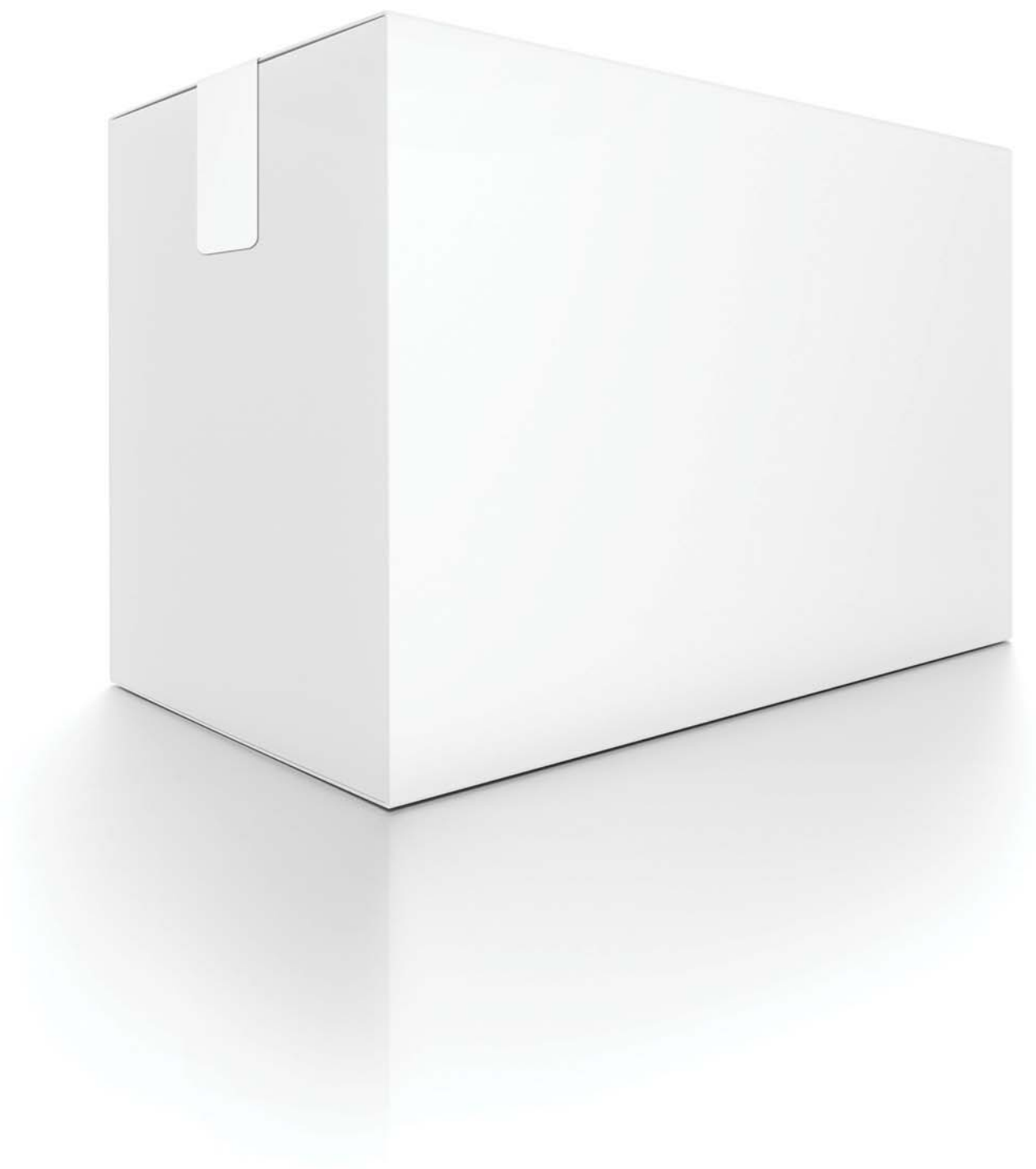
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Innovation teams at Toronto's CAMH make their cases to 'Dragons'

BY DAVE WEBB

Don Tapscott is in. At a recent pitch session for innovation projects at Toronto's Centre for Addiction and Mental Health (CAMH) – modeled after popular CBC TV series Dragon's Den, where entrepreneurs compete for investment cash from financiers – Tapscott the Dragon offered up his own cash for one proposal.

"Don't the Dragons get to buy in (on the TV show)? I'll give you $10,000," Tapscott told a group of presenters during the afternoon session of CAMH's Innovation Expo in February.

Tapscott, author of 16 books on technology and new economic models, joined Cisco Systems Canada president Rola Dagher, Muhammad Mamdani, director of St. Michael's Hospital's Li Ka Shing Centre for Healthcare Analytics Research and Training, and CAMH president and CEO Dr. Catherine Zahn on a Dragons-style panel. They evaluated the proposals of six finalists, chosen from among 41 applicants from across CAMH.

The panel chose HOPE, an individualized suicide safety plan app, to receive a funding request of $35,000.

The app would incorporate outpatients' written safety plans (a recognized suicide prevention best practice) with smartphone access to Canada-wide resources, Canadian content like crisis numbers and CAMH links, and journaling in an always-at-hand format.

The app was proposed by CAMH director of quality innovation for patient safety and experience Nicole Thomson, operations manager Tim Rankin, and IT specialist Gurpal Bubbra.

Future phases of the app would incorporate mood and medication trackers, machine learning technologies, and deeper

Panelists Rob Meikle, CIO, City of Toronto; SE Health's Zayna Khayat; Liam Kaufman, CEO of Winterlight Labs.

integration with CAMH's operational systems. The team envisions a resource that can be shared among patients, families and therapists.

"I think you guys are going to make a huge difference. You've also got a lot of work to do," Dagher said. "You should have asked for more money."

CAMH Innovation Expo attendees voted Data That Heals, a project that would leverage existing technology with $100,000 in hardware to bring personalized analytics to the inpatient bedside, as the People's Choice award winner. The proposal's slick and humorous presentation came from behaviour therapists Louis Busch and Mahfuz Hassan and senior business analyst John Fernandes.

Senior management at CAMH will pitch in to help develop the business cases for the implementation of HOPE and Data That Heals.

Take My Photo – the proposal that Tapscott offered to fund – may have won on a different level. The project would bring professional photography standards to a once-

a-year shoot to replace patient admission photos, often taken when people are distressed and dishevelled, with poor lighting and image quality.

That image can influence a clinician who views it as a chart picture, and the public if a photo must be released of a missing patient, said team spokesperson Zeynab Hassan, a clinical informatics nurse. Project analysts Matthew Jabile and Kevin Leung were also on the team.

The photos would integrate with the patient's "This Is Me" page which provides more detailed personal information in I-CARE – CAMH's electronic health record.

Other proposals included Ask Me Kiosks to complement the centre's welcome staff (Maxine Rukundo, project manager; Alan Tang, web applications lead); CAMH Coach, a multi-lingual video program for anxiety management and clinician skills development (James Watson-Gaze, psychologist); and Spot CAMH, a wayfinding application incorporating augmented reality technology (Emily Grant, senior project analyst; Gurpal Bub-

bra, IT specialist; and Caitlyn D'Souza, co-op student).

The "Dragons' Den" portion of the CAMH Innovation Expo was a follow-up of sorts to a similar event last year that involved only information management staff, said Damian Jankowicz, vice-president of information management for CAMH and its chief information and privacy officer.

The "This Is Me" page that Take My Photo was to integrate with was a product of last year's event.

But innovation doesn't work best in a silo, so CAMH opened the competition to ideas from management, clinicians and operations management as well.

Jankowicz, who hosted a morning panel on the challenges of innovation in healthcare, said while ideas may be plentiful, they often aren't brought to the fore. Instead, we "stew in our own juices."

"We don't always progress and implement our ideas," he said. "Today, I'm hoping we can close some of those gaps."

In fact, "pilot purgatory" is a frequent issue for innovation, said panellist Liam Kaufman, founder and CEO of Winterlight Labs, whose AI-based technology can detect cognitive impairment from a few lines of speech.

People are too comfortable with incumbent processes and technologies for incremental improvements and efficiencies to get user buy-in, he said.

Zayna Khayat, future strategist with home-care provider SE Health Care, formerly St. Elizabeth Health Care, defines innovation as a "next practice" with at least a fivefold improvement.

"We have to think way bigger in terms of what we can do," concurred Shivani Goyal, lead of strategy and research at eHealth Innovation at Toronto's University Health Network.

Nunavut implements successful iEHR and teleradiology project

Healthtech partnered with the Government of Nunavut for the Territory-wide implementation of a comprehensive MEDITECH 6.x application suite, along with PACS and digital radiography. This extensive project included nearly 2,200 healthcare providers in hospitals and health centres in 25 communities, over an area of more than two million square kilometers.

As a direct result, Nunavut has enabled more timely, closer-to-home inter-disciplinary clinical care for all of its 37,000 citizens. The project has lowered the barriers to accessing care and reduced patient transportation costs – two issues widely identified as major challenges by all Northern regions.

Nunavut has accomplished its goal of achieving a Territory-wide electronic health record, and Toronto-based Healthtech has been a partner throughout this journey.

A project of this size requires a com-

prehensive, collaborative team. Healthtech was engaged to provide both implementation project management and MEDITECH subject matter expertise.

External partners included Change Healthcare for PACS, Calico Medical/Nuon Imaging for Digital Radiography, and Dynacare for lab interfaces. Partners in the Government of Nunavut included eHealth for application support and Community and Government Services to provide both hardware and infrastructure.

Initially, the project scope only included MEDITECH foundational modules. However, these modules were so successful that Nursing and Physician Clinical Documentation were included as well. These additional modules were successfully piloted in one community, and quickly became part of the roll-out plan to all communities.

The project deployed MEDITECH modules for iEHR and Teleradiology in a staged approach using the Canada Health Infoway Change Management

Framework. The first implementation of this comprehensive, integrated system was at Iqaluit's Qikiqtani General Hospital and other clinical sites in Iqaluit. The next rollouts were in Cambridge Bay and Rankin Inlet, followed by deployment activities in 22 other communities. Digital Radiography was also deployed in each community. MEDITECH's ARM

> **Nunavut has accomplished its goal of achieving a Territory-wide electronic health record, with the help of Healthtech.**

module was implemented in Nunavut's Southern referral sites to manage medical travel outside of the territory.

The project required extensive change management because it was an entirely new system for the Nunavut healthcare providers. The team ensured their concerns were addressed prior to implementation, and staff were fully

supported during implementation.

Since the communities are extremely remote, the team did not have the luxury of being on-site before implementation. To address this, workflow calls were done for six weeks prior to implementation, a remote parallel run was done with an on-site resource, followed by "at-the-elbow" training on-site. This training provided practical approaches and best practices to healthcare delivery in Northern communities.

The team of local Nunavut resources and vendor partners were exceptionally dedicated to the project, showing the determination and flexibility required to coordinate with team members, and a willingness to express their unique needs and requirements. This was especially important in what can sometimes be a challenging Northern environment. Following each community health centre implementation, the entire team engaged in a debrief to discover new best practices and discuss lessons learned,

Cloud processing facilitates the use of analytics at U.S. hospitals

BY JERRY ZEIDENBERG

ORLANDO, FLA. – An employee of Sisters of Mercy Health, one of the top five hospital organizations in the United States, used to spend 30 hours a week manually collecting information for reports. When the I.T. staff at Mercy created dashboards and reporting tools that could perform the same tasks in seconds, the employee refused to use them.

"It was a massive cultural change," commented Curtis Dudley, VP of Performance Solutions at Mercy, speaking at the recent HIMSS conference in Orlando. "She felt there had been value in the way she worked, and she needed to understand the new way of doing things." It took a while for her to make the mental shift, Dudley said.

Still, with the right coaching and coaxing, reluctant staff have made the transition to analytics and dashboards.

Dudley and executives from a number of large hospital organizations talked about how they're using cloud technologies at the conference, which brought 45,000 attendees to Orlando. The presenters all showed how they were applying analytics to their reservoirs of cloud-based data.

"We are sharing data using Microsoft and Google [clouds]," commented Dudley. He noted that Mercy, based in St. Louis, employs 44,000 people, has 40 acute care and specialty hospitals, and generates $6 billion in revenues annually.

For years, Mercy has been an Epic client, and it produces an enormous amount of data. Now, it's all being brought together using an "Explorer" style tool that provides staff and clinicians with dashboards and reports. "The tool has been a game-changer," said Dudley.

To make things even easier, Mercy has deployed natural language processing (NLP) to make sense of the various ways that employees and clinicians chart or log their data. One dilemma the organization faced was the differing ways in which physicians were charting ejection fraction results – cardiology data that was captured in unstructured notes.

"It's a measure captured in the clinical note, and it determines whether you're part of the heart failure group," observed Dudley. "So, did we need to retrain 400 doctors to chart in a certain way?"

Instead, the organization created an NLP app that searches the doctors' notes and extracts the ejection fraction results. "It can even tell if the result is calculated or estimated."

The NLP application and medical ontology was purchased from an outside supplier – Linguamatics. "They've developed a medical language library, and we've found it to be incredibly helpful," said Dudley.

NLP is also able to determine the context. For example, shortness of breath is sometimes abbreviated as SOB. However, quipped Dudley, "SOB doesn't always mean shortness of breath," and the system has to be able to tell the difference!

Dudley observed that analytics are being used to solve many problems at Mercy. The shortage of nurses is a constant challenge, he observed, with some 1,400 positions open at any one time. The question was, how to attract and retain nurses?

"We did some work to create a predictive model," said Dudley. "We wanted to find out, who is most likely to turn over in their first year?"

By analyzing the data, they found out that overtime is actually an incentive to nurses. "But only to a point. So knowing that, we've been able to work on our turnover."

Meanwhile, Rush Health, in Chicago, has put a big push on cloud. "Before 2017, we were doing cloud as a side project," said Jawad Khan, Director of Data Science and Knowledge Management. "Now, it's the main project."

In 2017, Dr. Bala Hota joined Rush as VP and Associate CIO. An infectious diseases physician by training, he ushered in a cultural transformation at Rush, in which it is putting a premium on technological solutions to improve patient care. "We want to innovate and bring new technologies into the practice of medicine. But of course, we can't lose focus on the patients."

The four-hospital Rush Health system has already put its data centre into the

Managers from Rush Health told HIMSS19 attendees, in Orlando, that the cloud is now their top IT project.

Full cloud, hybrid cloud, multi-cloud solutions are now available

BY IAN MAYNARD

Cloud is key to achieving the efficiency gains needed to respond to growing demands on our healthcare system. It can also help organizations break free of vendor-induced information silos, and improve collaboration for better patient outcomes while reducing overall system costs.

Anthos, Google's multi-cloud solution, now allows customers to build their own applications and transfer them to any public cloud provider, all without changing a single line of code.

So, what about security?

Banks, hospitals and companies from almost all industries have realized that there are no privacy or security issues that can't be addressed. In many cases, cloud solution do it better, because of the scale of available resources. There aren't too many organizations that can afford 1,000 engineers dedicated to securing their infrastructure.

Relative to data encryption, you have the key to your own security. With encryption keys held at your site, or in the cloud, data is encrypted both in transit and at rest.

Now customers control whether anyone in the cloud provider organization can access their data, even for support or trouble shooting. If access is granted, you now have full transparency about who within the provider organization accessed what data.

For its part, Google announced that it is the first to offer full data access control and transparency. To quote Thomas Kurian, CEO of Google Cloud, "Your data, is your data and no one else's." So why is this important for healthcare? For too long organizations have been trapped in vendor-induced information silos, with information inaccessible to front-line staff, physicians, patients or collaborating colleagues.

How can we expect to increase system efficiencies while remaining constrained by what systems exist within one organization's network?

Can we realistically expect to streamline processes, balance workload and reduce system-wide costs that way?

Historically, what you could do in peer review, for example, depended on what system you had internally.

Well, no more. Now you can connect with colleagues across sites, systems and across the country, to benefit from a critical mass of peer experience in your sub-specialty, leverage cloud based AI and Big Query to identify patterns, learn of the latest findings, all while helping you avoid medical errors you may be prone to so as to reduce patient mortality and morbidity.

Now, patients with authenticated access to their own information, can collaborate in their own care.

To quote, Alpna Doshi, Philips Group CIO: "AI also means that as a patient you are well informed … so self management becomes possible."

Still, what barriers remain?

Now that customers have the choice of full cloud; cloud plus partial on premise architectures (hybrid cloud); encryption key held on-site, or in the cloud; full data access control and transparency; coupled with zero vendor lock; I would suggest that there are no material barriers to customers charting their own course to the cloud.

In fact, I would submit, that "Achievement of certain system-wide efficiency, capacity increase and cost reduction objectives, simply won't be possible, or will remain prohibitively expensive and hence unrealized, save for cloud enabled solutions."

As we all know, either we become more efficient, especially at scale, or the system and its associated costs become unsustainable.

What about the nay-sayers?

Ah yes, the nay-sayers. They've been on the wrong side of every technical transformation since the invention of the wheel.

You know, when there's a tidal wave coming, it really doesn't matter how many people decide to stand on the shore shouting at the sea, eventually, reality hits."

Has there ever been a seismic shift that could be pushed back into place? Okay, Superman did it once in a movie, but even then, it was too late. Fortunately, he could turn back time. Who knew circling the earth fast enough to reverse its rotation could turn back time. For the rest of us however, turning back time, just isn't an option.

Where will this wave find you? Strategy mapped out ready to ride, or standing on the shore shouting at the sea?

Ian Maynard is CEO and Co-founder, Real Time Medical. To learn about Google Cloud + and Real Time Medical's easily interfaced solutions, AICloudWorks™ and AICloudQA™, please see: www.RealTimeMedical.com

Ian Maynard

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Virtual house calls bring care to marginalized patients in Hamilton

BY DR. DENNIS DIVALENTINO

HAMILTON, ONT. – The Virtual House Call Project was started in 2017 to address a significant gap in access to care for patients who are considered marginalized. For clarity, a marginalized patient is one who cannot receive primary healthcare in a manner that is appropriate for their disease burden or needs in general, and consequently accesses ER and hospital services in lieu of primary care access.

This is a costly problem for the healthcare system and one that produces unnecessary suffering for patients and their families.

Usually, serious illness can be prevented with timely access to basic primary care services. These services are simply not accessible for marginalized patients who experience, in some cases, insurmountable barriers to healthcare access.

Limited mobility and serious mental health disorders are examples of common barriers to healthcare access. These barriers are usually compounded by poverty. The consequences range from the delivery of care that is unnecessarily excessive in terms of cost, to significant patient and family suffering, to premature and unnecessary death.

Our solution: The solution to this concern, like many current health concerns, lies in the application of technology. To reach the group of patients described as marginalized, my colleague, Dr. Richard Tytus and I developed a new tool called Virtual House Calls.

We were assisted by a $25,000 innovation grant from Joule, part of the Canadian Medical Association; the funding was used to ac-

quire equipment. We've shouldered the additional costs of staff time and training, and the cost of delivering the service, as Ontario does not yet compensate physicians for ambulatory telemedical services. However, we believe it is the compassionate thing to do; and as telemedicine proves its worth, we hope the funding situation will change.

The Virtual House Call solution uses videoconferencing and also employs new peripheral devices that allow providers to conduct more high-level patient encounters, in a virtual fashion, than we ever could before. The provider remains in the office and is available to provide care to other patients. The patient remains in his or her home.

The technology: The goal of a virtual encounter is to best approximate the quality of an in-person encounter, primarily with respect to the collection of objective information.

Collecting subjective information remotely can be done in many ways, including by telephone. The first version of our platform included a Microsoft Surface Pro tablet, a USB enabled stethoscope and a USB enabled otoscope/dermoscope.

Several peripheral devices were tried, in order to determine the best possible devices for quality, reliability and interoperability.

The limitations of the devices trialled are discussed below. The platform is powered by a mobile Wi-Fi stick, such that there are no technical requirements on the patient end.

In terms of software, several software platforms were tested. The platform that we ended up using is called REACTS, a Canadian platform developed by a Montreal-based physician named Yanick Beaulieu. The REACTS platform is ideal for this type of service due to its ease-of-use

Patients who have difficulty going to the doctor's office have been pleased with the Virtual House Call.

for both providers, and nurses or aides operating on the patient interface.

It has a high level of interoperability, making it peripheral device agnostic, thus allowing greater flexibility with respect to upgrading peripheral devices and improving the quality of objective information attained.

All of the hardware is stored in a messenger bag to create the "Virtual House Call Bag". This bag is completely mobile and can deliver care to essentially anywhere.

The service: We first delivered this service to patients who were identified by case managers at our local home care organization as being marginalized, and thus not receiving any type of primary care services.

We wanted to target patients who were known to be using hospitals for primary

care services. We cared for 20 patients in the initial pilot.

The "Virtual Bag" was brought to the patient home by a nurse or healthcare aide at the request of the patient or another healthcare provider or service.

The first pilot conducted was a proof-of-concept and technology. We wanted to demonstrate that the technology could be used to conduct a visit with patients in their homes, while connected to a remote provider, and that this visit would approximate the quality of an in-person encounter.

With some technical limitations, we felt this was achieved. We also noted an extremely high level of satisfaction from patients and family members or caregivers.

Some patient stories: Some of the patients, and circumstances that we encountered, were quite upsetting, even for us as urban core primary-care providers. When we see patients in our office, we often do not get a full appreciation of the difficult social circumstances they face.

We get it intuitively, but often the reality is eye-opening. This project was eye-opening.

We provided care for one patient, Anne, who we met after she was diagnosed with stage 4 cervical cancer. Anne had severe agoraphobia, for which she was not medicated. She also had bony metastases as a result of her cancer. This is generally regarded as one of the most painful conditions treated in medicine. Anne was in significant pain, but she could not leave her house.

In her case, the fear of leaving her house was more significant than the pain that she experienced due to her cancer.

Anne was thrilled at the availability of a Virtual House Call. Over many weeks we saw her several times. We provided her with pain medication and we managed her anxiety, and she never left her home.

As things progressed, Anne worsened and she requested to be transferred to hospice care, which she noted was something she had wanted all along but was afraid to consider due to her anxiety.

With proper treatment she became a different person. A few weeks later she noted that her wish was to have a peaceful death in hospice, but her anxiety had precluded her from doing that. She no longer felt this way.

Two weeks later, she was transferred to

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Tests of virtual visits show positive results for patients and physicians

BY GILLIAN WANSBROUGH

Being able to connect with a specialist by video made a world of difference for Abbi Wright Pereira. It meant no more driving across the city with a newborn and four-year-old in tow to get care, and all while potentially feeling dizzy, faint, and as if her "head would explode".

The 43-year-old Mississauga woman suffered from postpartum hypertension after the birth of her second child, which brought her to the ER. Following an initial office visit, internist and clinical pharma-cologist Dr. Jeff Alfonsi recommended weekly video visits, or eVisits, and an app to track her blood pressure.

"It's great," says Wright. "It's virtually face-to-face. And I am more comfortable (dealing with this) now – I'm really being monitored. I also use my phone to track my BP and send Dr. Alfonsi the report. And I email him when I have a question."

Dr. Alfonsi is equally enthusiastic. "Video consultations have made a huge difference for some patients. Relationships are built because you can respond to patients more quickly than would be the case if you were only scheduling in-office visits. Couple that with the fact that they don't have to drive to appointments or pay for parking and you have receptive patients."

Specialist eVisits through the Ontario Telemedicine Network (OTN) are simple: providers simply log into the platform (the OTNhub) and send a secure OTNinvite link to patients. Patients use the device of their choice – smartphone, PC or tablet.

It's ideal when an in-person physical exam isn't needed. Dr. Alfonsi, who has been doing eVisits to the home for about a year, says other benefits of the modality for healthcare providers and the healthcare system are greater practice flexibility and saving "inpatient space" for people who really need it. A recent pilot included close to 600 physicians providing specialized care. They conducted some 11,000 clinical events for which they were able to bill.

A survey showed that more than three-quarters of physicians were satisfied with their eVisit experience and that the quality of care they were able to provide was the same or somewhat better than an in-office appointment. Another plus was the avoidance of missed/cancelled appointments.

"Patients find it convenient, allowing them to avoid both travel and having to make arrangements for their dependents," said OTN CEO Dr. Ed Brown. "Providers also see the value of integrating video, especially with respect to follow-up care, preoperative consults, and periodic check-ins."

A second OTN-led pilot called eVisit Primary Care is leveraging virtual care to support primary care. It enables patients to connect with their own family doctors using secure messaging, video, or audio through one of two platforms co-designed and developed by OTN, participating regional partners, and vendors Novari Health and Think Research.

"We live in an age where everyone expects to be able to manage their lives through their smartphone. Healthcare is no exception, though it certainly has unique considerations given the personal information involved," says Dr. Brown. "It's exciting to be partnering with care providers and arming them with the tools to enhance their practices and, for patients, to improve the healthcare experience and make it easier."

Through eVisit Primary Care, patients are conveniently able to initiate contact with their doctors at a distance for simple, non-emergency, health requests like colds, flu, rash, pink eye, allergies and chronic disease management. Resolution is timely and the need to come to the office can be avoided. It's delivered at no cost to the patient and with all eVisit details recorded in the medical record. "The platform has been able to help my patients who have difficulty getting to the office, and for some of my patients who recognize recurring symptoms that I can address immediately," says Dr. Nihal El Khouly, a family physician in Bolton, Ontario. "I love it!"

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What's Next Canada conference highlights innovations for seniors

BY NEIL ZEIDENBERG

The Centre for Aging + Brain Health Innovation (CABHI), in partnership with Mary Furlong & Associates, held its first-ever What's Next Canada Conference in March, bringing together experts and thought-leaders in aging and brain health to network and discuss current innovations in the care of seniors.

By 2050, it's expected that one in five people will be 65 or older. But aging brings with it chronic conditions, and providing treatment to such expansive numbers may be unaffordable without new advances.

"Most people over 65 are living with two or more chronic conditions. And while treatment for these patients can be complex, it also creates a great opportunity for innovation," said Mary Furlong, President and CEO of Mary Furlong and Associates, a strategy and business development company specializing in the boomer and seniors sectors.

Regarding the next big wave in aging care, experts point to emerging technologies such as smart medication management, EMR connected technology, robotics and virtual reality. They're also looking to AI to help relieve the burden on caregivers and help them navigate the health system.

The conference featured a Pitch Competition that included nine innovative companies – all with a goal of improving treatment and quality of life for seniors through technology. Participants had just five minutes to highlight their solutions and impress a panel of six investors – with the goal of being selected winner of the 2019 CABHI Innovation Award or the People's Choice Award.

The panelists were looking for scalable projects that were relatively low-cost, improved quality of care for seniors, and could be readily adapted for commercialization.

All participants in the pitch competition are current CABHI-funded projects and are receiving acceleration services with the goal of getting their innovations commercialized. Acceleration services include access to an advisory panel of experts with lived-in experience in aging and caregiving; business development services, and knowledge mobilization.

The 2019 CABHI Innovation Award was

Top photo, L to R, Dr. Allison Sekuler, Managing Director, CABHI; Mary Furlong, CEO, Mary Furlong & Associates; Teresa Pitre, GM, Pack4U Ontario representing Catalyst Healthcare; Mel Barsky, Director, Business Development, CABHI. Bottom photo, L to R, Dr. Allison Sekuler; Mary Furlong; Dr. Kaveh Vejdani, Chief Medical & Technology Officer, Darmiyan; Mel Barsky.

presented to Darmiyan, an online platform for the early detection of Alzheimer's and related dementias. Darmiyan is a virtual microscope of the human brain, meant to quantify values and provide earlier and more accurate diagnosis. By using a routine brain MRI, Darmiyan can predict whether individuals with cognitive impairment will develop Alzheimer's. The system is being tested at Baycrest, UHN, Hamilton Health

Sciences, Sunnybrook and Southlake Regional Health Centre.

The People's Choice Award went to Catalyst Healthcare, of Kelowna, BC, for a medication adherence solution. The company aims to reduce the number of incidents of patients taking their medication incorrectly, thereby ensuring medication adherence. Catalyst Healthcare's app, called MyMedTimes alerts patients to take their

meds, and it also connects pharmacists and patients, providing a real-time communication platform.

Other innovators included:

• Linked Senior: A cloud-based resident engagement solution that offers real-time reports and analytics; it shows care-givers what is working for each client, and what is not. By understanding a resident's life experience, staff can see beyond a person's medical needs and develop a more person-centric care plan, including music therapy, brain fitness and sensory activities.

• Motitech: Through the use of video, music and physical activity, Motitech aims to improve quality of life for seniors by promoting an active mind and body. After six-months of beta testing, there was a dramatic reduction in falls, and some clients in wheel chairs gained back their mobility. Whether combined with or without an exercise bike, seniors can take a trip through their old neighbourhood and reminisce.

• Careteam Technologies: A digital collaboration platform that helps care teams follow up with patients and their families, tracking their progress and keeping everyone on the same page. The result is better communication and improved care provider experience.

• Memotext: Utilizing an Amazon Echo-type device to provide medication reminders, Memotext bridges the gap between patient and caregiver. Like a virtual nurse providing patient support, Memotext checks on medication adherence, and the patient's well-being. The result is better patient outcomes.

• Intuition Robotics: A friendly AI device, called ElliQ, can connect seniors to family; play music, give the weather, monitor their well-being with reminders to drink water, exercise and even provide companionship. Beta tested with 100 elderly adults, it can integrate with telehealth. ElliQ is meant to supplement, not replace human interaction.

• InteraXon: An application that uses neurofeedback technology, via a headband, to detect and measure an individual's brain signals during meditation. InteraXon aims to explore what's happening in a person's head to help improve well-being.

• RetiSpec: Transforming Alzheimer's screening in the blink of AI. The application aims to provide intervention of brain disease before symptoms begin to appear. RetiSpec is a simple eye test that doesn't use eye drops, and has been clinically tested on 31 patients in the early stages of Alzheimer's. It works by detecting Alzheimer's biomarkers prior to patient diagnosis.

Graeme Moffat, Chief Scientist at InteraXon, believes one of the challenges of bringing a device to market is taking it from consumer to clinical usability. In an ideal ecosystem, there is a rapid adoption of solutions so it's important to bring the right solution to market. "We need to get the technology prototype in front of the user, and get real world response and evidence before releasing it to the mainstream."

Ane Solesvik Oppedal, CEO of Ably Medical Inc., agreed, and added "As much as people would like us to get it to market quickly, it's even more important we do our due diligence, and test it properly before bringing it to market."

Cloud storage and processing ease the use of analytics

Microsoft Azure cloud. To do this, it retrained its entire I.T. team in cloud technologies. "Instead of hiring, we trained our existing people," said Khan.

As with Mercy, the use of analytics in the cloud is a major focus at Rush. It, too, is working to make sense of unstructured data in the records to improve performance and outcomes. In one use case scenario, Khan highlighted an effort to ensure that patient histories had been completed before surgeries. "It's a requirement that a patient has

this done 30 days prior to surgery. If not, the surgery is cancelled."

Cancellation is very disruptive for both patients and staff, so a drive was made to build a Deep Learning model that reads the patient notes and determines whether all of the needed data is present.

"We've got it to a 95 percent accuracy rate," said Khan. "With this tool, we can call patients beforehand and address the issue." And the application only took four months to build, he said.

Finally, Dr. Ashish Sharma, an Assistant Professor at the Department of

Biomedical Informatics at Emory University, discussed how he and his colleagues have devised a system to predict the onset of sepsis in patients four to eight hours in advance of its onset. "The system is a second set of eyes for the physician," said Dr. Sharma.

Called Deep AISepsis Expert, or Deep-AISE, the system is Google Cloud-based. The developers have been early users of the Google Healthcare API and HL7 FHIR. He explained that sepsis affects 30 million patients worldwide annually, with 1 million in the United States stricken each year.

68
bpm
heart rate

CHOLESTEROL
HDL: 44
LDL: 100
TOTAL: 160
25   50   75   100   125   150   175   200

steps
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Netcare province-wide EHR helps Alberta docs fighting opioids crisis

BY JERRY ZEIDENBERG

Alberta physicians have been able to use the province-wide, electronic health records network – called Netcare – as an effective tool for combatting the opioids crisis for several years now.

Dr. Allen Ausford, an Edmonton family physician and clinical professor of medicine, discussed ways in which he has used the Netcare system for this purpose, and for making better diagnoses of patient problems, in general.

In one instance, Dr. Ausford was covering for a colleague when a patient asked for an opioids prescription renewal. The patient was normally seen by Dr. Ausford's clinic partner, who was away on vacation.

By checking into the provincial EHR, Dr. Ausford was able to see the patient had been seeking and obtaining opioids from several different physicians and pharmacies.

He then asked the patient to come in for a chat, and upon further discussions, discovered the woman was actually being strong-armed by her boyfriend to obtain opioids, as he was selling them on the street.

"She wasn't an abuser, she was being abused," said Dr. Ausford.

He was then able to obtain the appropriate help for the woman – rescuing her from an abusive relationship, and eliminating an illicit source of opioids from the streets.

Dr. Ausford was recently at the HIMSS International conference in Orlando, Fla., where he gave presentations about Netcare and its usefulness for Alberta's physicians.

He noted that the Health Information Exchange software in Netcare aggregates records from many different sources and presents them to clinicians in a user-friendly way. Currently, users of the system can see the records of 96 percent of all dispensed medications in the province; 92 percent of all lab tests; and 92 percent of all radiological images and reports.

A new project, expected to begin shortly, will add parts of the EMR records of family physician offices to Netcare, including a new Community Encounter Digest (CED). The CED report includes patient visit information including birthdate, gender, clinical assessment, and observations (allergies, blood pressure, height, weight, etc.), immunizations and referrals.

Alberta is in the midst of a conversion of its hospital electronic records to the Epic clinical information system. Some general practitioners, including Dr. Ausford, also use Epic ambulatory in their offices, though many community doctors use systems from Telus, QHR and Microquest.

Netcare is already an enormous help in the care of Dr. Ausford's patients.

He observed that on one typical day in February, he saw 24 patients at his clinic. For six of them, he used Netcare to make decisions that were actually different than if he had used his EMR alone.

He also gave the example of an Edmonton patient who had sudden onset of shortness of breath while skiing in Canmore, Alberta. The patient was taken for care to Foothills Hospital in Calgary, where he was given a CT scan. A blood clot was found on the lung, and the patient was
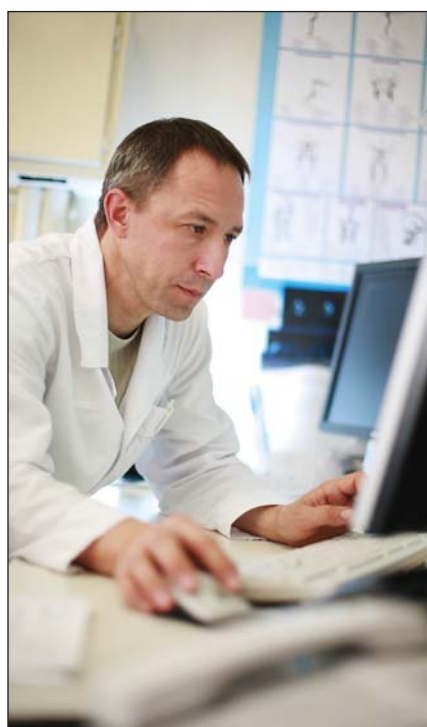
soon able to be transferred back to an Edmonton hospital.

"The CT in Calgary showed a blood clot, but the radiologist later added an addendum in the report, stating there was a tumour, as well," said Dr. Ausford. That addendum was sent to the Calgary physicians but not to the Edmonton physicians. "We were able to discover this by checking the report on Netcare".

"Because of that, we were able to start treating him for the tumour," he said.

Dr. Chris Hobson, medical advisor with Orion Health, the supplier of the software solution, noted that more than 120 different systems have been integrated into Netcare.

Because the system is used in healthcare settings around the world – including the Cleveland Clinic, in the U.S. – the company has devised methods of quickly patching in different applications.

"We can do them in three weeks, three days or sometimes, three hours," said Gary Folker, executive director of Orion Health.

In Alberta, the system is now being used for e-referrals from GPs to specialists, medication reconciliation during transitions of care, and tracking of allergies. It includes feeds from pharmacies, labs and hospitals, as well as long-term care and home care.

Dr. Ausford said the system has been especially useful with new patients, including the elderly, who often can't remember the names of the medications they're taking.

"They often come in and say they're on a green one or a blue one," quipped Dr. Ausford. But by using Netcare, he can see exactly what they have been prescribed.

"With a new patient, the first thing I do is a Netcare review," said Dr. Ausford. "One patient told me he was on a few medications. When I looked in Netcare, I saw he was on a lot more than that, and had just had a few hospital visits, too. He hadn't mentioned that."

He can also see if they are properly taking medicines. For example, he may see a patient's last prescription for a regular medication was a three-month supply that was dispensed five months ago. In this way, it's helpful with tracking compliance.

Meno Ya Win Health Centre implements new risk management software

SIOUX LOOKOUT, ONT. – As the Lab Manager for Sioux Lookout Meno Ya Win Health Centre (SLMHC), Brenda Voth understands the pressure to deliver timely and decisive lab results, just one of the many demands of an acute care hospital lab.

So, when leading life science company Bio-Rad Laboratories Limited approached the Kenora Rainy River Regional Lab Program with an opportunity to pilot the first version of their risk management software – designed specifically to meet these needs – Voth and the five other regional lab managers jumped at the chance.

"At that time in 2015, no other North America labs had ever used the Mission:Control software, so it was quite an opportunity for our area labs," said Voth, who anticipated immediate benefits. "Deciding what quality control rules to use is a time-consuming and sometimes ambiguous process, often left to the lab manager or senior technologist. I felt that, if it worked as promised, Mission:Control could relieve that added workload."

As it turned out, the software exceeded her expectations. Its ability to eliminate false rejections saved the equivalent of around two weeks of full-time work per year, according to Voth's estimates.

The time saved from troubleshooting was a boon for her department. More importantly, the decrease in troubleshooting allowed patient results to be released consistently quicker.

Voth explained that if the quality control passes and no troubleshooting is needed, then the result can be released immediately, in some cases 10 to 20 minutes earlier because of the Mission:Control software.

Voth pointed out what she sees as Mission:Control's greatest benefit. "The way it constantly pulls the data and does behind-the-scenes calculations decreases the likelihood of sending out an incorrect patient result. That's the most important part of the software-total risk management for patient care."

Recognizing her aptitude for the software, Bio-Rad later decided to beta test the next version of Mission:Control solely with Voth and her SLMHC lab team starting in early 2018.

"It was a natural next step to invite Brenda and her team to participate in the Mission:Control 2 Early Adopter program," said Kevin Koole, Business Manager for Bio-Rad. "Brenda is herself a champion and 'super-user' of Mission:Control, regularly evaluating risk performance as part of on-going lab operations, but also providing Bio-Rad with feedback and suggestions for improvement. She and the SLMHC team have uncovered efficiencies that will allow staff to better understand complex quality control rules as well as run the appropriate amount of daily quality control."

Last October, Bio-Rad sent Voth to the Quality Control Summit in Beijing, China to share SLMHC's experience with its leading-edge software.

Voth estimated there were around 200 lab managers and directors in attendance, which was much larger than what

> **The lab software helped with quality control, and saved the equivalent of two weeks of full-time work per year.**

she had initially anticipated. Regardless, she went into her very first summit presentation undaunted. While toting the software's benefits, Voth also acknowledged that the SLMHC lab was the first lab in North America to pass accreditation with this software in place.

"The accreditors had never seen the program before, but I reviewed it with them and they agreed that it completely

complies. The fact that assessors are now familiar with Mission:Control can give other labs confidence to implement the software themselves... It's nice knowing we are pioneers in that."

Koole acknowledged how Voth's informative presentation helped stimulate interest in the software and inspired the audience. "Brenda spoke of her success in using Mission:Control to turn statistics into actions that improved lab efficiency, quality, and speed-all of which improved patient care. It's a real Canadian success story."

SLMHC President & CEO Heather Lee further extolled the lab manager's efforts. "Brenda is a leader in her field. Being asked to present her findings to fellow healthcare professionals halfway around the world is testament to that. She committed herself to improve the quality of services we offer at SLMHC, and she did so by teaming with fellow leaders in the field-milestones in both innovation and collaboration."

"I am fortunate to work for an organization that values innovation and partnership," said Voth. "Together, we work with our partners to offer the best and newest technologies available. Being remote doesn't mean we should go without. All our patients deserve the best."

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they want to achieve clinical excellence in their hospitals. A model like this has never really existed before."

Cole is extremely pleased with the result. "INFRAM gave us a great opportunity to have a third party come in and give an objective point of view of where Markham's infrastructure was to date," he says. "It provided a strong starting point, showcasing where we were at the time and what we needed to do to craft tangible steps to drive forward.

"In addition, it gave us a succinct snapshot not only of our HIMSS (EMRAM) score, but also of where we stood around security and stability. Using it, we were able to easily communicate with our leadership team."

Cisco continued to work with Cole and the IMIT team on the infrastructure design, at which point they brought in TELUS as a technology partner to provide the equipment needed to build the new foundation.

Cisco worked with TELUS on a complete redesign of the hospital's network layer, wireless infrastructure, data centre and security. TELUS was responsible for the network access control, firewalls, LAN and wireless LAN, cabling, racking, stacking and mounting of equipment, as well as all networking configuration.

"TELUS' role was to hone Cisco's design and make it more specific to Markham Stouffville's needs," says Cynthia Esnard, Healthcare Account Executive with TELUS Business Solutions. "It's our job to implement that design and establish a partnership going forward to continue to assist the hospital in reaching that higher IN-FRAM level. Ultimately, we are the enabler of the foundation for the recommendations resulting from INFRAM."

Markham Stouffville now has a roadmap to become one of Ontario's leading digital hospitals. Some of the areas that will be focused on in the near future include cybersecurity and an upgrade in collaboration tools.

"This has been a crucial step in elevating Markham Stouffville's digital transformation journey to the next level," says Cole. "Over the next few years, we can start mapping out projects to improve the patient experience and enable our providers to deliver even better care."

Nunavut implements successful iEHR

which added to the success of subsequent implementations.

Project management was key to project success. With challenges such as multiple partners, weather and equipment delays, and transient staff, the project required a significant commitment, strong attention to detail, and perseverance. Weekend travel was often necessary, and significant weather delays were sometimes unavoidable.

Another major project success factor was ensuring knowledge transfer after each community health centre implementation. At the larger health centres, a Nunavut eHealth member provided a day of crossover training followed by in-person support during the entire second week.

For the smaller healthcare centres, knowledge transfer was done by phone, followed by daily check-ins to ensure staff were comfortable supporting the site. The project manager and subject matter experts played mentorship roles and were always available to eHealth staff.

The project has met or exceeded adoption targets in all categories. Each of Nunavut's nearly 2,200 healthcare providers is using the technology in their community care setting and across the vast and remote geography of Nunavut. Digital radiography report turnaround times have been reduced from eight days to just two days or less. And the integration with Dynacare (a southern partner) has allowed faster laboratory reporting.

The new, comprehensive Electronic Health Record has enabled Nunavut to support patient-centered care for all Nunavummiut. Clinical coordination and communication between all healthcare providers has been greatly enhanced.

The Territory-wide electronic health record has been Nunavut's largest healthcare project. Without the dedication of the team and all partners, it would not have achieved such a successful outcome or provided such significant, measurable results.

Personalized prescriptions help Canadians get more from their meds

BY MORGAN DONALDSON

On the 15th floor of 150 York place in downtown Toronto sits a patient awaiting her annual health assessment at Medcan. This year, she will get something new as part of her assessment – information on how her DNA may affect her response to medications.

A fixture in the community for over 25 years, Medcan provides a range of innovative health services for individuals, employer groups, executives and their families. Among the many services available to clients at Medcan is pharmacogenomic (PGx) testing: the profiling of one's DNA to more accurately predict their response to a medication and to reduce the risk of an adverse drug reaction (ADR).

Since 2016, Medcan has partnered with Minneapolis-based startup OneOme, to provide clinically actionable PGx testing to their patients. OneOme's RightMed comprehensive test, co-developed with Mayo Clinic, analyzes a patient's DNA and predicts how they may respond to more than 300 frequently prescribed medications: from common analgesics to anti-depressants, statins and anticoagulants.

There are an estimated 200,000 adverse drug reactions and 22,000 fatalities as a result of ADRs in Canada each year, according to Adverse Drug Reaction Canada (adrcanada.org). Adverse drug reactions can manifest as uncomfortable side effects in cases where a patient is not clearing a medication fast enough, or, they can manifest as a lack of therapeutic response, in patients who report that their medication just doesn't seem to be working.

Many factors can contribute to the de-

velopment of an adverse drug reaction, including: age, number of concurrent medications, liver function, gender and regimen adherence.

However, none are as significant as an individual's pharmacogenomic profile, which studies suggest can account for up to 90 percent of an individual's response to a medication. In other words, the RightMed test allows physicians to greatly increase medication safety for their patients.

At Medcan, clients routinely opt into PGx testing in order to optimize their medication management and to reduce the risk of unwanted side effects.

As of March 2019, several hundred patients had received PGx testing through Medcan's various health management programs. When looking at medications that these patients were already on, it was found that approximately 40 percent had a

gene-drug interaction identified by their RightMed test results – meaning the DNA of these individuals may adversely affect how they metabolize a medication they were already prescribed.

"The addition of pharmacogenomic testing to our health management programs has armed our physicians with an additional tool to help make more informed prescription choices for our clients," says Dr. Jason Abrams, Associate Medical Director at Medcan.

The RightMed comprehensive test isn't reserved for the lucky few. In fact, the company's mission is to provide cost-effective pharmacogenomic testing and medication optimization tools for healthcare providers and patients worldwide. OneOme most recently partnered with an Alberta-based medication therapy management startup, GenomeRx, to make the

test available to Canadians through their community pharmacies.

"We chose the RightMed PGx test because it is backed by the most rigorous clinical evidence and because the RightMed Advisor platform is so intuitive to use," said Stephen Williams, founder of GenomeRx and owner of Apollo Clinical Pharmacy where the test is sold. "Using the RightMed test, we have been able to optimize medication management for many patients, especially those with psychiatric conditions, pain, or gastrointestinal conditions."

Through the GenomeRx network of affiliate pharmacies, Albertans can now order the test from their local pharmacy, where trained clinicians can provide patients with a consultative review of their test results and explain the impact to their current medication regimen.

OneOme, named by Fast Company as one of the 50 most innovative companies in the world in 2018, is determined to make pharmacogenomic testing the standard of care in hospitals and health systems around the world. With several top tier clinics and hospitals like Mayo Clinic (USA), St-Catherine Specialty Hospital (Croatia), Tucker Medical (Singapore), and GenoMedik (Mexico) already using the RightMed test, the company is rapidly expanding its global footprint.

In 2019, OneOme plans to continue growing its medication optimization platform with seamless EHR integration solutions and risk stratification tools in order to help enhance the adoption of pharmacogenomics globally.

Morgan Donaldson is Director of International Business Development for OneOme. She is based in Ottawa.

How care providers can maximize the benefits of genomic knowledge

BY JOEL DIAMOND, MD

Today's healthcare professionals are witnessing a rare event: The rapid and dimensional change in how healthcare is practiced.

The force driving this change? A tsunami shift from trial-and-error medicine to precision medicine powered by discoveries in genomic science.

Few advances have captured the attention of the healthcare community (and, even more significantly, the healthcare consumer) than the opportunity to leverage genetic and genomic insights to guide better diagnosis and treatment.

More than a year ago, the Personal Genome Project Canada published results of a study in which 100 percent of participants recognized the impact of pharmacogene variants, carrier status for recessive alleles and/or copy number variants on their health and wellbeing – an astounding level of awareness.

Researchers also reported they identified genomic variants with potential implications for health management in a

full 25 percent of the participants – implications not only for the individuals studied, but also for their families and future generations.

It's clear that, when extrapolated across the patient population of the typical health system, the impact of genomics on disease prevention and treatment optimization could be momentous.

Precision medicine is gaining traction. In the months since the study was published, my colleagues and I have seen a marked uptick in interest in precision medicine – specifically related to pharmacogenomics and, somewhat surprisingly, among mid-sized organizations in addition to large academic centres. Contributing factors appear to be:
• Commercially available genetic tests, which have fanned consumer interest. Increasingly, patients are approaching primary and specialty care providers to ask about how genomics might improve their care.
• Availability of new clinical approaches that empower individual providers. In this era of burnout and

disillusionment, physicians feel energized by genomic insights they can leverage with patients in real time. One physician told me genomics was "making medicine fun again."
• Research advances – and consequent regulatory approvals – driving adoption of targeted molecular therapies for treatment of diseases like cancer.

Still, barriers to adoption remain. Our challenge now is to harness the potential represented by recent findings (and growing clinical interest) and leverage them in daily medical practice. One of the most significant barriers, according to providers across the industry, is making this critical information actionable at the point of care.

To date, results of genomic testing have been difficult for clinicians to access in a meaningful way. Often, results

Joel Diamond

generated by molecular labs are delivered on paper or in pdf, which prevents them from being integrated with clinical information or stored as discrete data for optimal utility.

Nor are genomic data and analysis readily available within the EHR workflow, impeding providers' ability to conveniently factor crucial information into their clinical decision making.

To overcome these barriers, forward-thinking healthcare leaders are adopting informatics and data management strategies to ensure their organizations can maximize the value offered through genomic advances.

Rather than looking at specialty-specific software (e.g., oncology genomics or pharmacology-only tools), they seek platforms that offer the potential for adoption across their entire enterprise and deliver functionality that can adapt to future scientific discoveries and clinical applications.

Plus, they require solutions capable of ingesting data from multiple lab sources, integrating these insights with clinical information, and delivering the resulting

Cutting down on wait times by using artificial intelligence

AI solutions are already in use, improving care delivery in hospitals and physician practices.

BY DR. SUNNY MALHOTRA

Artificial intelligence is a field of computer science whose goal is to mirror human thought processes and our learning techniques.

AI has many forms, many of which are being applied to healthcare software, including systems for psychiatry, scheduling and radiology, to name but a few. The use of artificial intelligence will never replace healthcare professionals, but the various forms of technology can change how we manage our services by improving wait times and health outcomes.

Time is an important performance indicator in clinical care. Universal healthcare is part of fundamental care in Canada, but there are issues with access to care, which have contributed to increased emergency room hospitalizations.

Same day or next day appointments are difficult to obtain, leaving patients with few options. Various companies have tried using statistical methods to estimate delays that can occur in appointments, but these methods have not been able to lower the average waiting time below 45 minutes in a busy clinic.

Research has found that more than 60 percent of patients find that the wait in the lobby is the most taxing part of going to the doctor!

Adopting artificial learning techniques has proven to be beneficial in reducing clinical wait times. Deep learning techniques, which are a subset of machine learning, can be designed to improve efficiency.

These techniques use a pool of data to train an algorithm, which is then able to determine which is the optimal output. Depending on the patient, data from blood pressure readings, lab results and doctors' notes can be available.

In deep learning, different forms of data can be run through models, which are able to detect specific patterns. For example, a deep learning system can be designed to detect factors that influence wait times and optimize for them.

Software programs are currently being designed and improved for scheduling appointments to reduce wait times. One such example is seen in Strong Memorial's emergency department in Rochester, New York. A program called On-Cue works to adjust

> By creating new associations between various types of data, AI is helping to solve healthcare problems and improve the quality of patient care.

schedules for many procedures in the emergency department, inpatient and outpatient clinics, with its main goal to decrease wait times for patients.

On-Cue has the ability to include many factors into its algorithm when scheduling procedures, including the need for contrast fluids before getting a test done.

This allows for schedules to be adjusted as the timeline shifts and as new requests come in. Strong Memorial Hospital has six scanners in operation that are divided into three rooms, each spaced a considerable distance from each other.

Before the hospital adopted On-Cue, communication between staff members would be through rushed phone calls and

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non-streamlined communication. With the use of this program, communication has improved drastically, as staff members are able to view each scanner that is in use on their screens and are even alerted when a scanner is free, should a request come in.

Technicians are also able to chat with each other between rooms with a messaging system while also writing out notes about the patient. This allows for a much more efficient system throughout the hospital, improving wait times for scheduled patients as well as emergent cases.

A technology company located in Quebec has designed a program that can cut wait times in doctors' clinics to less than 20 minutes.

Bonjour Sante is a company that overlooks bookings for more than 300 clinics throughout Quebec. Bonjour Sante has paired up with Montreal's flagship artificial intelligence lab to create a sophisticated algorithm that can predict delays. The program looks at prior appointments and at factors such as the current weather or prior patterns of the doctor being delayed.

The software can send out a personalized SMS text message two hours before the scheduled appointment time, informing the patient when the doctor will be able to see them.

This cuts down waiting times and makes clinic visits more efficient. The ability of these programs to detect specific patterns and to decipher through a large collection of data can improve diagnosis speed while also reducing wait times, improving health outcomes and decreasing cost.

To be sure, artificial intelligence is continuing to evolve and is being implemented universally. By creating new associations between data, it's helping to solve healthcare problems and improve the quality of care provided.

More ambition is needed in healthcare procurement

BY DENIS CHAMBERLAND

In an earlier column I mentioned that the Council of Academic Hospitals of Ontario (CAHO) issued a publication intended to debunk what it calls 'myths' in procurement. In The Art of the Possible: A Quick Reference Guide to Ontario BPS Procurement Myths, CAHO clarifies and explains 16 points relating to Ontario's BPS Procurement Directive, with the stated goal of removing "major barriers to innovation adoption".

In other words, according to CAHO, the procurement rules in Ontario are shrouded in so many myths that hold back innovation in healthcare.

CAHO formed the view that barriers to innovation abound in procurement based on a survey it conducted in 2016, where apparently 76% of hospital respondents identified policies, directives and procurement rules as barriers to innovation.

To address such barriers, CAHO brought together a group of myth-busting experts to write a reference guide designed to help unleash new levels of innovation in healthcare procurement. The task was not an easy one: the myth busters would also offer strategies to overcome barriers while complying with the vast regulatory framework that informs healthcare procurement in Ontario, including the BPS Procurement Directive, all applicable legislation, as well as the domestic and international trade agreements.

Though not mentioned explicitly but obviously included in the compliance exercise was the mountain of court decisions that inform healthcare procurement in Ontario.

Point no. 12 is representative of the guide's 16 points, as it tackles the long-standing belief in Canada that the public sector is not allowed to negotiate with vendors. The guide goes on to point out that a health system is perfectly entitled to negotiate "with a successful proponent" provided the intent to negotiate is expressly noted in the bid call document (i.e., RFP). This is about transparency (as in 'open, fair and transparent'). The rules of the competition must be accessible upfront to those who want to know.

Denis Chamberland

There is no legal basis, however, to the statement that negotiations are only allowed with a single party, the "successful proponent', as the guide suggests.

The Directive does not bar contemporaneous negotiations with two or more bidders, which consistently generates much more value from the procurement process than singling out the top-ranked proponent (which only becomes the "successful proponent" after contract execution).

Contemporaneous negotiations obviously tax a health system's resources but the added measurable value that the ongoing competitive tension between the proponents

Humber River goes beyond EMRAM to achieve better patient outcomes

BY JERRY ZEIDENBERG

ORLANDO, FLA. – It drives Peter Bak nuts when hospitals tout their HIMSS Analytics EMRAM scores and make reaching Stage 6 or 7 the object of their I.T. strategies.

Not that he's against the EMRAM program. It's just that he believes there's more to healthcare I.T. than dreamt of in the HIMSS Analytics philosophy. "EMRAM doesn't cover what's going on, above and beyond the patient charts," he said. "It's limited."

Bak, CIO with Humber River Hospital in Toronto, gave an interview to *Canadian Healthcare Technology* while at the annual HIMSS conference, in Orlando.

For its part, Humber River Hospital – which calls itself North America's first 'Digital Hospital' – recently invested in a predictive analytics Command Centre. It presents real-time data on screens at the front of the room, called tiles, and alerts the staff if too many patients are waiting for care in the ED, if there are delays in diagnostic tests for patients on the floors, and if patients are waiting to be discharged.

Peter Bak

Once they are apprised of these delays, staff in the Command Centre can provide solutions. That's made the hospital much more efficient. Since its opening at the end of 2017, the Command Centre has led to the creation of 23 "virtual beds", which means extra capacity for the hospital without the cost of extra nurses or staff.

Yet, this kind of project isn't part of the EMRAM ladder.

"Where's the Command Centre in the EMRAM score?", asks Bak. "It's nowhere."

Another example: outside of each patient room at Humber River is a large-sized computer monitor and a supply cabinet.

The computer screen is connected to the patient electronic chart, and it displays icons of note to the nursing staff. So, if the patient has special needs or conditions, like an infection or risk of falls, the nurse sees a warning right away.

Moreover, if there is a particular precaution that requires gloves or gowns, as indicated on the monitor, the nurse doesn't have to trek to a supply station – the supplies are right there, in the cabinet.

"This saves time for the nurse, and saves steps," commented Bak. "And it's not in EMRAM."

Neither are the integrated bedside terminals that are used throughout the hospital. They enable the patient chart to be displayed, and also connect the patient with a nurse, when needed. They allow the patient to control the lighting in the room, temperature and window shades, and also offer entertainment services.

They contribute to both better patient care and patient satisfaction. "But they're nowhere in EMRAM," reiterated Bak.

He observed that lab orders, which used to take two to four hours of turnaround time in the old hospital, are now completed in one hour, with zero labelling errors. "This is what digitalization is all about, and it's not in EMRAM."

Bak said that planning for I.T. should start with the healthcare and administrative improvements an organization wishes to make; it should then acquire the right technology to achieve these goals.

In the case of Humber River Hospital, the planning started with a strategic vision that included the elimination of "never events". These are medical errors or adverse events that experts say should never happen.

The Canadian Patient Safety Institute says they include surgery performed on the wrong patient or body part; the wrong tissue of blood type given to a patient; an unintended foreign object left in a patient after a procedure; patient death or serious harm as a result of pharmaceutical errors; and several others.

As healthcare organizations computerize, security threats may impact more users

Organizations must become more proactive to reduce the chances of being hacked.

BY DIANNE DANIEL

When a zero-day virus hit Health Sciences North in Sudbury, Ontario, earlier this year, HSN and 21 hospitals put their main electronic medical records on downtime to avoid further contamination. No data was corrupted and there was no privacy breach, but it did lead to a slowdown in a number of departments until the issue was resolved four days later.

In May 2017, the National Health Service in England was hit by WannaCry, a virus that encrypts data on infected computers and demands a ransom payment to allow users access. It was the largest cyber attack to affect the NHS, resulting in the cancellation of thousands of patient appointments and surgical procedures.

And on Boxing Day, 2018, Seattle's University of Washington Medicine in Washington became aware of a vulnerability on a website server that made protected files available and visible by Internet search. Though there was no evidence of misuse or attempted use of the information, letters were distributed to approximately 974,000 patients to alert them that files containing their names and medical record numbers had been compromised.

The list of events like these will go on, say security experts. From ransomware attacks to server misconfigurations and unpatched programs, the threat of new vulnerabilities is ever-present in healthcare.

"Security is never 100 percent solved," says Josh Wood, solution lead, Security, at Compugen Inc., an IT solution provider based in Richmond Hill, Ontario. "It's a treadmill where you're always moving, trying to work to a better position."

According to PricewaterhouseCoopers (PwC), healthcare is a greater target than other industry sectors because personal health and research information is deemed such a high-value commodity. Health systems are also increasingly interconnected, meaning more people have access to networks from all over, which in turn poses greater risk.

In 2017, PwC assessed the cybersecurity readiness of a sampling of Ontario healthcare organizations by simulating techniques used by attackers. Not surprisingly, they were able to access sensitive information without being detected. Based on their analysis, they recommended that organizations take five steps towards cybersecurity resilience: develop a risk-informed cyber strategy; actively monitor systems; improve security awareness among staff; discover and act on vulnerabilities; and, engage leadership.

In short, healthcare organizations need to develop a culture of security which must be accepted and adopted at all levels, says Wood. "You can't just have silos of security," he says. "Security has to be managed right across your organization, from the person at the front door all the way to the person at the back of the building and everyone in between, including the doctors, the surgeons, the admin staff and IT departments. They all have to be aware of security and the potential breaches."

Compugen security solutions focus on eliminating both internal and external risk. Not long ago, says Wood, it was normal for new iterations of security products to arrive on the market every two to three years. Today, major revisions are coming out every three to six months.

"The core problem is customers need more security than they think they can afford and they need to implement it more quickly," he says, noting that the shortened timeline is in direct response to the increased velocity and complexity of attacks.

"At the moment, the skills of attackers are getting better faster than many companies can adapt to the attacks," adds Wood. "There's always going to be someone out there looking for your vulnerabilities. If you're not locking your doors, watch out because they're always going to be knocking on them to see what they can get."

Many healthcare organizations face the need to secure both older on-premise infrastructure as well as newer cloud services. One important concept that

is emerging as a security best practice for the cloud is micro-segmentation, a method that creates secure zones in data centres and cloud deployments by isolating workloads. Wood says it's analogous to giving every user on a network their own office with soundproofing.

When micro-segmentation is properly architected, it is transparent to users, doesn't impact performance and dramatically improves security. Yet, just like any other security implementation, it needs to be routinely reviewed and improved over time in order to maintain effectiveness.

Compugen is currently working with Mackenzie Vaughan Hospital, a new build in Ontario expected to be complete by 2020, to ensure security challenges are addressed in its design. A smart hospital equipped with state-of-the-art technology, the site is introducing cutting-edge innovations that rely heavily on a secure, highly available wireless network and that means security needs to be forward-thinking.

One of the objectives is to implement a smart tracking system for hospital beds. As a patient is wheeled in a bed from one floor to another, or from an inpatient ward to a CT scan suite for example, the elevator will be able to track the bed's location and ensure an elevator is ready and waiting when it arrives with a goal of expediting patient care, particularly in critical situations. On the security front, the challenge is to enable uninterrupted wireless connection while protecting sensitive data.

"Our team is working to make sure that as much as possible, we future-proof ... We have to think ahead to the standard two to three years from now," says Wood.

First Nations Health Authority (FNHA) in B.C. is another healthcare organization partnering with Compugen to provide best-in-breed security for health records. Established in 2013 to reform the way healthcare is delivered to First Nations communities within the province, the health authority manages primary, mental, dental and environmental health services, and health benefits for roughly 142,000 citizens.

In response to a provincial mandate that all health authorities install a secondary data centre to safeguard patient data and maintain operations in the event of an attack or other catastrophe, FNHA implemented hyperconverged technology from Nutanix that integrates compute, storage and virtualization resources in a single system. Data from its primary data centre is replicated to the new environment every 24 hours; in the event of a compromise, health records seamlessly failover to the backup data centre.

As a young organization, FNHA had the benefit of putting privacy and security departments in place from the start, and systems are "growing in parallel" with privacy and security policies, says FNHA IT manager, Core Technology, Valeriu Surdu. "Everything is monitored 24/7; we're trying to be proactive rather than reactive," says Surdu.

In addition to its 12-person IT team, which is responsible for applying patches and configuring firewalls, the health authority has a dedicated IT security team of two people who manage governance, policy and ongoing system monitoring. According to Surdu, the hyperconverged architecture is inherently secure and simpler to manage.

"It gives us the ability to easily segregate data so we can protect client data much better and more efficiently," he says. 'With hyperconvergence you also have the ability to encrypt data at rest, which is a future we're looking at."

Michael Lonsway, president of Toronto-based Dapasoft Inc., says the more interconnected the healthcare ecosystem gets, the easier it is for threats to pop up and propagate. Hence the need for an approach that embraces "secure by design."

"All developers need to be thoroughly trained in secure development principles, and that needs to be part of any solution deployed in healthcare today, recognizing the new and ever-changing threats related to cybersecurity," says Lonsway.

In March, Dapasoft merged with iSecurity Inc. of Toronto to collaborate on evolving Dapasoft's Corolar Cloud product. The move is intended to benefit customers "looking for a highly secure cloud integration platform" and to "offer cybersecurity along with DevSecOps advisory and managed services to customers across multiple industry verticals," including healthcare.

Raheel Qureshi, a partner at iSecurity, says the

ILLUSTRATION: LINDA WEISS

two companies are working hand in hand to identify the real security challenges facing healthcare and correct them at the root cause. He points to several areas of security that need to be top of mind for any healthcare organization, in addition to microsegmentation and disaster recovery.

First, it's important that organizations maintain the right level of applying software updates. "Patch management continues to be a challenge and we need to understand why," says Qureshi, noting that some organizations delay applying security updates because it may require downtime and they are reluctant to negatively impact system availability.

Compugen's Wood agrees that effective application of security updates is an area with which every customer struggles, regardless of industry. There are different approaches to mitigate the risk, including using an external or automated patch management service, but nothing on its own offers the perfect scenario, he says.

"Some patches you can automate but sometimes it requires a human eye," he explains, noting that an update in one area may cause an unwanted cascade effect in another. The benefit of using an external managed service, he says, is that a service provider can keep on top of the process and "clean it up as quickly as possible" if or when a patch goes awry without adding a large amount of work to the existing IT staff.

A second recommendation from Qureshi is that healthcare organizations focus on providing the right level of protection to privileged users, who often hold the proverbial keys to the kingdom. "When hackers get in, the first thing they want to do is get access to the privileged IDs," he says.

Protection means designing a security architecture so that identity and access management is properly handled, using tools like Microsoft Azure Active Directory, a cloud service that can also be integrated with on-premise directory tools. Manual practices for tracking and sharing privileged account passwords should be replaced with automated privileged account management (PAM) software that will provide visibility into who's doing what, when, helping to identify potential threats.

As pointed out by PwC, active monitoring is another step healthcare organizations should be undertaking to safeguard systems and data. It's not enough to implement a security information and event management (SIEM) product to provide real-time analysis of security alerts and call it a day. Qureshi recommends organizations start with an effective threat modelling exercise to truly understand their infrastructure and all of the various avenues of inbound and outbound traffic that are unique to it.

Even when effective strategies are applied to guard against cybersecurity threats, no organization is immune from an incident. Sometimes the best defence means going on the offense, applying a red team, blue team approach. Borrowed from the military, the terms are used to signify teams that simulate real-word attacks using the same techniques of a would-be hacker.

Red teams focus on penetration testing, exposing back door or exploitable vulnerabilities that pose a threat. Blue teams focus on strengthening incidence response efforts and making the entire security in-

frastructure more responsive to unusual or suspicious activity.

Often the challenge is finding the security professionals to do the testing. For years, industry analysts have predicted a shortfall of cybersecurity talent with recent estimates suggesting there will be as many as 3.5 million unfilled cybersecurity positions by 2021.

Qureshi says that's why hospitals need to rely on security partners, like the way car manufacturers rely on suppliers. A large automobile manufacturer sources multiple parts from multiple vendors in order to assemble a car, for example, but at the end of the day they still maintain responsibility over the end-product and its certification.

"It requires a team of individuals who bring all of this together to build a robust security strategy for an organization," says Qureshi, pointing to skills such as security architect, forensic security officer, threat specialist and those with deep knowledge of security monitoring techniques. "No one hospital has all of those skill sets and no one person does either ... Own the governance, own the oversight, have the right security program but when it comes down to validating and securing all of those components, leverage your partners," he says.
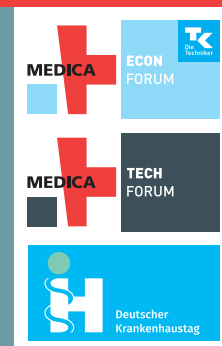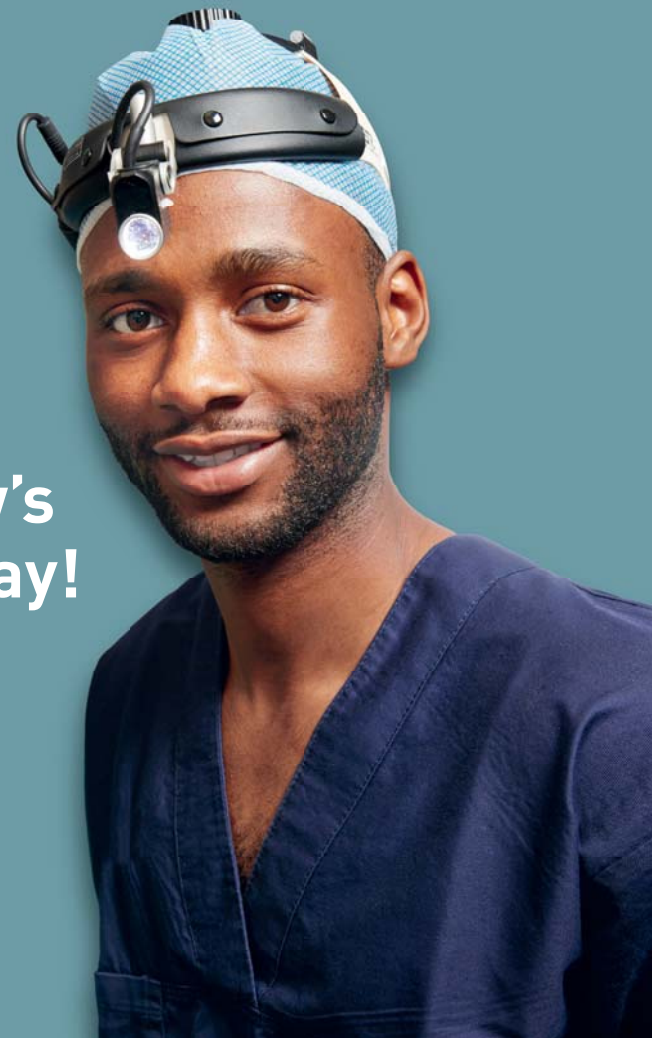
Shared EMR leads to better outcomes for patients in northern BC

BY BAILEE DENICOLA

Imagine being in charge of the health and wellness of 300,000 people scattered over a wild and remote area the size of France, where there's one bear for every two people, ten-hour drives between communities are the norm, and winter brings temperatures of -20 or below.

This is the challenge faced by Northern Health, the organization responsible for providing healthcare in northern British Columbia.

However, thanks to a shared electronic medical record (EMR), healthcare providers in parts of northern BC can now easily access the most up-to-date information about their patients at any time of the day or night, enabling them to provide better care.

The EMR in question is MOIS® (Medical Office Information System), first developed in 1990 by Dr. Bill Clifford of Prince George, BC.

More than 11 years ago, Dr. Clifford selflessly donated the software to a not-for-profit, and now MOIS® is owned, collaboratively developed, administered, and licensed by the Applied Informatics for Health Society (AIHS). AIHS has been working with Northern Health ever since.

"We partner with Northern Health to improve efficiency and outcomes," says AIHS CEO Bill Gordon.

"We've had a great partnership with AIHS for over a decade," says Darren Ditto, Regional Manager, Clinical Applications & Specialty Care Solutions, at Northern Health. "Things have changed and grown over the years, but what remains constant is that by working in partnership with our providers and AIHS, we collectively make MOIS better able to serve our patients. Another huge benefit of AIHS is that they're not-for-profit, so

Pictured: Dr. Bill Clifford, CMIO, Northern Health; Alyssa Halliwell, Director, Support and Services, AIHS.

we can work on a system and not have to worry about the bottom line in deciding what features are included – it truly is for the good of the patient."

Northern Health currently has several separate instances of the MOIS EMR.

"We're working with Northern Health to consolidate the instances and to reduce any barriers between health teams, in an effort to provide the right information to the right people at the right time," says Larry Chrobot, Senior Director at AIHS.

MOIS functionality includes documenting and in many cases, electronically downloading, key elements of the patient medical record, including:

• Encounter notes and measures
• Prescriptions, long-term medications and labels
• Health issues and rankings
• Allergies and medication administration records
• Past procedures
• Diagnostic imaging reports
• Consultation and referral reports
• Patient preferences and care plans
• Team-based communication, including EMR-to-EMR communication
• Service documentation

Sharing this information between different members of the healthcare team is key in providing comprehensive, coordinated care.

Dr. Suzanne Campbell is a GP who works at the Omineca Clinic in the small northern BC farming community of Vanderhoof (pop. 4,439).

Northern Health is implementing changes to strengthen basic healthcare: they're putting a model in place where an interprofessional team will support each physician's or nurse practitioner's office.

Depending on the size of the community, the interprofessional team can include nurses, physiotherapists, occupational therapists, social workers, and more. Dr. Campbell is an important part of the Vanderhoof interprofessional team: "While the patient has the most vested in their health outcome, the physician is the quarterback of team healthcare," says Chrobot.

When the team began using the same MOIS EMR, all team members, including Dr. Campbell, could view patient notes whenever needed, helping them provide continuous, coordinated care.

"The Omineca Clinic in Vanderhoof was one of the very first clinics to put their hand up and ask for that integration in MOIS," says Chrobot. "They took that leap of faith in the pursuit of better patient outcomes. They were visionary, and one of the first in northern BC to do that. For a clinic to take that on, that was tremendous."

As one example, Dr. Campbell's patient Ashley (all patient names and identifying details have been changed) gave birth via c-section, returning afterwards to her remote rural home, where she struggles with financial and transportation issues.

Dr. Campbell worried how Ashley would cope with a newborn, in addition to recovering from surgery plus her other challenges. She feared that with Ashley's transportation difficulties, it would be hard to check in on the young mom.

However, when Dr. Campbell saw on Ashley's MOIS chart that a nurse had been in regular contact, assessing Ashley at home and documenting the visits, her concerns were assuaged. The MOIS chart clearly showed that Ashley was recovering from her c-section, was coping with her other challenges, and that the baby was thriving.

Bailee Denicola is a Communications Advisor, Primary & Community Care and Clinical Programs, Northern Health.

PHOTO: DARREN SMIT, SMIT.PHOTOGRAPHY

EHR at Baycrest offers CPOE, improved communication and analytics

In November 2018, Baycrest adopted the long-term care (LTC) sector's leading electronic medical record (EMR) software, PointClickCare, for the Apotex Centre, Jewish Home for the Aged. It represents another technological step forward, as Baycrest PointClickCare provides innovative tools for both clinical and non-clinical staff and enables enhanced communication among the care team.

"This was more than just a technology upgrade, it was a clinical project and technology was merely the enabler," says Andrew Pigou, Program Director eHealth and project co-lead. "With the right people at the table, strong executive sponsorship from the beginning, and a robust EMR implementation plan, we were able to focus on where practice and technology intersect, improving systems and workflows to make PointClickCare work for Baycrest."

Baycrest's goals for this project included more efficient allocation of clinical resources relative to resident health-care needs, the ability to track clinical documentation, capturing information at the point-of-care, resident assessments, tasks and care assignments, medication management including ordering, tracking and administration of medications and treatments.

"Baycrest's innovative approach toward addressing clinical and operational challenges through innovative technology is evidence of its dedication to care and forward thinking," said Stuart Feldman, General Manager, Canadian Operations, PointClickCare. "As the healthcare sector moves toward a patient-centered care model, technology will serve as a force multiplier and key enabler for providers."

"At their fingertips, our clinical leadership now benefits from innovative dashboards, reports and analytic tools, which allow them to monitor resident care," added Maria Muia, Executive Director of Information & Technology. "The team can instantly pinpoint short-term opportunities to improve quality of care, while also leveraging the data to inform longer term strategic initiatives for enhancing outcomes and resident experience".

Advanced technologies are now in place, which maximize the availability of e-health records, optimizing uptake and adoption. These include fully mobile computerized medication administration carts, treatment carts and iPads,

> **Baycrest is the first LTC home in Canada using the platform to implement computerized physician order entry (CPOE).**

which operate across a sophisticated wireless infrastructure.

Baycrest is not only meeting the industry standard, but it is surpassing it with the development of the physician documentation tools led by Dr. Andrea Moser, Apotex Associate Medical Director and Chief Medical Information Officer. Dr. Moser points out that "Baycrest is the first LTC home in Canada using the platform to implement computerized physician order entry (CPOE)."

Computerized physician order entry improves the ability to enter and process orders in a timely manner, decreasing reliance on verbal orders and reducing potential medication errors.

One example is how it allows clinical staff to document patient progress and condition in real time for staff in the next shift, making the care delivery and communications process more intuitive. "This has been very valuable," says Dr. Moser. "Being able to tell a resident's story to the next shift of staff is vital, and making that story more detailed with the help of PointClickCare is truly beneficial."

"Uptake and adoption is very strong among our clinical teams who are thrilled to have a system that fully meets their clinical documentation and workflow requirements," said Simon Akinsulie, Executive Director of Long Term Care. Akinsulie noted "the rapid rate at which staff are adjusting to an extensive range of new technologies."

Innovative partnership creates process for digitally onboarding hospital staff

MARKHAM, ONT. – Markham Stouffville Hospital (MSH) has partnered with VitalHub to create a streamlined, digital onboarding and orientation process for the hospital's new professional staff. A mobile application named VH Engage, referred to at MSH as MSH Ignite, is being used.

MSH is a community hospital located in Markham, Ontario. After an expansion in 2014, MSH doubled in physical size, adding over 100 new inpatient beds and eight new operating rooms. It also tripled the size of the emergency department and welcomed almost 100 new highly skilled professional staff.

Due to this significant growth, there was a need to address the process of onboarding professional staff. Prior to Ignite, onboarding professional staff involved a flurry of activity, which intensifies in the 48 hours before they officially started.

With all the demands of a busy hospital environment a new professional staff member is expected to hit the ground running. Before they can do so, there are various agreements to sign, hospital policies to understand, and questions to answer, such as "where do I park?", or "how do I contact another doctor?" and "how do I log in to access lab results?"

MSH found that their paper-based process to onboard new residents and professional staff was very cumbersome and time-consuming. And because MSH tends to hire a large proportion of locums, it can get especially complicated for professional staff who need to quickly adapt to systems that are often completely different from hospital to hospital.

MSH brought this challenge to the first cohort of a MaRS led initiative called 'Innovation Partnership: Procurement by Co-Design'. VitalHub responded to the co-design innovation partnership opportunity and was selected through a competitive evaluation process to develop a smartphone application, leveraging its mobile application development framework and experience.

MSH sought a solution that would allow professional staff to be onboarded, access vital hospital information, complete required documentation, review leadership structure and other important tasks all remotely via their mobile devices. The app efficiently addresses these areas as well as increases knowledge transfer and helps foster the relationship between professional staff and administration.

"This isn't just about orientation … this is about building an enhanced culture of respect between the hospital and our professional staff," says Dr. George Arnold, Chief, Department of Obstetrics and Gynaecology, Clinical Innovation & Strategic Ventures.

The app was launched in the summer of 2017 on IOS devices and made available on Android devices in the fall of 2018. MSH Ignite has been very successful with all professional staff using the app to complete onboarding and orientation. "This app helped me access important information when I needed it and helped me keep up to date with events at the hospital," says one new physician.

Ensuring professional staff have ready access to updated policies, QBPs, and medical directives though MSH Ignite is a priority for the hospital. This app has made this knowledge transfer faster and easier, reducing potential risks in patient care delivery.

This enhanced communication flow means that professional staff have the information they need, when and where they need it. "We're providing our newly appointed professional staff with the necessary tools, so that they can provide our patients with the best care possible," says Dr. Caroline Geenen, Chief of Staff at MSH.

Using the app makes 80 percent of professional staff feel more engaged and 60 percent continue to access information and resources after onboarding. One of the goals of this project was to reduce the process time for Medical Administration. To date, there has been a 50 percent increase in time savings for both Medical Administration and professional staff with the digital process.

AI and bots are reinventing how patients connect with health clinics

BY TAYLAN PINCE

A new digital platform has launched to help busy doctors, patients, and clinic staff communicate better. Avocare, an AI-powered chatbot, is vastly improving communication in Ontario clinics, with over 8,500 patients using the digital platform to book appointments, request doctor's notes, message reception staff, order refills, and contact their physicians directly. Since implementing the chatbot last year, calls to the front desk at Toronto's Village Family Health Team clinic have dropped from 12,000 to 9,500 per month – a 20 per cent decrease.

Previously, patients could only email their doctors through an outdated, provincially-approved communications platform (with no limit on the number of messages they could send), and front desk staff had no way of directing the flow of emails between patients and doctors. This meant the extra administrative burden was falling squarely on the doctors' shoulders.

"Before using the Avocare chatbot, I would spend long days working at the clinic – then often spend an additional two to three hours at home responding to patients' emails," says Dr. Manisha Verma of the Village Family Health Team.

But the frustration wasn't limited to doctors and administrative staff. Patients were frustrated too, as many of their requests to reschedule appointments were met with a response directing them to contact the front desk. Upon calling the front desk, patients were being placed on hold for long periods of time. It was a poor solution to a simple request, and it meant that nobody was getting what they needed.

The power of AI: This is where artificial intelligence (AI) comes in. If a chatbot were to improve the clinic's congested user flow, it would need to understand and respond to the requests submitted by patients.

In order to train the AI-powered chatbot to engage in conversation with patients, around 10,000 pieces of text and email correspondence were collected. From this data, the chatbot learned how to identify different types of requests and respond accordingly. Eventually, some of the basic requests could be handled automatically, while the more complex queries would get forwarded to the front desk.

As with all machine learning, the AI-powered chatbot only gets smarter with time. The more patient requests that Avocare fields, the better it's able to respond; and the better it's able to respond, the smoother the clinics run.

The biggest hurdle: The biggest hurdle in implementing Avocare has been working within the bureaucratic, technological, and privacy constraints of Canada's outdated Electronic Medical Record Software (EMRS). About 75 percent of EMRS platforms don't allow for integration with software like Avocare, either because the technology is too archaic or the owners of the software want to guard against competition.

Taylan Pince

The remaining 25 percent of EMR platforms do allow for some level of integration, and Avocare is currently running in three such clinics. However, all Ontario EMRs will eventually be required to play nice with outside software, and Avocare will be in a first-mover position to offer their solution when that change comes into effect.

When it comes to patient privacy, Avocare adheres to strict security protocols and data encryption requirements. Every three months, privacy standards set out by the government are reviewed, in addition to the software undergoing regular stress tests from a third party.

Small steps forward, no big steps back: 'Small steps forward, no big steps back' is advice commonly given by nurses to their patients. It's not about overnight recovery, it's about gradual improvement. It's also a fitting mantra for a new software like Avocare looking to integrate into Canada's slow-to-change healthcare system.

Once the barriers to integration are removed, Avocare will reach more clinics, with the goal of saving administrative staff time, allowing doctors to focus on being doctors, and ensuring patients get what they need quickly.

It's clinic communication that works.

Taylan Pince is CTO and Co-Founder of Avocare.

Patients should help design systems, along with vendors and investors

BY KARIM KESHAVJEE,
DAVID GORANSON
AND FAHREEN WALIMOHAMED

Over the last several years, we have been researching options for how to manage the upcoming complexity in healthcare – such as aging populations, rising costs and technological revolutions. We have spoken with leaders in health information technology from around the world and looked at case studies in other industries, such as retail, the airline industry, transportation and the financial industry to identify methods that have worked to manage high levels of complexity and rapid change.

Our interviews with health information technology leaders have identified recurring features of success:
• good governance of information technologies;
• physician leadership of technology programs; and
• alignment of incentives for key players in the system.

We have noted that the complexity in the health system spans so many different domains (consumerism, cost, information flow, diagnostics, treatments, system complexity, artificial intelligence), that existing methods of dealing with the needs of patients and providers are no longer working.

Previous arrangements which have worked for decades are breaking down. Ministries of Health can't seem to find common ground with physicians anymore. Information technology costs are mushrooming, yet don't increase safety or quality of care. What is the pathway out of this maze?

New principles are required that involve more stakeholders at all levels of the health system than has previously been the case, especially patients.

We need to work together more as a community of participants and stakeholders, including vendors, researchers, guideline developer-implementers and health informatics professionals.

A multi-stakeholder governance model provides us with a self-organizing and self-correcting mechanism for adapting in real-time to an ever changing environment.

In addition to a broadened and more inclusive definition of good governance, we need new principles of patient empowerment that enable patients to play a much more active role in the healthcare system at multiple levels.

Patient empowerment cannot be limited to health education and access to medical records. Empowerment needs to encompass power at the individual, community and societal levels. Patients need to be able to bargain collectively, just as other stakeholders are able to bargain collectively.

Patients and health seekers should also have their alternative ways of learning respected. They should have ownership, control, access and possession (OCAP™) of their data.

Patients should also be able to participate in the monetization of their data, an increasingly common feature of the health system landscape. The recent Patient Declaration of Values in Ontario is an excellent start.

We need better ways of encouraging vendors and investors to bring new innovations to market. Canada is famous for doing health information technology pilot projects that go nowhere. This needs to end.

The reason for stalled pilot projects is clearer than ever. The lean startup movement has shown that there is no such thing as a perfect product meeting pent-up demand in one fell swoop.

A minimally viable product has to be evolved over time by working closely with key customers. This type of market shaping requires time and robust markets.

Without markets for new products and patience for evolving products, we will always be stuck in pilot mode. Given the low rates of return on product investments in the Canadian healthcare system

> **The upcoming virtual meeting place will allow stakeholders to propose policies to improve the healthcare system.**

compared to the rates of return in the US, government intervention is required. Governments need to help create markets for health information technology products.

Given the large gap between existing and desirable patient care, there is an opportunity for governments to encourage made-in-Canada solutions for mobile technologies that serves the needs of patients. This is likely to be popular with patients, will encourage external investments and growth of Canada's software and services marketplace and create new jobs for mobile app developers, health coaches, data analysts and user interface designers. A quadruple win for the Canadian healthcare system and our economy.

Canada also needs to support more directed research in interoperability. Current approaches to interoperability have not worked. Canada has spent billions over the last two decades pursuing an interoperability approach that doesn't add value to any of the players involved.

All the blaming and shaming of vendors for data lock out is a red herring. Interoperability is hard. We need to conduct more research to understand what makes it hard and come up with solutions that make it easier.

Finally, we need better integration of our healthcare system. Our healthcare organizations all work in silos. This problem was recognized long ago, but the problem is difficult to solve.

However, increasingly, patient care suffers because hospitals, home care and primary care are not able to coordinate care sufficiently for patients. We need to think about how we can use our health informatics resources in this country to help us better integrate our health care organizations.

Over the next several months, we will be creating a virtual Meeting Place or Public Sphere where all interested stakeholders can join and propose policies that will help us identify and prioritize problems together, create solutions together and collectively work together to shape the information technology future of Canada's healthcare system. After all, Canada's healthcare system is our collective pride and joy.

Dr. David Goranson is a rural family physician in BC; Dr. Karim Keshavjee is a health informatics consultant and an Adjunct Professor at the University of Toronto. Fahreen Walimohamed is a student in the Master's of Health Informatics program at the University of Toronto.

Virtual house calls

hospice care at her request, where she died peacefully. There are many other anecdotal stories like this one, including one Virtual House Call that we performed to a patient who had neither heat nor electricity. We conducted this visit by flashlight!

I imagine as other front-line providers read this article, patients will come to mind who would clearly benefit from this technology and service.

In time, it is my hope that we can find more resources and opportunities for collaboration to make this service more widely available.

Limitations: When the first version of this service was offered, in 2017, the discus-

sion around integrating digital health into the Canadian system was in its infancy.

There was limited ability to integrate this care with other services, and while we had good success with conducting encounters with patients, we struggled to integrate this service into their healthcare and often lost track of patients as they traversed the healthcare system.

Admission to hospital in some instances was unavoidable, and subsequent discharge did not return the patient to our care. Moving forward, and with greater awareness of the benefits of digital health, improved integration of these types of services should prove beneficial.

More resources will be required to demonstrate the magnitude of the benefit with respect to reduced hospital admissions and ER visits, among other things.

Technical limitations: Early technical

limitations related primarily to the quality of objective information obtained in the course of conducting an assessment and making a diagnosis and treatment plan.

Videoconferencing capabilities have supported the collection of subjective information, i.e., history, for a long time.

Many software platforms provide the

> **"It is my hope that we can find more resources and opportunities to make this service more widely available."**

required security for this encounter. The challenge, however, lies in the physical exam. Early stethoscopes proved technically limited in several ways.

Higher level Bluetooth stethoscopes that are very similar to traditional stethoscopes promised connectivity, but in practice, they were not overly reliable, especially for remote use in real-time (asynchronous remote care is another topic entirely!)

The quality of the acoustic information was good, but unreliable.

Basic USB enabled stethoscopes, such as the one that we ultimately used, offered easy connectivity (to REACTS, not all platforms) but limited quality of information.

These stethoscopes do not offer the abil-

ity to adjust the frequency settings. This is critically important for digital auscultation as background noise is a much more significant factor than in person auscultation.

High-frequency sounds, such as lung sounds, require different settings in digital auscultation than low-frequency sounds such as heart sounds. The device that we used performed well at low-frequencies (heart sounds), but poorly for higher-frequency sounds (lung sounds).

Accordingly, auscultation of the lungs was of low-quality, and in some instances rendered the visit technically suboptimal. After each visit a telemedicine provider should assess whether or not the visit approximated an in-person encounter; if it did not, then the patient should be notified of this concern and the assessment and plan may be modified.

Summary: Virtual House Calls are technically feasible and result in high levels of patient and caregiver satisfaction. Technological advancements since the inception of this program have made this service even more beneficial, such that it is rare that a trained provider would be unable to approximate an in-person visit.

More study is required to produce information on the scalability of this service and the cost savings that will be realized. Consideration will have to be given to the fact that acquiring data requires an investment.

Humber River goes beyond EMRAM

On another note, Humber River is using technology to improve overall efficiency, quality and to reduce resource utilization.

"It's a logical progression," said Bak. "Everything we do is driven by these themes."

He asserted the direction was originally set by former CEO Dr. Rueben Devlin and current CEO Barb Collins.

One of the ways in which communication has been improved in the hospital has been through the use of Ascom smartphones, which are assigned to staff when they start their shifts. Of course, one might

> **"Whether the patient is in serious pain, or simply wants a blanket, we want to respond,"** says Bak.

think a personal phone would do the job, but Bak asserted that these devices are more than just phones, they are "tools of the trade" and thereby need to be well managed: devices must always be available and working.

Once nurses are on a shift, patients can reach them through the smartphones. There's intelligence built into the system, too. For instance, the system knows if a patient's primary nurse is occupied with another patient and cannot respond; it will automatically re-direct the call to the secondary nurse.

Moreover, the nurse must respond to the call. "You can't just ignore it," said Bak. "We've created service level agreements with the nursing staff, and they can't let the patients sit there. There's also a central dispatch centre that can see if you've responded."

This is all part of a quality drive. "Whether the patient is in serious pain, or simply wants a blanket, we want to respond," said Bak. "For this, the communication system is very valuable."

While much has been accomplished in the past few years, Bak said, "We still have a lot to do." In particular, more work is being done on the Command Centre. A set of "generation two" tiles are being constructed to provide alerts in new areas.

One of the focuses is on perinatal alerts, and Humber River is creating an early

warning system for babies in distress during perinatal care. Bak stressed that Humber River's strategic direction isn't the only solution for improving care and efficiency in the hospital sector. "We're not saying it's the only way to go. But it's how we've chosen to invest our money."

Care providers can maximize benefits of genomic knowledge

comprehensive record directly into the clinician's workflow regardless of EHR.

The advantages of this approach are many and include critical IT considerations such as:

• Data liquidity. This enterprise approach means genomic insights can be applied across the organization for better patient care and population management.

Assembled into a comprehensive and discrete informatics layer, data can follow a patient into various clinical settings. The

entire care team can access valuable insights; information is available and not isolated in a single care encounter or specialty area.

• Data governance. There is no doubt that precision medicine introduces new challenges related to lab ordering practices, prescribing decisions and data management. An enterprise-spanning informatics approach means organizations can enact consistent practices according to their own policies and priorities – as well as apply governance to this new layer of complex data to ensure organizational and legal compliance.

Recognized as a thought leader in the field of precision medicine, Dr. Joel Diamond is an Adjunct Associate Professor of Biomedical Informatics at the University of Pittsburgh. He is a diplomat of the American Board of Family Practice and a fellow in the American Academy of Family Physicians. He cares for patients at Handelsman Family Practice in Pittsburgh, Pennsylvania.

Learn more about Allscripts innovations at the e-Health 2019 Conference, Toronto, May 26-29. Allscripts is a Silver Sponsor.

Denis Chamberland

produces is often startling and makes the exercise well worth the extra effort.

So effective is this approach that the health system's procurement counsel should be asked to structure a robust dual-track negotiation process and be prepared to put his (her) fees at risk in the event of a disappointing result.

There is also reason to doubt the accuracy of the guide's assertion that negotiations are legitimate provided they do not "result in a material change to the scope of the RFP and the terms of the legal agreement."

What if the RFP explicitly reserves a right to materially change direction as the health systems learns of the solutions being offered during the procurement process? Particularly where the health system is tapping the market for a highly innovative solution and may even be defining a new path never seen before in the industry, there is nothing sinister about an important change in direction. There is no process unfairness. As al-

ways, provided the language of the bid call document properly anticipates the possibility of an important change, the rule on transparency is honored.

It is noteworthy that the misconception around the bar on negotiations with vendors precedes the arrival of the BPS Procurement Directive by precisely 30 years! Clearly the Directive did not trigger this misconception, and the guide – while usefully clarifying that negotiations are not

> **"I believe that what is needed now is a higher level of ambition to try new approaches in procurement."**

prohibited by the Directive and despite the best intentions of the myth busters – may well contribute to new misconceptions, as can be seen by point no. 12.

To have called the guide The Art of the Possible is apt, as it connotes the goal of trying to achieve something that is good enough rather than being driven into complete paralysis by a desire to achieve perfection. To be sure, the pro-

curement regulatory framework is complex and will continue to provide endless learning opportunities for all of us working in the field. But waiting to have mastered everything before innovating is unrealistic, will not produce the results hoped for, and will unnecessarily slow the pace of innovation.

As a procurement specialist who has worked in public procurement in many industry sectors over many years in Canada and abroad, I believe what is needed now is a higher level of ambition to try new approaches in healthcare procurement. The guide purports to be "for hospital executives". If significant new innovative outcomes are to be achieved through healthcare procurement, it will fall on such executives to see their way through the barriers to innovation, real and imagined, and ambitiously lead the way.

Denis Chamberland is CEO of MES Group and a lawyer with extensive procurement, technology and trade law experience in the healthcare sector in Canada and Europe. He can be reached at dachamberland@gmail.com

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