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Eliminating human error

Dr. Paul Chang, a radiologist at the University of Chicago, asserts that more processes in healthcare need to be automated, so that human decision-making is reduced.

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Reducing heart disease

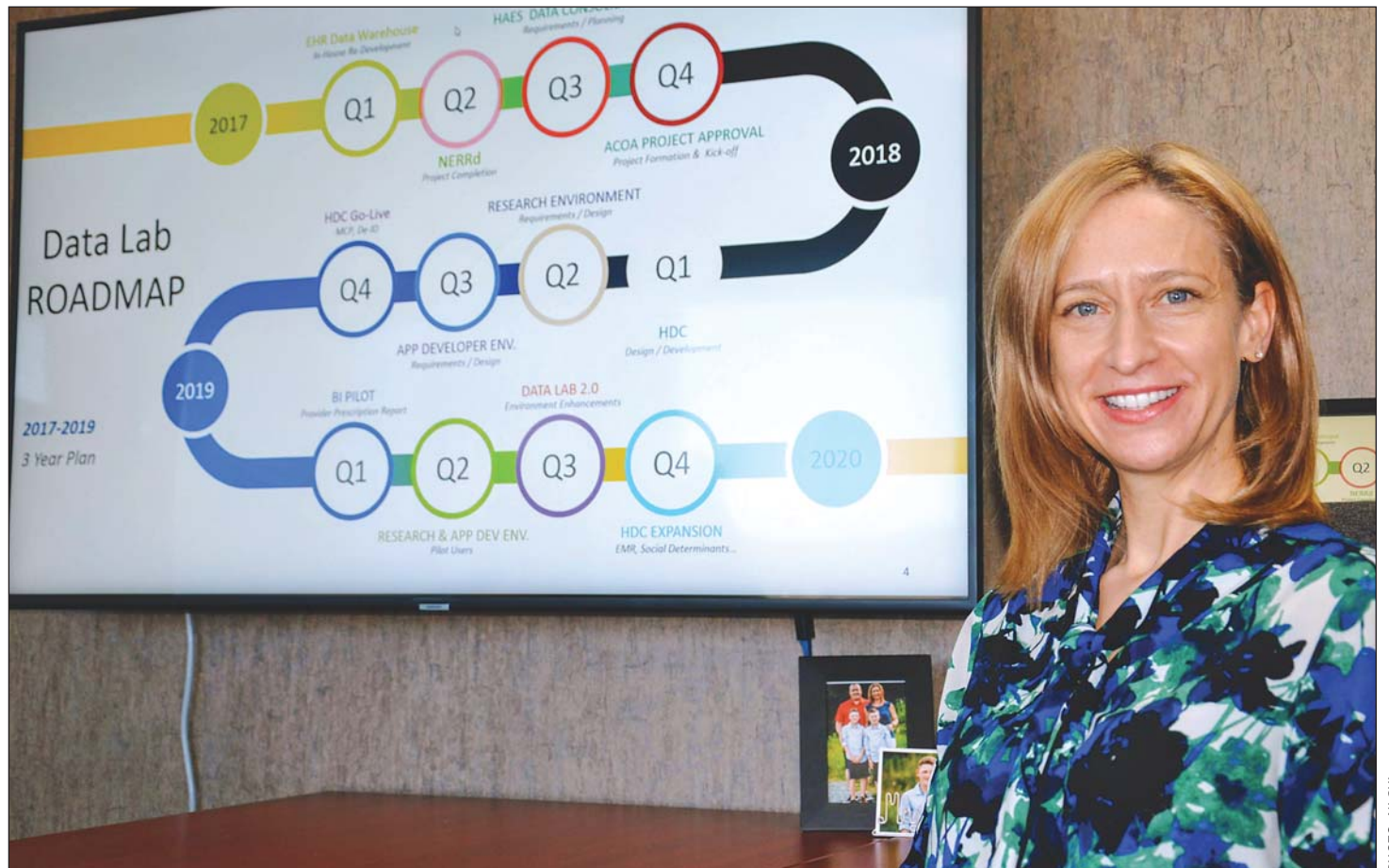
The Heart and Stroke Foundation of Canada has launched its 'Activate' program to lower the risks of hypertension in a target group of 7,000 Canadians. The program uses a computerized platform and personal coaches.

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Hybrid operating rooms

The Northern Alberta Vascular Centre is now using two, state-of-the-art vascular hybrid operating rooms. The advanced technology, including fluoroscopy with a double C-arm, is providing doctors with high-quality images.

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Jill Grant, Director of EHR Operations at the Newfoundland and Labrador Centre for Health Information, discusses below how a \$9 million investment from ACOA has fuelled the development of advanced analytics for health in the province. The funding has also enabled an expansion of telehealth solutions, including video visits, and some pioneering work in the use of electronic ordering.

PHOTO: NLCHI

Newfoundland jump-starts its work in health analytics

BY JERRY ZEIDENBERG

ST. JOHN'S, NL – The province of Newfoundland and Labrador is investing \$3.8 million in a Health Data Lab that's focusing on analytics and artificial intelligence to improve healthcare delivery. The project may very well become the most advanced of its sort in Canada, as it brings near real-time data flows from across the jurisdiction into a secure, consolidated repository.

"Most of the data sets are no more than 24 hours old," commented Jill Grant, Director of EHR Operations at the Newfoundland and Labrador Centre for Health Information. She noted the goal was to capitalize on the vast, rich data sets accumulated since the launch of the provincial Electronic Health Record, HEALTHe NL, and to provide an advanced, secure and robust analytics environment with leading edge technology.

Traditionally, the data sets used in the healthcare sector to perform analytics are quite old – they're out of date by weeks, if

not months. By the time analysts gain access, conditions have changed and their insights are no longer relevant.

By obtaining current data, the decision support can be much more useful.

For their part, the project team in Newfoundland and Labrador intend to combine the data with predictive analytics to obtain new insights on how to improve healthcare

Most of the data sets are no more than 24 hours old, commented NLCHI's Jill Grant.

investments and where to build up resources. They're also hoping to spur the rise of innovation and entrepreneurial activities.

The Newfoundland and Labrador Centre for Health Information (NLCHI) is spearheading the project, and it's one of three areas of investment made possible by a \$9 million grant from the federal government's Atlantic Canada Opportunities Agency (ACOA).

The two other project areas are focused on expanding its existing telehealth services and electronic ordering.

The Health Data Lab is currently working on enhancing its existing data warehouse so that it's capable of handling a variety of data streams, from multiple provincial clinical source systems across the province. Such data sets include lab, pharmacy and the MEDITECH system that's used in hospitals in Newfoundland and Labrador.

NLCHI is in the process of working with multiple vendors to enhance the provinces health analytics environment such that stakeholders will be able to use and interact with health data and information in new ways while also mitigating risks associated with data disclosure.

In the end, there are three groups who will benefit from the data – health system users, researchers and innovators.

Grant noted the Health Data Lab will be producing a portal for health system users.

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Newfoundland's \$3.8 million investment focuses on analytics and A.I.

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"As an initial pilot, we will be providing access to an up-to-date dashboard for healthcare providers," she said. "So, for example, physicians will be able to log-in to look at their medication prescribing habits, and to compare themselves with their peers across the province."

Indeed, improving care at the primary care level is one of the major goals of the project.

Secure access is also being provided to researchers, including experts at Memorial University of Newfoundland. "Having access to provincial-level data, in a secure and timely manner, holds a lot of potential for researchers," said Grant.

Finally, there will be access for entrepreneurs, through programs like Hacking Health, and to health IT vendors. It's believed that use of data – in a secure, private and anonymized way – will help produce new innovations and also help seed economic growth in the province.

"We're opening the door to innovation," said Grant.

She observed that a good deal of policy

work has gone into the project, to ensure the right security and privacy features are in place. The provincial government has worked closely with the NLCHI, too, to help usher in the policy changes needed for the project.

A significant investment has also been made into the infrastructure to support additional analytical software capabilities.

Regarding the other initiatives, Grant noted the e-ordering project involves a \$1.8 million investment. e-Ordering will enable clinicians to request a referral for service from another health care provider electronically, rather than by fax or mail. The technology will review both the referral and the patient's medical profile in addition to clinical best practice and provide advice on the recommended course of action.

Pilots have been developed in two areas, the cardiac catheterization lab and the vascular imaging lab. "They're both areas where there are wait lists," said Grant.

The goal is to convert the paper-based processes used in ordering to electronic methods, to improve quality, enhance patient safety and care while increasing throughput and productivity.



The team at NLCHI is working on new initiatives in analytics, e-ordering and the expansion of telehealth.

Both clinical areas, cardiac catheterization and vascular labs, have centralized intakes, so it's somewhat easier to digitize the ordering process than for others.

The cardiac cath solution, myCCath, went live in June 2018, with Nova Scotia-based MOBIA as the main vendor partner. The vascular lab solution was in progress at the time of writing, and Orion Health, of Toronto, is the key vendor.

"We're working closely with our clinical staff on the vascular lab system, and we're

aiming for a spring 2019 rollout deployment of the electronic requisition form for vascular imaging exams in HEALTHe NL, the provincial electronic health record, with integration into eDOCSNL," said Grant. "Once these two ordering solutions are in full swing, an evaluation will be done. Based on the evaluations of these pilots we will look at other clinical areas to expand."

A key feature of the solution is the intelligence that's built in, Grant said. In particular, the acuity of the patient is recognized and prioritized, so that urgent cases go to the top of the queue.

By tying into the provincial electronic health record, Health NL, clinicians will have access to data from labs, pharmacies and hospital records as they're working on the orders, which helps with decision-making.

For its part, the telehealth expansion project involves a \$3.4 million investment. The emphasis is on expanding service into rural areas, and also into new clinical areas such as mental health and addictions.

"We also want to expand the service into physician offices and into homes of patients," said Grant. "This will greatly reduce health care costs for both the patient and health care provider. It also allows continuity of care, increased capacity and reducing barriers to health care, such as waitlist reduction."

With virtual visits, there's a need to increase the capacity available in the system, and also to ensure that services are secure. To support this, the project has placed significant investment on enhancing the Telehealth infrastructure to support the expanded access through a more cost effective, sustainable and secure technology solution.

Video visits will be a boon to the aging population, and to rural patients who don't have easy access to medical professionals. Using telehealth in homes and physician offices, the playing field will be leveled.

Grant said the ACOA funding has been transformational. "It has enabled us to build the foundation for the future," she observed.

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Patients supplying advice to Alberta as it builds Connect Care system

BY DAVID VEITCH

Ryan Magnussen has used Alberta's healthcare system hundreds of times since a debilitating spinal condition forced him to retire 15 years ago.

The former bank manager and businessman says, over that time, the key to improving healthcare quality and safety became clear to him.

"Every little mistake that happens in healthcare seems to come back to problems with information and communication," says the 56-year-old Calgary man.

"So if you fix those two things, I think you can eliminate a lot of these errors."

Wanting to make a difference, Magnussen accepted an invitation from Alberta Health Services (AHS) in 2013 to volunteer his time as a patient advisor, providing health leaders with advice, direction and the patient perspective on decisions related to policies, programs, services and facility design.

AHS is Canada's largest province-wide health system with more than 100,000 staff, physicians and volunteers, including about 800 patient advisors.

About 80 patient advisors, including Magnussen, are currently embedded in all levels of planning and design work for Connect Care, a mammoth undertaking that aims to consolidate and digitize the health information of 4.3 million Albertans. This information is currently stored in about 1,300 independent electronic systems, in addition to paper-based systems.

The foundation of Connect Care is a common clinical information system that will allow healthcare providers a central access point to patient information, common clinical standards and best healthcare practices.

The first phase of Connect Care is expected to launch in Edmonton this fall.

"We are catching up and digitizing the



Ryan Magnussen, right, is playing an active role as a patient advisor with Alberta's Connect Care system.

healthcare workplace. All of it. Every aspect of it," says Dr. Robert Hayward, Chief Medical Information Officer with AHS.

"Closed-loop medication management. Full digital documentation. Team relationships and communication. The way tasks are managed. All of that is moving from paper and various other media into one single integrated environment.

"Not only will Connect Care help Alberta continue to lead as a health information systems innovator but, with an integrated record that spans the entire continuum of care, Connect Care will create a foundation for health informatics innovation, allowing us to further explore how health technologies can improve health outcomes. It's really extraordinary."

Patient advisors have been involved in this 'extraordinary' project every step of the way. One or two patient advisors sit on each of more than 30 major Connect Care governance committees and councils.

"We need the voice of patients and families to guide us, help with some decision-making and provide a perspective to broaden our thinking and make sure we're staying as patient-focused as we intend," says Barb Kathol, Senior Program Officer, Connect Care Operations.

"Connect Care is being designed by the people who will be using and benefiting from it: frontline healthcare staff and physicians, as well as the patients they care for. This way, the system is being designed and built with the people using it in mind, as well as the people we care for."

Magnussen stresses the involvement of patient advisors is anything but a token gesture.

"From Day 1, I've been treated like a respected partner," he says.

Magnussen has full voting privileges on the 33-member Connect Care Executive Committee that reports directly to the AHS executive leadership team. Among

other tasks, this committee assessed proposals from seven vendors and selected Epic Systems Corporation in 2017 as AHS' partner on the project.

Magnussen also co-chairs the Connect Care Patient and Family Advisory Group comprised of about 20 patient advisors who provide recommendations to any and all teams involved in the project's planning and design. This advisory group was recently tapped to provide advice on how to best manage patient consents through an electronic system, and how quickly test results should be made available to patients.

"Any committee or any council can go to them for consultative advice," Dr. Hayward says of the Connect Care Patient and Family Advisory Group, "or (patient advisors) can insert themselves and raise a red flag if there's an area where they think more input is needed."

Patient advisors are also embedded with clinicians and operational leaders on more than 20 area councils that are examining how Connect Care can best support specific clinical areas, such as cancer, surgery, primary care and continuing care.

AHS Chief Information Officer Penny Rae says patients bring a much-needed outsider perspective to Connect Care planning and design. "They're not biased to AHS," she says. "They're biased to what's good for patients."

Magnussen is quick to note patient advisors bring a diversity of backgrounds and experiences to the table, and don't always agree with one another.

"We can have quite (pauses) ... fruitful discussions," he says, laughing. "It's not just a rubber stamp, that's for sure."

Magnussen spends about 15 hours per month volunteering as a Connect Care patient advisor. He considers this work the third act of his professional career.

"This is something I take great pride in," he says.

BC's Digital Technology Supercluster revving up on healthcare projects

BY ZENA RYDER

The trial and error process of finding the right drug, at the right dose, is frustrating for both patients and doctors. As we now know, many medications are ineffective or harmful because of an individual's genetic makeup.

Canada's Personal Genome Project reported in 2018 that over 23 percent of the people whose genomes they sequenced turned out to be "at risk for severe potentially life-threatening adverse drug reactions" because of their genetic makeup. [<http://www.cmaj.ca/content/190/5/E126>]

The BC-based Digital Technology Supercluster [<https://www.digitalsupercluster.ca/>] is addressing this problem with their Pharmacogenomics Project. The Supercluster is a group of 600+ businesses, organizations, and institutions that are collaborating on projects involving the collection, storage, analysis, and

use of digital data in various sectors, including healthcare.

Supercluster CEO Sue Paish explained that when the Pharmacogenomics project is complete, doctors anywhere in Canada can order cheek swab kits to be mailed to their patients. Each patient will then send their swab sample away for genetic analysis.

Based on that patient's unique genetic profile, as well as on factors such as age, medical history, and medications they're taking, the patient will receive a detailed report on how they're likely to respond to hundreds of different drugs – a number that's growing as researchers discover more drug interactions.

This information will become part of that patient's electronic medical record (EMR), so that when they need a prescription, their doctor can immediately access drug recommendations – improving patient safety and convenience.

Through this project, as well as other Supercluster projects, the expertise of

small and medium-sized enterprises (SMEs) can reach all Canadians by collaborating with larger companies and organizations.

Paish said, "Each Supercluster project must have at least three organizations involved, and at least one of those must be a small or medium-sized enterprise."

GenXys and LifeLabs are the SMEs involved with the Pharmacogenomics

One of the Supercluster's health sector projects is a teledermatology system that includes artificial intelligence.

project. The other collaborators are Telus Health and the non-profit research organization, Genome British Columbia.

Over the next five years, the federal government will invest a total of \$950 million in the five superclusters across the country that successfully applied for

the funding. In November 2018, the Digital Technology Supercluster formally launched with an announcement that it will receive federal funding of \$153 million to get started.

Across various projects, federal funding will be matched by Supercluster members. The Supercluster has initiated seven projects, which was to be officially announced in February 2019. Three of the projects are in healthcare. In addition to the Pharmacogenomics project, the others are the Dermatology Point-of-Care Network and the Secure Health and Genomics Data Platform. [<https://www.digitalsupercluster.ca/wp-content/uploads/2018/12/Supercluster-Project-Summaries-docx.pdf>]

How will the Dermatology Point-of-Care Network help Canadians? Doctors and patients are all too familiar with the current situation – a lengthy and time-consuming process.

A patient who is concerned about a

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The myths and realities of AI in health care

AI has great potential for helping clinicians and patients, but we should start with modest projects to master the technology.

By Greg Horne



Greg is the SAS Global Principal for Health and is based out of Toronto, Canada – he joined SAS in August 2012. In this role, Greg has the opportunity to work with healthcare strategy in a way that focuses on outcomes as well as the cost, quality and other challenges that any modern health system faces. He is considered a thought leader in the future of health care and the introduction of patient focused technology.

Health care is facing an unprecedented need to reform, drive quality and cut costs. Growth in targeted, specific treatments and diagnostic technology, coupled with a rise in people with long-term and multiple chronic conditions, is creating unsustainable demand on the system. To thrive – or even merely survive – health care organizations must adapt and find ways to deliver better, more efficient care.

This need for greater efficiency and rising demand has sparked a discussion about how artificial intelligence (AI) will save the day, replace the physician and deliver precision medicine to all. Is the concept myth, reality or perhaps a mix of both?

Until recently, the health care industry has had little to no automation, very limited use of predictive analytics and a lack of complexity in the predictions clinicians do make. And yet we commonly see headlines implying that health care organizations can take tools like AI, machine learning and advanced algorithms and vastly change the clinical landscape overnight.

The result? Many health care organizations attempt to leap to the most advanced uses of AI – automated diagnostics, complex imaging analysis and robotic surgery – as a first step out of the gate. When those attempts fall short of hyper-inflated expectations, reactions range from head scratching to complete disillusionment with the promise of advanced analytics and AI.

Closer to reality, the industry can use analytics to help doctors and other clinical staff in ways that drive

value and remove the need to for time-consuming, low-value tasks before they take on the complex, big-ticket items.

AI learns from pattern matching and context through data searches. It's a process, and it takes time to train a model. Keep in mind, too, that it's also impossible to train the machine without bias, so first tackling low-prediction, low-complexity solutions help organizations learn how to train and build for greater complexity and predictive ability.

We don't let a newly graduated medical student perform open heart surgery unaided as a resident, right? We likewise shouldn't expect the world of AI to make that leap. Instead, some great places to start include:

Helping doctors and patients get the most out of face-to-face interactions

Primary care physicians have growing patient needs and limited time for each visit. This stress causes burnout and poor-quality interaction. Why not automatically prepare the patient's records prior to a visit to highlight areas to focus on related to the appointment? Then, using AI, take the patient's demographics and social determinates to present potential questions and outcomes to the doctor and structure the appointment.

Automating comparison of radiographic imaging

Radiologists spend a lot of time examining the relevant pathology across large sets of medical images. How might AI help clinicians make better diagnostic and treatment decisions? Maybe once the radiologist highlights a pathology on just one image – a CT scan of a liver tumor, for example – AI could automate a comparative exploration, finding every image where the liver captured on any modality and present the analysis immediately to the doctor. The physician would be able to compare the images more quickly and it would make it easier to study the pathological progression of disease.

Alleviating alert fatigue

Building automation is growing in hospitals and it's generating alarms – from doors, medical devices, overhead announcements and more. The result is alarm fatigue, a problem of epidemic proportion that causes caregivers to miss legitimate warnings. Alarm

fatigue is killing patients and causing other negative outcomes. But what if hospitals started training AI to determine when an alarm is potentially serious and to prioritize and escalate the call to action accordingly? A door being opened in the maternity unit and the movement of a baby requires immediate attention, but a door opening on the back of a staff area during break time on a sunny day does not. Alarms for patient critical medication require a nurse to attend, but for a hydration infusion the need isn't so critical.

The true promise of AI in health care

AI will be a tool that supports physicians, not replace them. AI will help them use more data points to make better informed treatment decisions and spend more time having meaningful conversations with their patients. Just as the stethoscope didn't replace the doctor's ears, but instead augmented their skills, AI is the latest tool that will enhance the ability to deliver care.



The power and predictive abilities of data and analytics will change health and medicine in many ways, but that transformation needs to start somewhere. If we strive only for the moon and don't appreciate the value in what's immediately around us, the true promise and potential of AI will only be delayed further still.

If you would like to learn more, download this ebook: Emerging topics in health care, at https://www.sas.com/en_us/whitepapers/emerging-topics-health-care-109815.html. If you have any questions, please connect with me on LinkedIn.

Improving throughput in radiology relies on process, not on people

BY JERRY ZEIDENBERG

CHICAGO – There was plenty of talk at the annual Radiological Society of North America (RSNA) conference about the growing importance of business intelligence and analytics (BIA) as technologies that can solve problems in the here and now.

Unfortunately, on this front, healthcare may be well behind the times. “We as an industry are laggards,” commented Dr. Paul Chang, professor of radiology at the University of Chicago. “We’re still talking about dashboards and scorecards, as if it’s the 1990s.”

Often the terms scorecard and dashboard are used interchangeably in healthcare, which they’re not, he asserted. A dashboard gives real-time information, he said, while a scorecard is retrospective.

He demonstrated this with the example of the dash of a car. “When I’m speeding on the road, the dashboard tells me how fast I’m going, in real-time,” said Dr. Chang. “When I get the speeding ticket, that’s a scorecard. It’s retrospective, and tells me how fast I was going – but in the past.”

Dr. Chang, at an educational session, averred that other industries have gone way beyond dashboards. “What do other industries do? They’re not using scorecards or dashboards, because both are used by humans. Many humans won’t react to them.”

He joked that as a tenured professor at the University of Chicago, he could be given a scorecard or dashboard showing that his



The University of Chicago’s Paul Chang: The more you automate, the less chance there is for human error.

performance was poor. “Here’s your scorecard Chang – you suck – try to do better.”

But that doesn’t mean Dr. Chang will do better. After all, he is a full professor with tenure. Why bother?

What other industries are doing, Dr. Chang said, is building improvements right into the workflow, so that people don’t have to make decisions about doing the right thing.

In healthcare there are some successes on this front.

As examples, he cited PACS, which can

automatically bring up a patient’s past exams and related medical documents when a radiologist goes through a workload. These charts and images provide more context, enabling the radiologist to make a more informed analysis.

Another example is the “correct patient” in the IHE scheduled workflow profile, which uses IT to automatically ensure you’re dealing with the right patient.

Of course, closed loop barcoding and medication management, for institutions that are using IT on an enterprise-wide ba-

sis, could be cited as another example of a process that ensures “best practices” are carried out.

What Dr. Chang seemed to be saying is, the more you can automate various functions, the less chance there is for human error to occur. “Humans are terrible at remembering to do things,” he said. They are also not so good at doing the right thing, he opined.

And sometimes, they’re just wrong. That’s why peer review in radiology can be a bad idea, said Dr. Chang. “What if your peers are wrong, too? Then you’re reinforcing errors.” He noted that AI, on the other hand, could be wonderful for peer review, as it could consolidate the opinions of hundreds of radiologists to arrive at correct readings of multiple conditions.

Radiologists could then learn from these automated solutions, which would provide the best evidence.

Today, when building improved workflows, Dr. Chang said, you must first decide what your goals are. You must then figure out what the key performance indicators (KPIs) are to achieve these goals. The KPIs should then be measured, ideally in real-time.

Determining KPIs, however, is again something that healthcare is terrible at, said Dr. Chang. But he asserted that consultants are very good at it, and that bringing in consultants for this job is worth the investment.

Trouble arises again when it comes time

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DI departments could benefit by deploying automated analytics systems

Jeff Vachon is President of Biologics Analytics Inc., a Canadian leader in the development of business intelligence (BI) and analytics systems for Diagnostic Imaging departments. The company’s claim to fame is that it has produced an “agnostic” solution that connects to all and any devices and databases, presenting the data in real-time and in an easy-to-use format. Biologics has implementations across Canada and the US, from single hospitals to complete provincial implementations. Canadian Healthcare Technology editor Jerry Zeidenberg interviewed Jeff Vachon about the current environment for BI and analytics systems.

CHT: Jeff, what is the state of business intelligence and analytics in hospital DI departments today?

Vachon: Every Canadian hospital today does perform some form of analytics. Unfortunately, most are still capturing data manually from different systems – PACS, RIS and EHR – and consolidating the data into spreadsheets to extract the data required for reporting. This process is very labour-intensive. You’d be surprised how many systems they’re trying to pull data from. And by the time it reaches management, it’s often out of date.

CHT: What should a BI system in a DI department look like? What should it consist of?

Vachon: It all starts with the ability to capture data and put it into a usable and structured database. But the data capture should be automatic, and to do this, you must be able to handle HL7, DICOM and XML data coming from multiple contributing IS systems. That will give you a view of the entire patient workflow and operational performance of the department. Once you have it in a database, data utilization can continue to evolve, from BI to Machine Learning and AI applications.

CHT: So, we’re just in the initial stages of using analytics in DI departments. Is the market growing?

Vachon: It’s expected to grow quite fast. The global healthcare analytics market is expected to reach \$18.7 billion by 2020, with AI in medical imaging to exceed \$2 billion 2023. The demand is growing now for more rigorous data reporting, with DI departments and entire hospitals trying to figure out how to do better. They’re relying on data to improve the effectiveness of operations and care. And the better the data, the more up-to-date it is, the better you can make changes on the fly and respond immediately to the challenges of running a large department.

CHT: Are people a little in awe of analytics and AI? Do they think they’ll need skills that they don’t have?

Vachon: To be successful, an analytics system has to democratize the data so that everyone is able to understand it. It’s hard to believe, but in many DI departments, there are no automated analytics systems. Instead, they’re making decisions based on gut feel or out-dated information.

That’s a problem for medical imaging, which is one of the largest and most expensive departments within a hospital. Analytics should be available for all of the management team from the charge tech monitoring



Jeff Vachon

specific metrics for their own modality specialty, to the imaging director and chief of radiology looking for operational metrics. The growth of data is also spawning a new specialty profession, that of the imaging informatics specialist, focusing on managing imaging data to assist the management team with sophisticated analysis, routine reporting and informed decision-making.

CHT: Once you’ve got the data flows and database, what do you do with it all?

Vachon: Usually, you’ve got a problem in mind, whether it’s patient workflow issues across the department, or with a certain clinical specialty or modality. If you’ve got the data, in graphic or tabular form, you can quickly see where possible bottlenecks are and brainstorm solutions about how to fix them. It can help with scheduling, too. If you see, for example, that historically, on a particular weekend there are greater demands from the ED and you need more CT exams, you can staff appropriately with the right number of technologists and radiologists to ensure appropriate wait times are met.

CHT: Are there sites in Canada where your technology has helped DI departments?

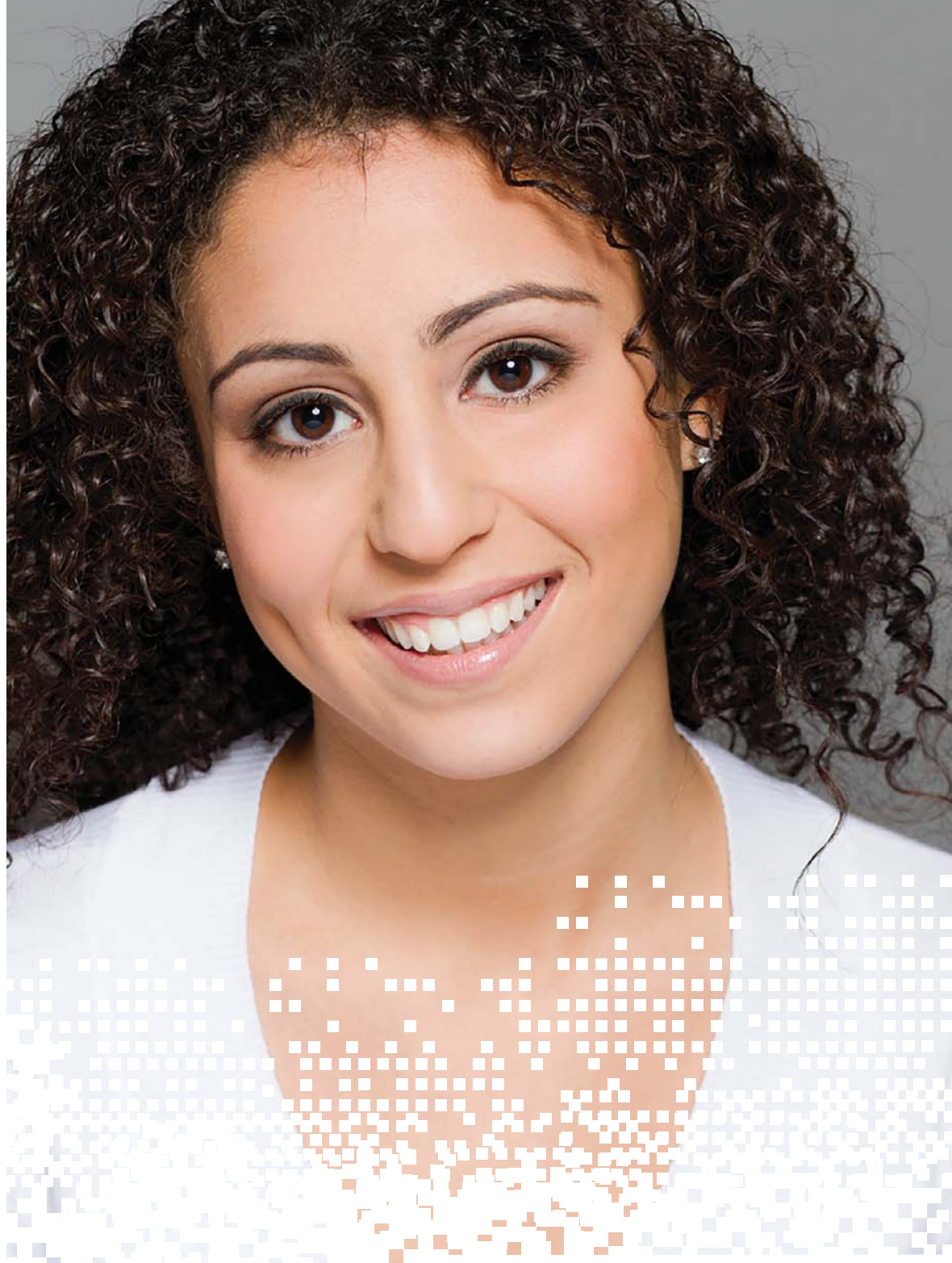
Vachon: Yes, we’ve got installations at various sites including Halton Healthcare, Peterborough Regional Health Science Centre, North York General Hospital, the PHSA in BC, and the whole province of Saskatchewan. We also have many sites across the US in use today. At Halton Health, for example, the solution has been in place for several years now. It delivers routine reports to stakeholders and is an important tool for solving ad hoc questions that arise across the imaging service.

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'Activate' helps Canadians lower their risk of heart disease and stroke

BY NEIL ZEIDENBERG

The Heart and Stroke Foundation of Canada has entered Phase 2 of a free program called Activate – a 3-year preventive program that aims to help 7,000 Canadians with pre-hypertension to lower their risk through healthy eating, smoking cessation, stress management, and regular exercise.

This is taking place after a successful start to Phase 1, which saw over 90 percent of participants complete the program with excellent results.

The program focuses on people over age 40 with a BP (blood pressure) between 121 and 139, otherwise known as 'pre-hypertensive'. High blood pressure is the number one risk for stroke and a leading risk factor for heart disease.

"Without intervention, half of pre-hypertensive people in Canada over age 60 will go on to develop high blood pressure within four years," said Doug Roth, Chief Financial & Administrative Officer and Head of Social Enterprise for Heart & Stroke. "The goal of Activate is to provide participants with the tools to empower them to make positive lifestyle changes to turn around this dangerous trajectory, and reduce the risk of heart disease and stroke."

The program is free for participants. To enrol, people must be over 40 years old, not have diabetes, and must not be on blood pressure medication.

They can book an appointment at heartandstroke.ca/activate or at participating YMCA or Shoppers Drug Mart locations in the Greater Toronto Area, Oakville, and Oshawa.

"Enrolment can even be done at the

workplace, an experience that adds to the peer support aspect," said Erin Kim, Strategic Initiatives Lead of the Activate program. "It promotes the idea that people are not alone, that others are going through the same thing, and that help is available – if you want it. There is absolutely no cost to becoming involved, and we invite interested companies to contact us for more information."

Once enrolled, participants gain access to an online health platform with curated content and support from a personal health coach. They may also consult with a Loblaw in-store dietitian to learn about healthy eating.

Program sponsor YMCA of Greater Toronto is offering a two-month free membership and will waive the renewal fees if participants continue their membership – a good will gesture that benefits everyone. In addition, participants are rewarded with PC Optimum points for healthy behaviour while using the platform.

"The name Activate was chosen because the hope is that people will activate themselves, make lifestyle changes for the better to live healthier lives," said Kim. "In 2018, we had 527 participants, and in 2019, enrolment will increase to 4,100 around the Greater Toronto Area."

Activate is a \$3.4 million program where, through working in partnership with MaRS Innovation, the funding is being provided by socially minded investors who are repaid by the Public Health Agency of Canada – if the program achieves its health outcome goals.

"The program is performance-based where the investors take on the financial risk. If we can prove that participants make improvements to their health – and that the



The Activate program makes use of a computerized platform from NexJ, along with personalized care.

program works – there are greater outcome payments for investors," said Roth. "If we don't achieve our target outcomes, the investors can lose the majority of their funds."

"Investors like the funding model because their backing can generate both a social impact and a financial return. The government likes it because it allows them to push health innovation while managing risk, and Heart & Stroke likes it because without this funding we wouldn't be able to run this program for Canadians," added Roth.

Volunteers in the program have either a nursing background, or are students in healthcare programs such as wellness coaching. They are trained to enrol participants, take their blood pressure, and encourage them to join the program.

Online coaches all have a healthcare background; and some even work at NexJ Systems – the company providing the online platform. Coaches help people adopt healthy behaviours, answer health-related questions, and help people navigate the platform.

Access to the online platform is done via a user's own smartphone, tablet or desktop, and the program is designed to be simple, easy, and fun for people of all levels of experience with technology.

Once goals are set, through a guided assessment or a discussion with a coach, the participant's progress is monitored over six months. "It provides many modes of communication and information including motivational messages from health coaches, informative articles, and suggested activities on the app. It is meant for people who want to make lifestyle changes," said Kim.

After six months, participants discuss their overall progress and the lifestyle changes they've made. If they like, they can continue using the online platform for another six months, and participate in community wellness days with the YMCA.

Success of the program comes down to the results we can help participants achieve. "In our initial cohort in 2018 involving 527 people, the results were better than anticipated," said Roth. "Our target is to have the blood pressure of participants stay flat and in this initial group we were able to lower the aggregate blood pressure by 5 mmHg in the systolic rate – e.g. 135 over 90 to 130 over 90. If we can help participants control their blood pressure, research has proven this will lead to fewer strokes and heart attacks, which is really exciting."

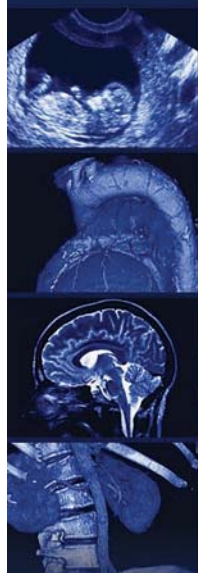
Roth believes the program has the potential to be expanded in other ways. "The idea behind Activate is empowering people to make better choices by giving them the tools to eat better, be more active, manage stress and to stop smoking. These lifestyle behaviours are not unique to just preventing heart disease and stroke.

"In addition to expanding Activate to more locations, we see the potential to use our learnings to support more integrated health prevention initiatives. We are keen to work with others who share our vision of preventative healthcare."

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The 2019 conference is being held at the Beanfield Centre, one of Canada's greenest conference spaces.

ceive wireless headsets to tune in or tune out of presentations and truly customize their experience.

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New Sunday Workshop
Partnering to Design Together – An Innovative Workshop with Patients

More and more the healthcare industry is leaning on the experiences and expertise of patients to find innovative approaches and solutions for healthcare improvements. With that in mind, this year's conference is kicking off with 'Partnering to Design Together', a full day workshop that will connect digital health innovators with patients to explore new techniques and resources through 'design thinking'.

Design thinking approaches complex problems with the philosophy that solutions should be created with, and not just for, end-users. Guided by the Hacking Health team, participants will adopt a design thinking mindset, as they identify problems, create innovative solutions and present ideas to the Hacking Health panel to be developed.

Plenary Speakers: e-Health always brings in an impressive roster of speakers for its plenary program and this year is no different. To date, Michael B. Decker, President and Chief Executive Officer of LDIC Inc., and Globe and Mail health columnist Andre Picard have been confirmed to speak at e-Health 2019.

Michael B. Decker, a Harvard trained economist, served as Deputy Minister of Health for Ontario and Cabinet Secretary in Manitoba. Michael is a well-recognized expert on healthcare policy. He was the founding Chair of the Health Council of Canada. He continues to serve as the Chair of Medavie Inc. and Patients Canada. He is also a Trustee of Auto Sector Health Care Trust and Chair of its Finance, Audit and Investment Committee.

He has authored *Healing Medicare: Managing Health System Change – The Canadian Way* (1994); *Four Strong Winds – Understanding the Growing Challenges to Health Care* (2000); and *Navigating Canada's Health Care*, co-authored by Francesca Grosso (2006). In 2004, Michael was awarded The Order of Canada.

André Picard is the health columnist at *The Globe and Mail* and the author of five books, including *Matters of Life and Death: Public Health Issues in Canada*, and *The Path to Health Care Reform: Policies and Politics*. He also has a large Twitter following at @picardonhealth.

André has received much acclaim for his writing, including the Michener Award for Meritorious Public Service Journalism and the Centennial Prize of the Pan-American Health Association, awarded to the top health journalist in the Americas. He is also an eight-time finalist for the National Newspaper Awards – Canada's version of the Pulitzer Prize.

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Improving throughput in radiology

CONTINUED FROM PAGE 6

to extract the data you need, as the data could be housed in six or seven different production systems. There again, investments must be made into integration engines and interfaces. And, of course, the data itself could be wonky. "The data you extract is sometimes not trustworthy," said Dr. Chang. "Too many times, people grab every data element and use it."

But despite these challenges, creating business intelligence and analytics systems is still possible. It helps to think about it in a new way, though, said Dr. Chang.

"BIA isn't something you buy, it's something you do," he said.

He noted that at his own institution, the University of Chicago Department of Radiology, doctors and residents are encouraged to spot problems. And when they do it, they're urged to let the IT department know.

Indeed, IT is seen as the solution, rather than additional staff. "We don't throw additional FTEs in to solve problems," he said. As he mentioned, adding staff can compound problems, as people tend to make mistakes, and more people can make more errors.

Instead, the goal is to re-design processes and to automate them, as much as possible.

On a practical note, Dr. Chang advised his audience that when pitching management for funding to improve processes, never position them as "quality" projects. That's because quality is seen as a "floormat".

And floormats, when you buy a car, he explained, are expected to be free. "When I pitched a project to the C-suite, and called it a quality project, they said great, go find

a grant." Things changed when he re-packaged it as a productivity effort. "When I called it a throughput project, I got the funding immediately," said Dr. Chang. "It did double our throughput. And it also raised quality. But management thought the quality part should come free."

BC's Supercluster

CONTINUED FROM PAGE 4

skin mole phones for an appointment with the family doctor, or waits to see a physician at a walk-in clinic. The doctor orders tests. The patient visits the lab, waits for test results, and then makes another doctor's appointment once the results are in.

If the patient is referred to a specialist, they may wait weeks or months for an appointment – because there is a national shortage of dermatologists.

This back and forth is time consuming, involves time off work or school, and is especially difficult for those who face additional barriers, such as the elderly, disabled, mentally ill, and those who live in remote, rural areas.

It would be better if, as Paish puts it, "The healthcare system could come to the patient," instead of the other way around. She says technology is now available to make "point-of-care" patient access a reality in dermatology.

Technology can increase the geographical reach of each doctor, enabling

a BC patient to access the expertise of a dermatologist in Ontario, and vice versa. Paish didn't want to reveal too many details before the February announcement, but the Supercluster's website says the project aims to "reduce time to diagnosis and help improve patient care with teledermatology and telepathology imaging, both of which will be augmented by artificial intelligence." [<https://www.digitalsupercluster.ca/wp-content/uploads/2018/12/Supercluster-Project-Summaries-docx.pdf>] Seven organizations are collaborating on this project: BC Cancer, Careteam, Change Healthcare, MetaOptima, Providence Health Care, Telus Health, and the University of Victoria.

Paish is aiming for a world leadership role with the Secure Health and Genomics Data Platform.

The Secure Health and Genomics Data Platform also reduces geographical barriers. Currently, a doctor in New

Brunswick, for example, can access patients' genetic data collected in New Brunswick. So, if their patient has a rare disease, a doctor might find information about a couple of other NB cases, learn how they were treated and what the outcomes were.

But that's very little to go on. Paish says, "There's currently no Canada-wide system for collecting, analyzing, and securely storing health and genetic data." If the NB doctor could access data from across Canada, they would be better informed when they provide treatment. This project has the potential to make Canada a global leader in this field. Paish says she's received letters of international support telling her, "If the Supercluster builds this platform, they will use it".

Collaborators on this project include household names such as Microsoft Canada and Deloitte. Other partners are Genome British Columbia, LifeLabs, DNA Stack, Molecular You, UBC, and the BC Provincial Health Services Authority.

Sue Paish is proud of the Supercluster's momentum. She says, "Organizations across Canada have quickly recognized the potential of being involved."

CAMH wins HIMSS award for using analytics to advance patient care

BY PATRICK CALLAN

TORONTO – CAMH is the first Canadian hospital to win one of the highest international awards for using analytics to improve patient care. CAMH has achieved HIMSS Adoption Model for Analytics Maturity (AMAM) Stage 6 for demonstrating its leading analytics capabilities to deliver high-quality patient care with an enterprise electronic health record in place.

“Providing the best patient care is our top priority,” said Tracey MacArthur, Senior VP and Chief Clinical Officer, the Centre for Addiction and Mental Health. “We’re committed to capitalizing on the data we collect to ensure the best outcomes for our patients – today and in the future.”

“This signifies the level of commitment across CAMH to use data to inform decision-making in a way that optimizes quality and efficient service delivery,” added Dr. George Fousias, Associate Chief, Schizophrenia and Medical Head, Slaughter Centre, CAMH.

As a data-driven hospital, analytics play an important role in driving improved quality and efficiency at CAMH in both clinical and non-clinical areas. This certification recognizes CAMH’s efforts in establishing a robust data governance structure,



(Green shirt) Marc Greene, Manager, Emergency Department, CAMH, leads a morning huddle in the CAMH Emergency Department, while (L to R) Christine Bucago, Advanced Practice Clinical Leader, CAMH, Cara Mirabelli, Team Lead, Reporting and Analytics, CAMH, and Philip Bradley, HIMSS Reviewer, listen attentively.

as well as in developing business intelligence solutions that reflect a comprehensive analytics strategy.

CAMH is the largest provider of emergency psychiatric care in Ontario. From April 2017 to March 2018, the Gerald Sheff and Shanitha Kachan Emergency Department (ED) at CAMH received nearly 12,000 visits – a 52 percent increase since

2012. And while 30 percent of all ED visits at CAMH result in an inpatient admission, 80 percent of all inpatient admissions come from the ED.

CAMH is projecting an 8.5 percent increase to 13,000 ED visits for its current fiscal year. To better understand inpatient capacity and flow, CAMH developed a new dashboard and bed-projection model. The

dashboard provides CAMH with the data it needs to monitor key indicators related to ED optimization, such as length of stay.

In addition, the results from the bed-projection model informed CAMH’s decision to open a new 23-bed unit in March 2018 to help ease congestion in the ED and meet a growing need for acute care inpatient beds.

“Data has become a big part of the culture at CAMH and the way we manage our work,” said Shayla Gutzin, Clinical Director, Acute Care Inpatient and Emergency Services, CAMH.

CAMH is also using data to support the expansion of its recently launched Drop-in Bridging Service for lower acuity patients. Located down the hall from CAMH’s ED, the bridging clinic provides quality care to those who arrive at the ED with non-urgent needs.

“These examples not only demonstrate CAMH’s leadership in effectively using analytics, but also shine a light on further possibilities to continue to use data to improve outcomes and enhance patient experiences,” said Rachel Solomon, Executive Director, Performance Improvement, CAMH.

Patrick Callan is Communications Coordinator, CAMH.

DocBox integrates data at the bedside from medical devices

It’s a common sight in hospitals – nurses scribbling down the numbers at bedside monitors, sometimes on scraps of paper, then keying them into electronic patient records back at a workstation. Checking and updating the data is a time-consuming task, and also a potential source of error when the numbers are transcribed incorrectly.

“When hospitals moved to the digital world, medical devices didn’t move with them,” asserts Tracy Rausch, CEO of DocBox, a company that’s produced a system that gathers real-time information from multiple devices at the bedside, provides a computing platform for running real-time applications and stores the data in a “black-box recorder”.

As Rausch notes, the “10 feet around the patient bedside” usually consists of standalone medical devices, such as pulse and oxygen saturation monitors, medication pumps and cardiac monitors. They’re all producing data, but in different formats that aren’t easily integrated into databases.

As a result, the devices exist as hundreds of standalone silos that dot the floors of hospitals. DocBox removes the silos by collating the proprietary data and converting it into ISO standard terms and making it immediately available to bedside clinical and operational applications.

However, Rausch’s company – which is based in Waltham, Mass. – has now

installed and tested their own solution, DocBox, at 22 ICU beds in the Medanta Hospital cardiac ICU in, Delhi, India.

The 17-person company is poised to start marketing the system in the United States and Canada in 2019, and has benefited from the expertise of London, Ont.-based anesthesiologist Dr. Steven Dain. For his part, Dr. Dain has been working on the nettlesome issue of computerizing the data from medical devices into easy-to-access databases for years.

He originally met Rausch, a biomedical engineer who worked at a major U.S. hospital chain, while collaborating with Dr. Julian Goldman at Massachusetts General Hospital on research projects to solve this very problem. In addition to his duties as a London-area anesthesiologist, he also works as an advisor to DocBox.

“We currently have the capability to interface with about 25 various medical devices, such as physiological monitors, critical care ventilators, syringe pumps, intra-aortic balloon pumps, cardiac output monitors, and anesthesia workstations,” said Dr. Dain.

“We can accommodate any number of devices at the bedside, depending on the type, as long as the manufacturer of the device provides us with their data communications protocol,” he added.

DocBox can collect real-time data, including discrete numbers, text and waveforms, from multiple devices and stores them as ISO 11073 standard terms in its database. The system can use any Hadoop database, which are optimized

for very large data sets.

“We’re collecting an order of magnitude more data than is typically found in electronic patient records,” said Rausch. Indeed, an average patient in an ICU bed can have 300 different parameters coming from various medical devices, producing 1.5 gigabytes to 2 gigs of data daily. DocBox is capturing and displaying that data in real-time.

Not only can clinicians quickly see vital stats, waveforms and trends on screen both at the bedside and remotely, software developers can also use the system to build early-warning systems.

One of the roadblocks to creating such systems has been integrating the

DocBox can interface with 25 different types of medical devices, including ventilators, pumps and cardiac monitors.

medical devices into a real-time system that can collate and analyze the data. DocBox, said Dr. Dain, “provides the ability for us and third-party developers to easily write applications for analysis, deep learning, AI, smart alarms, real-time predictive clinical and operational analytics, without having to deal with proprietary nomenclature, and expensive proprietary middleware. DocBox has been built from the ground up with device and system cybersecurity at the forefront.”

At the bedside, clinicians can see all of

the real-time data on a 19-inch touchscreen. “When physicians come in to do their rounds, they can go through the touchscreen to review,” said Dr. Dain. “Healthcare providers can also manually add physical findings.”

There are different pricing models for DocBox, depending on whether a hospital wants to buy the system outright or use it on a per diem/per patient basis. But the company is promising a fast payback: “We’re looking to get the hospital a return on investment in less than a year,” said Rausch.

Currently, the company is focusing on ICU applications, as these beds tend to be the most data intensive. However, Dain and Rausch also foresee applications in other areas, including the transport of critical care patients. In these cases, clinicians can monitor the condition of patients as they’re being brought to hospital by paramedics.

Dr. Dain noted the system could also be used in emergency situations, such as vehicle crashes, when the number of patients overwhelms the local resources.

DocBox could allow clinicians to keep tabs on patients in the field and in remote hospitals by monitoring and controlling medical devices from afar.

As well, it’s ideal for home monitoring of patients, especially those in frail condition. That’s an important function, as healthcare systems now try to keep patients out of hospitals and in their own homes.

“We definitely see this going beyond the ICU,” said Dr. Dain.

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Hybrid operating rooms redefine vascular patient care at the NAVC

BY EMMA SMALL

EDMONTON – In September 2018, the Northern Alberta Vascular Centre (NAVC) at the Grey Nuns Community Hospital opened two, state-of-the-art vascular hybrid operating rooms (ORs). These advanced suites will improve care for vascular patients and benefit their care teams with added clinical efficiency, safety and effectiveness.

The two-year project integrated the latest technology from Canon Medical Systems Canada – the Infinix-i Sky Plus.

The Infinix-i Sky Plus contains a variety of features that compliment a multifaceted OR environment. The Canon-made innovation includes a double sliding C-arm that has flip, lateral flexibility, speed and full-body 3D imaging capability. It also has industry leading dose management tools designed to minimize patient X-ray exposure while maintaining image quality.

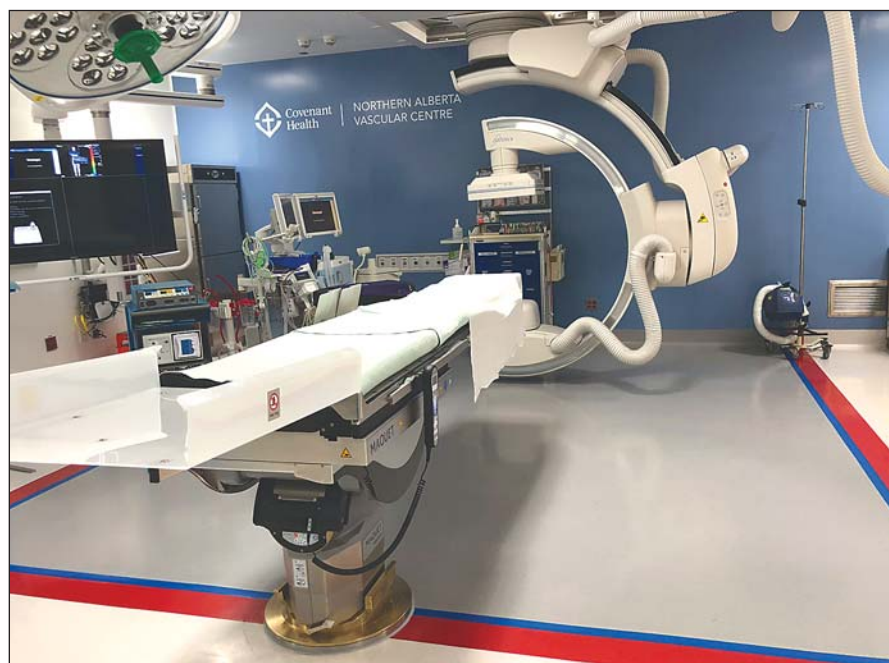
The advantage of hybrid ORs is their use of a large fixed imaging system that supports high-quality interventional images. This specific system of imaging contributes to the success of processes like fluoroscopy and the surgical procedures requiring it. The need for patient radiation exposure or imaging dye is greatly reduced.

“The substantial improvement in image quality allows us to deliver intravascular devices with a very high degree of accuracy,” said Dr. Gerrit Winkelaar, Head of Vascular Surgery at the NAVC.

“We can achieve this with significantly less radiation which makes the theatre safer for the patients, surgeons, anesthesiologists and OR staff.”

In addition, hybrid ORs support complex open and minimally invasive surgeries, exemplified by procedures such as Endovascular Aneurysm Repair (EVAR).

EVAR involves inserting a graft within the aneurysm through small groin artery incisions using X-rays to guide the graft



More than 67,000 pounds of structural steel is hidden within the ceiling space that supports the medical equipment, including the fixed C-arm pictured here. The permanent installation provides a higher-quality image than a portable C-arm.

into place. The new technology provides surgeons with exceptional image resolution in real-time, which means EVAR can be completed with more accuracy, speed and confidence than before.

The positive benefits of EVAR for patients include no abdominal surgery and decreased hospital stay due to a far shorter recovery period. Where traditional surgery would take three to six months to heal, EVAR results in a time of two weeks to several months for recovery.

Shorter surgery time and recovery time extends to other vascular treatments as well, including surgical bypasses, artery angioplasty and stenting.

Alberta Health Services supported the project with collaborative project management and a \$10 million infrastructure and equipment budget. The creation of the NAVC’s hybrid ORs used several innova-

tive design approaches during the project planning phase.

First, a multidisciplinary team took the idea from conception to tabletop, having a tangible diorama where everyone involved could gauge the flow of the rooms. Teams focused on the positioning of intraoperative equipment and how staff and patient would maneuver within the space.

A mock OR was then built to see all aspects of a room at an actual scale size with wooden replicas of the key pieces of equipment, such as OR bed, C-arm, monitors and anesthesia cart.

Program Manager of Operative and Endoscopic Services, Steve Lucas, says, “As the hybrid suites were constructed in existing OR infrastructure, it was imperative we maximized the functionality of the space we had.”

Vascular teams also practiced in the

mock OR and used cameras to film various scenarios, including emergencies. From this analysis, human factors recommendations were integrated into the design.

Dr. Winkelaar said, “Everyone, from the surgeons and anesthesiologists, to the OR nursing staff and managers was given the opportunity to provide feedback on the design in a proactive manner, bringing their unique perspectives to the table.”

Lastly, virtual reality (VR) and Hololens technology was used to visualize the components of the operating room.

VR showed the multidisciplinary team an entire virtual room where they could see what colors the walls could be or how the C-arm moved within the space.

Similarly, the Hololens technology used a headset to show virtual objects integrated into the real world. Essentially, the team viewed where certain virtual objects could be placed in the mock OR without wasting time or energy on moving around physical items.

“The 1:1 scale mock up and the use of VR and Hololens technology was absolutely key to determining the best set up of the hardware and allowed for multiple changes to be made to the final design before building the suites,” adds Dr. Winkelaar.

The overall result led to less OR disruption in the hospital, and the efficiency of the build was able to meet construction timelines and budgetary expectations.

“Our future plans really centre around maximizing the technology to its fullest, routinely incorporating the fusion imaging technology to further reduce radiation and contrast administration,” says Dr. Winkelaar.

“There are also future opportunities to partner with cardiac surgery to provide endovascular treatments of ascending aortic aneurysm disease and other potential cardiac conditions.”

Hybrid ORs are one example of how Covenant Health is envisioning and actualizing better patient care for those they serve now and into the future.

Indian cardiologist uses tele-robotics to implant stent in remote patient

A cardiologist in India used tele-robotics to clear an artery and implant a stent in a patient located 20 miles away. Dr. Tejas Patel, Chairman and Chief Interventional Cardiologist of the Apex Heart Institute at Ahmedabad, had already operated on the woman a few days previously to remove a blockage after she suffered from a heart attack.

However, a few days later, another blockage was identified.

Dr. Patel was able to take a seat behind a console at a distance of 20 miles away to operate on the middle-aged woman. The procedure, which lasted just 15 minutes, was to place a stent in the second artery that was clogged, using an internet-enabled robotic arm which Dr. Patel guided to perform the surgery as a team of doctors and paramedics attended the patient to take care of any eventualities.

The tele-cardiology procedure occurred 32 years after the world’s first stent surgery was carried out in 1986. This leap in medical history means the very best doctors can reach patients at any part of the world as long as there is an internet connection, cath lab and robotic arm.

Fifty-five-year-old Dr. Patel has performed over 100,000 heart surgeries to date, and it is with this experience that he took on the live operation for the first time. He said: “This remote robotic PCI (Percutaneous Coronary Intervention) represents a landmark event for interventional medicine. Cardiovascular diseases, including stroke, are the number one cause of death worldwide resulting in nearly 18 million deaths per year. The use of telerobotics has the potential to impact a significant number of lives by providing access to emergency care by

the best surgeons in the world – that may not otherwise have been possible.

“This is particularly important when treating heart attacks and stroke, where treatment must be received in as little as 90 minutes or within 24 hours, respectively, to avoid death or permanent disability.” Dr. Patel made use of technology from Corindus Vascular Robotics, Inc., a global leader in robotic-assisted vascular interventions. The company’s CorPath System is the first FDA-cleared medical device to bring robotic precision to percutaneous coronary and vascular procedures. During the procedure, the



Dr. Tejas M. Patel

interventional cardiologist sits at a radiation-shielded workstation to advance guide catheters, stents, and guidewires with millimeter-by-millimeter precision. The workstation allows the physician greater control and the freedom from wearing heavy lead protective equipment that causes musculoskeletal injuries.

CorPath GRX is the second generation robotic-assisted technology offering enhancements to the platform by adding important key upgrades that increase precision, improve workflow, and extend the capabilities and range of procedures that can be performed robotically. With the CorPath System, Corindus Vascular Robotics brings robotic precision to interventional procedures to help optimize clinical outcomes and minimize the costs associated with complications of improper stent placement during manual procedures.



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UHN shows potential of light therapies to rid donor lungs of infection

BY ANA FERNANDES

TORONTO – New research at the University Health Network (UHN) shows that light could be the answer to get rid of virus infections in donor organs – a milestone with the potential to dramatically increase access to life-saving transplants.

A pre-clinical study is demonstrating for the first time the effectiveness of using light-based therapies to inactivate the hepatitis C virus in a donor organ – in this case, in donor lungs. As a result, the virus from an infected donor organ becomes unable to infect a patient during the transplantation process.

When translated to clinical practice in the future, these findings could mean regularly accepting organs without concerns of virus transmission, which universally occurs without any treatment.

The innovative research was a collaboration between UHN and University of Sao Paulo (USP), in Brazil. It revealed that therapies using Ultraviolet C (UVC) light and Photodynamic Therapy (PDT) may completely inactivate the virus before transplantation.

The results were published online in Nature Communications.

“We observed that light therapies have the ability to lower the viral load and make it non-infectious,” said Dr. Marcos Galasso, a PhD student at the Latner Thoracic Surgery Laboratory and first author of the study. “Although you can still detect fragments of the virus after the treatment, we showed after exposure to the light therapies, the virus could no longer infect liver cells.”

The research team was led by Dr. Marcelo Cypel, Surgical Director of the UHN Transplant Program and scientist at



Infections like Hepatitis C have been inactivated in organs when treated with light-based therapies.

Toronto General Hospital Research Institute (TGRI).

The team treated nine rejected human lungs that were infected with hepatitis C, using light therapies and the Toronto Ex Vivo Lung Perfusion System (EVLP) – technology developed at TGRI in 2008, which perfuses organs outside of the body and allows for further assessment of organ suitability for transplant.

They showed that virus exposed to the light therapy could not infect liver cells, work carried out in the laboratory of Dr. Jordan Feld, R. Phelan Chair in Translational Liver Research and an expert on hepatitis C treatment.

A customized device was developed to deliver the light therapies into the EVLP circuit.

Next steps: The results showed PDT was the most effective therapy to clear the virus from the lungs. However, the researchers also concluded that the remaining virus left after UVC treatment was inactivated, meaning both therapies could be successful in completely avoiding infection to a transplant recipient.

“Although PDT was more successful in the lab in lowering the virus count, both PDT and UVC were able to completely inactivate the virus and prevent it from infecting cells,” said Dr. Galasso. “Our study also shows both therapies are safe for patients waiting for a transplant.”

“Since UVC is a simpler therapy, we decided to start the next phase there.”

PDT requires the use of medication which is activated by light (in this project

methylene blue was used). On the other hand, UVC is a therapy that only requires direct irradiation of the liquid going through the EVLP system.

Based on this study, Dr. Cypel’s team has recently started to apply UVC treatment clinically to donor lungs with hepatitis C. The initiative is part of an ongoing clinical trial that is a world-first in assessing the safety of transplanting hepatitis-positive organs to non-infected patients using the ex vivo technology.

“If we can find a way of ‘curing’ these lungs before transplantation, we won’t even need to treat the recipients because they will never get infected,” he said.

“We can lower the risks for the patients and the costs to the healthcare system.”

Waiting for a life-saving transplant: Dr. Cypel explains that being able to use hepatitis C positive organs would have a high impact in transplant waiting times.

With the opioid crisis, he said, clinical teams across North America have observed a spike in organ donors that test positive for the virus. Dr. Cypel estimates that regularly accepting hepatitis C positive donor organs would increase the number of lungs available for transplant by 1,000 per year in North America.

Currently, approximately 2,600 lung transplants are done per year in Canada and the United States.

“This study is a first step in assessing how light therapies can potentially clear donor organs from viral infections,” he said. “If we are able to routinely translate this to clinical use, this could help reduce waiting times for organs considerably.”

As of 2017, more than 240 patients were waiting for a lung transplant in Canada.

Ana Fernandes is a Senior Public Affairs Advisor at the UHN.

Titan Medical readies its dual-camera system for roboticized surgery

TORONTO – Titan Medical Inc., a medical device company focused on the design and development of a robotic surgical system for application in minimally invasive surgery, announced that it has completed the system engineering confidence build for all components of its single-port robotic surgery system.

This accomplishment highlights the completion of a new camera system along with the design enhancements of both the surgeon workstation and the patient cart, the two primary components of the system.

The engineering confidence build reflects all significant improvements inspired by the company’s preclinical experience.

“I extend congratulations to Dr. Perry Genova, our Senior Vice President of Research and Development, and our engineering team for achieving this significant development milestone on an aggressive schedule during the fourth quarter of 2018,” said David McNally, president and chief executive officer of Titan Medical.

“We are proud of their accomplishments and are thrilled with our substantial progress in 2018, and note that timely completion of this build is a critical step in preparation to file for regulatory clearances in the U.S. and the European Union. We are also grateful to the visionary surgeons who performed 45 preclinical studies with our earlier SPORT system prototype, including 14 different procedures within four surgical disciplines, providing key input to our design team,” McNally said.

He added, “As a result, our single-port robotic system now incorporates multiple important and patent-pending enhancements specifically intended to improve surgical performance and ease of use, which will better position us in the rapidly-expanding surgical robotics market.”

Mr. McNally added, “We welcome viewers

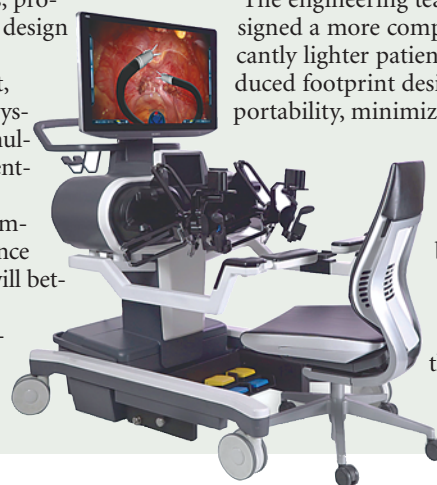
to our website where we have posted video of the SPORT system enhancements, which include a completely redesigned unique dual-camera system with a 3D high-definition steerable endoscopic camera for use during surgery, as well as a 2D high-definition wide-angle camera integrated into the camera insertion tube for visualization of instrument insertions, which also serves as a backup camera for safety.

The engineering team has also designed a more compact and significantly lighter patient cart, with a reduced footprint designed to optimize portability, minimize set-up time and facilitate unencumbered assistance of surgical staff at the patient bedside.

Further, we have improved the surgeon interface at the workstation with a more comfortable

handle design, a new 4K monitor and upgraded haptic feedback with image overlays to assist the surgeon with the positioning of the instruments for optimal performance. We are excited to move into 2019 with this next-generation single-port robotic surgical system, with a focus on meeting our regulatory milestones.”

Titan Medical Inc. is focused on computer-assisted robotic surgical technologies for application in minimally invasive surgery. The company is developing the SPORT Surgical System, a single-port robotic surgical system comprised of a surgeon-controlled patient cart that includes a 3D high-definition vision system and multi-articulating instruments for performing MIS procedures, and a surgeon workstation that provides an advanced ergonomic interface to the patient cart and a 3D endoscopic view inside the patient’s body. Titan intends to initially pursue focused surgical indications for the SPORT Surgical System, which may include one or more of gynecologic, urologic, colorectal or general abdominal procedures.



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AI scribes are being developed to assist clinicians with documentation

The aim is to come up with solutions to reduce physician burnout.

BY DR. SUNNY MALHOTRA

Physicians are struggling with solutions to burnout across all specialties. Physician burnout has become a key issue, as resources have become strained at the frontlines and clinicians are continually being asked to do more. At the same time, their documentation demands have increased, from government mandated forms and reporting to working with electronic medical records.

We're now coming up with solutions to reduce the documentation burden on a day-to-day basis. Scribes, real people who assist with documentation, have emerged as possible solutions. But artificial intelligence in the form of AI scribes also offers great potential. These computerized scribes make use of natural language processing that can be integrated into physician practices during the clinic visit. Some solutions now include integration with wearable devices, including Amazon Echo and Apple watches.

How does it work?

Key anchor words are used as part of the sentence structure, and using machine learning, intent is clarified to grammatically structure the sentence and complete the syntax.

This improves over time as recurrent neural networks are utilized through hidden layers and multiple inputs until an appropriate output is created. Higher probability words are given weights and biases and future errors are reduced through reinforcement learning and back-propagation techniques. Voice-based actions are created to put them in the

appropriate section of a SOAP note, and orders are created to reduce manual data input.

Suki is an example of an artificial intelligence powered, voice-enabled digital assistant that's being used across eight U.S. states and seven medical specialties. They have processed over 12,000 patient encounters and they're handling 1,000 patient encoun-

In some cases, physicians are turning to human scribes for help with their EMRs, but it's an expensive option with a higher turnover rate.

ters every week. They claim a 70 percent reduction in EMR documentation time through this solution by reducing the time spent filing medical notes.

Nuance launched its next generation PowerScribe One, which connects developers with radiologists and healthcare facilities. It includes a marketplace which includes creating imaging products to aug-

Dr. Sunny Malhotra is a US trained sports cardiologist working in New York. He is an entrepreneur and health technology investor. He is the winner of the national Governor General's Caring Canadian Award 2015, NY Superdoctors Rising Stars 2018 and 2019. Twitter: @drsunnymalhotra



ment the decision-making abilities of radiologists.

It is able to extract structured data continuously while dictating, and it applies structured data to aid in the creation of diagnostic reports. It can also share clinically relevant structured data between systems – including EHRs, PACS and others.

It populates reports with content from integrated systems to minimize redundancy and reduce errors, and integrates AI image characterization directly into the reporting workflow for high level efficiency and accuracy via Nuance's AI Marketplace.

We have moved beyond using things like Google Glass to have a remote e-scribe on the other end who documents the note after high levels of training.

In some cases, physicians are turning to human scribes, but it is an expensive option with a higher turnover rate. Providers say that the scribes tend to move on to medical school or other professions in the future.

This is a crucial opportunity for the artificial intelligence scribe to improve a difficult problem faced by healthcare providers. It will be instrumental in reducing repetitive documentation tasks and allowing providers to pull up imaging and lab testing results with simple voice commands. From a patient perspective, it will improve and restore the physician-patient relationship via communication efficacy. Physicians will have more time to focus on patients, as the rote work of documentation will be greatly assisted by automated systems.

New challenges, opportunities for medical radiation technologists

BY FRANCOIS COUILLARD

Technology and practice in medical imaging and radiation therapy is changing at a rapid pace. The past 40 years have seen the adoption of now common technologies such as computed tomography (CT), magnetic resonance imaging (MRI), positron emission tomography (PET) and picture archiving and communication system (PACS) – allowing for faster, more precise diagnosis and care.

Recent developments have shown that the pace of change is poised to accelerate. Three areas of change we have noted – artificial intelligence (AI), hybrid technologies (combining different modalities from medical imaging) and new Advanced Practice roles – will redefine the role of medical radiation technologists (MRTs) and empower them to increase their impact in the diagnosis and treatment of healthcare conditions in the near future.

AI: Artificial intelligence has re-

cently emerged from a niche development to become a dominant theme in radiology and radiation therapy. At this early stage, it is hard to see what impact AI will have on the MRT's work. The scenario where AI is used to facilitate image interpretation will no doubt impact MRT workflow, but to what degree is uncertain.

Another possible scenario is that AI is used to simplify the operation of imaging and therapy equipment, automating tasks previously performed by MRTs to improve quality, make patient positioning more precise, and increase throughput.

Yet another scenario is that Deep Learning and Big Data converge to combine vast datasets that will allow for personalized patient recommendations at the point of care. For example, GE Healthcare's new X-ray technology, empowered by Deep Learning, promises to provide critical findings that may indicate the presence of pneumothorax, accelerating patient diagnosis and treatment.

In all cases, the work of MRTs and

other members of the healthcare team will be affected, and professionals will need to be prepared for change.

Hybrid Technologies: Historically, the education of MRTs has been separated into four disciplines in Canada: Radiological sciences, MRI, Nuclear

medicine and Radiation Therapy. The advent of hybrid technologies (like PET-CT and SPECT-CT), which bring together two or more of these disciplines, has

begun to blur the lines. This trend of hybrid equipment continues with PET-MRI and MRI combined with linear accelerators (LINACs) in therapy.

PET-MRI is still mainly used as a research tool in Canada, and their operation requires a unique set of skills that only a handful of tech-

nologists currently possess.

MR-Therapy will allow for real-time imaging at the same time as therapy treatments. The possibilities are exciting; for example, treatments can be stopped instantly if the patient moves, ensuring precise therapy.

These hybrid technologies reinforce the need for MRTs to continually broaden and deepen their competencies. The trend creates major implications for professionals as their scopes of practice evolve. In some cases, this might lead to enhanced scopes, with greater autonomy and independent clinical judgment.

The Canadian Association of Medical Radiation Technologists (CAMRT) has been at the leading edge of these changes by creating certificate programs to bridge the gap between modalities for those originally educated in other disciplines (e.g., CT certificates for nuclear medicine technologists).

But as the hybridization trend continues, it raises the question as to

CONTINUED ON PAGE 22

Innovative health technologies continue to appear at the CES show

BY DAN WASSERMAN

After a two-decade hiatus I attended this year's CES in Las Vegas. The last time I went it was truly the "Consumer Electronic Show". Boy, has it changed.

I was sorry I didn't go last year, especially after reading about how much healthcare technology was debuted. So, I made a pledge this year that I would attend.

Naturally, I saw the stuff the press fawned over, including the Bell Nexus hybrid electric flying taxi, the Google "bubble gum" machine, and a "ride-em suitcase" for tired executives to sit on while navigating through crowded airports. But, I was there to see what was new in health technologies.

I attended a number of excellent sessions including "Wearable Tech" by Seismic, where the audience was treated to both a video and then a live demonstration of Powered Clothing. This was truly game changing technology. It had all the expected sensors, including smartphone telemetry and ultra-modern fabrics. But it was the "discreet robotics" that made it remarkable.



Dan Wasserman

In fact, this demonstration led to a conversation on the shuttle bus the following morning. The lady next to me had a young daughter with cerebral palsy who's increasingly frustrated by how her body movements were becoming more restricted over time. I proceeded to tell her about what I'd witnessed, and gave her a link so she could see if they had started producing child sizes. (You never know who you'll meet and the conversations you'll have at these global events).

Additionally, I caught the "First 1000 Days of Life" session, which was part of the "Living in Digital Times section." This too had an excellent panel that covered everything from what you'd expect in prenatal and infant monitoring to a discreet breast pump from Willow that fits inside a brassiere.

The show floor was massive. Much of what was of interest to me was in the same space HIMSS occupied at the Sands Convention Center last year. So, being familiar with how things were laid out was helpful. But, it wasn't ideal.

Often the large multinationals were located in the larger venues, like the North, Central and South Halls at the Las Vegas Convention Center, but they too had health tech worth seeing.

It appears that the organizers tried to set up the Eureka Hall on the lower level of the Sands in an orderly fashion. However, there were many health tech companies scattered about and in the upper hall, and they were mixed in with Sport Technology, IoT, Smart Home, etc.

In the "Canada at CES 2019" booth at the West Gate Hotel, there were a total of 33 podiums with eight of these set up as rotational sites for 40 smaller innovators (the balance were dedicated to specific companies).

Since the cocktail reception was extremely well attended, it was clear attendees were willing to come to the booth. However, most of the international delegations like the UK, Japan, South Korea, The Netherlands and Israel, were located near the Eureka Hall at the Sands.

As expected, I came home with a significant card collection that needed follow-up. This included the expected range of advanced digital POC diagnostics from Prominent, based in Alberta, senior care with aging-in-home from companies like Xandar Kardian (Toronto and Seoul) and tap2tag of Toronto, 3-D scanning by TechMed3D of Quebec City, a "relaxation watch" from feel-

doppel in England, digestion monitoring from foodmarble in the UK, dyslexia correction from Aidodys in France, many general sensor technologies, and even a cross-over between neuro-stimulation and cosmetics from Rezienna in Korea.

Additionally, Muse by Interaxon of Toronto had its own sizable booth in the main hall at the Sands and was attracting a large crowd every time I passed by it.

I can't say there was any particular disease or condition the various technologies were addressing. Unlike BIO, HIMSS or RSNA, it was a much broader show with a range of health innovations. Perhaps the most visible were watch-based wearables,

since with the advent of the latest version of the Apple Watch crossing the "interesting versus actionable" monitoring chasm, there were many companies showcasing a raft of features.

Overall, some of the technology was repetitive and much may never be truly commercialized. But, with 180,000 registered attendees, and at least 20 percent of the content being health related, the sheer size of the CES dwarfs other health events.

Dan Wasserman is CEO of Mammoth Health Innovation, a management consulting firm. He can be contacted at: dan@danwasserman.com

Social procurement can benefit Indigenous peoples

BY DENIS CHAMBERLAND

Social procurement is coming on strong in Canada. Until just a few years ago, public procurement practices measured success based on economic value, often focusing either on the lowest price alone or a combination of narrow criteria designed to measure value for money.

The general assumption was that to take non-economic factors into consideration was illegal, contrary to the applicable trade agreements and other statutes that govern public procurement, or contrary to existing government policy.

Local preferences or set-asides, a type of policy-driven sole sourcing, were universally banished in Canada while variations of social procurement practices were widely accepted and legislated into law as early as 1953 in Washington DC (yes, 1953!).

Social procurement looks a lot like ordinary procurement except that it's... well, more 'social', in the sense that it takes a more holistic view of its mandate.

Here, procurement is more than just a financial transaction and becomes a powerful community development tool. The purpose of procurement expands beyond the financial value that can be achieved from the process and includes other institutional, governmental, or more specific objectives such as environmental sustainability, promoting the well-being of select groups of people, or the development of certain types of businesses.

In short, public dollars are spent with a view to achieving a broader range of objectives, ones that contribute more broadly to the wellness of the community.

Social procurement is now knocking at the door of the healthcare sector, courtesy of HealthCareCAN in its 2018 paper entitled *Bringing Reconciliation to Healthcare in Canada: Wise Practices for Healthcare Leaders*.

"Hospitals and other health organizations may also be able to support Indigenous communities through social procurement," the paper notes, adding that social procurement could be an important step toward reconciliation.

The HealthCareCAN paper is not a figment of any one person's imagina-

tion. At the 2016 National Health Leadership Conference – co-hosted by HealthCareCAN and the Canadian College of Health Leaders – over 700 health leaders adopted a resolution to implement the health-related recommendations of the Truth and Reconciliation Commission of Canada.

The Commission was set up to document the history and lasting impacts of the residential school system on Indigenous students and their families and concluded in December 2015 that the school system amounted to cultural genocide.

The resolution from the 700 health leaders ultimately stood out as the highest declared priority at the conference and was overwhelmingly supported by 73 percent of the voters – not just for the 2017 calendar year, mind you, but until the Commission's recommenda-



Denis Chamberland

tions are fully implemented. That could be a long time.

Many examples of social procurement exist, one being the city of Toronto's Social Procurement Program. The city annually awards an average of \$1.8 billion of goods and services, professional and construction services.

The city's program is designed to provide access to economic opportunities to people who experience economic disadvantage, discrimination or otherwise experience barriers to equal opportunity, including so-called 'equity-seeking communities' who are protected by human rights legislation. Such communities include, among others, Indigenous people, women, racial minorities, persons with disabilities, newcomers, and LGBTQ persons.

verse suppliers who provide community benefits."

Of course not all social procurement programs need to be as complex or ambitious as the city of Toronto's Program. It is possible to set up a program that is highly focused on Indigenous contractors, whether through the use of set-asides, teaming arrangements with large prime contractors, or where the hospital awards points in its bid call document to suppliers proposing an Indigenous sub-contractor.

Each situation needs to be considered separately. Our work with Indigenous contractors has shown that teaming arrangements are one of the most effective ways to generate concrete results for all.

But is social procurement legal? The trade agreements – such as the domestic Canadian Free Trade Agreement (CFTA), and the Canada-European Union Comprehensive Economic and Trade Agreement (CETA) – generally apply to public hospitals in Canada.

While these do not necessarily bar social procurement, they inform the approach that may be taken in structuring a social procurement program. There are many ways to go about it. Other jurisdiction-specific legislation, such as the Broader Public Sector Procurement Directive in Ontario, must also be considered.

The HealthCareCAN paper invites healthcare leaders to begin by acknowledging the past and accepting the truth, and to reflect on how their organization can leverage their purchasing power to create positive outcomes for Indigenous peoples.

Acknowledgement and reflection are not always easy when the resulting consequences are unclear or unpredictable. But taking small, practical incremental steps that help to mitigate the risks and validate the progress being made is undoubtedly the best way to get started.

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

Canada's hospitals make use of analytics to predict demand for services

Command centres, advanced mathematics and simulations are being deployed to catch problems.

BY DIANNE DANIEL

Deemed to be futuristic at its launch in 2017, the digital command centre at Toronto's Humber River Hospital was shrouded in mystery when it first opened. Fast forward to today and the trendsetting approach to analysing, displaying and acting on real-time information is so widely accepted and trusted, hospital staff are beginning to question how they ever worked without it.

"People have felt the improved access to interventions for their patients; they've felt the reduced logistical nightmare of trying to get things done," said command centre medical director Dr. Susan Tory. "As a result, the engagement has been really great and people are asking more of the command centre, coming forward with more ideas for things we can monitor."

The command centre's rapid acceptance and evolution is indicative of a widespread movement within healthcare to deliver data-driven care. Adoption of digital systems and electronic health records is making it easier to capture information; now health systems are working to extract operational, financial and clinical insights from that data in real-time, with the end goal of operating safer, more efficiently and with improved patient outcomes.

A first for North America, the Humber River Hospital command centre works like an airport control tower, bringing key decision-makers together in a central communications hub to work together to keep an extremely complex healthcare environment running smoothly, and to monitor and solve challenges as they emerge.

Created in partnership with GE Healthcare, the cornerstone of the centre is a wall of computer screens called "tiles" that present a snapshot of what's going on where, using real-time analytics to display information about things like bed management, emergency department admissions and waits, medical imaging resource utilization, and long-term care patient monitoring.

Data are continually fed to the tiles from a range of IT systems, including the hospital's Meditech electronic health record.

The first generation of the command centre focused on improving patient flow, preventing delays, improving access to medical imaging tests and investigations, and eliminating barriers to safe discharge plans.

In the year since its launch, advanced analytics have helped to reduce the time it takes to clean an inpatient bed by 21 percent and the time to admit an ED patient to an inpatient bed by 13 percent. On average, patients are waiting eight hours less for an ultrasound and six hours less for a CT scan.

"We know that we would require 23 additional acute care beds if we hadn't done this work, which is equivalent to \$6.5 million," said Jane Casey, program director, Emergency Services, and command centre director.

One of the most popular tiles is the medical imaging display, which provides a snapshot of demand for ultrasound, CT scan and MRI machines, as well as interventional radiology procedures.

A medical imaging flow technologist sits in the command centre to monitor activity such as who's been waiting longest, who's marked urgent, where

there's opportunity to schedule multiple investigations together for a single patient, and where there's room to move people around to expedite cases.

"If an outpatient test gets cancelled, we are immediately able to see that and use that space or appointment for an inpatient to help improve our resource utilization," explained Dr. Tory, noting that medical imaging turnaround times continue to improve, enabling the organization to set its bar higher.

Access to advanced analytics also means the team can dig deep to find the root cause of problems.

In interventional radiology, for example, one particular procedure that requires a specialized line was experiencing significant delays. The data showed the bottleneck was due to the fact that patients requiring the line could only be scheduled on a Monday, Wednesday or Friday.

"It made no sense that someone would have to

catheter-related urinary tract infection or central line-related bloodstream infection.

"It's all very exciting and it has involved a lot of engagement from all interested parties," said Dr. Tory, noting that physicians in particular are providing input. "There has never been work quite like this done before in the sense of monitoring and trying to prevent poor perinatal outcomes, improve safety and awareness and detection of potential problems, as well as improve our processes at Humber and seize opportunities to improve team communication."

Artificial intelligence technologies are expected to play an increased role at the Humber River Hospital's command centre as it expands. Predictive analytics are already used to forecast bed demand and staffing needs with a high level of accuracy – using data that paints a clear picture of what to expect within the next 48 hours. Similar forecasting is also applied to help



ILLUSTRATION: LINDA WEISS

wait because we had decided we would only put that line in (on those days)," said Casey, noting that the quick fix was to extend the capability to five days. "Having that data has helped us to go right up to the board and show them what's going on, and see what we can do to improve."

The second generation of the command centre – currently in development – is focused on adding tiles to improve patient safety and quality. The process is providing a lot of food for thought as clinical practice leaders, nursing leaders, physicians and departmental teams work together to look at current processes and identify areas where analytics can help, said Dr. Tory.

Plans are under way to introduce tiles in four main areas: an early warning system for ward patients that will detect patients who are declining before they reach a critical state; a perinatal monitoring system for babies and mothers that will detect issues that require closer monitoring or early intervention; a system that will monitor seniors who live independently in the community during their hospital stay, with the end goal of helping them to return home sooner; and, a "risk of harm" tile that will identify and prevent hospital-acquired harms that patients may be vulnerable to as inpatients, such as a

manage surgical and allied health workloads. Whereas "in the past it was firefighting the day of, now the hospital is able to plan and move forward," said Dr. Tory.

Yet, despite the increasing role of automation, there's still a strong case for human intervention, she added. "What we've found, at least in the discussions about this second generation, is there's always a human element that seems to be very pivotal in terms of being able to provide an actual clinical assessment," she said. "Machines are very intelligent and very smart at interpreting a fetal heart rhythm or amalgamating a score for vital signs, but sometimes numbers don't tell the full story."

For the Nova Scotia Health Authority in eastern Canada, advanced analytics is primarily about transforming information into actionable insight. When the authority amalgamated in 2015, it created a province-wide analytics portfolio spread across three main branches: Performance, Analytics and Accountability; Financial Analytics; and, Workforce Analytics. All three teams work in close collaboration.

"What we've found in terms of system-level planning is that we really need to tie all three of those elements together," said NSHA director of performance, analytics and accountability Matt Murphy. "The leaders need to understand not just which peo-

ple they are seeing in their clinics or in their beds, but also the cost to the system to provide the services and the personnel who are actually at the bedside or clinic performing the work.”

Over the past three years, the NSHA has moved away from retrospective analysis – what happened, how much did it cost and who did it – to a more predictive model that examines who will be coming to hospital, how many beds will be needed, what workforce is required to staff those beds and what it will cost. As Murphy described, the shift is necessary to cope with a higher volume of sicker people, including the frail and elderly who require a different type of care.

“If we’re not forward thinking, and using the information we have available to us to understand what our patient population is going to be, what their care needs are going to be 12, 18, 24 or 36 months out ... we’re never going to be able to meet the proper care need, or meet it in an economically viable fashion,” he said.

The new analytics infrastructure within NSHA works together to deliver an organization-wide view of information, pulling data from multiple clinical information systems, including admission, discharge and transfer systems. By simply using Microsoft Excel – software that is commonly available across the health authority – the Performance, Analytics and Accountability group is able to build data models that draw a common data set from those disparate systems.

Information is displayed to end users as easy-to-read balanced scorecards that pull information from Finance, Human Resources and Performance to provide a quick snapshot of a how a unit is performing.

Murphy considers Excel a good “starting block” to introduce analytics into healthcare environments because it is familiar to managers at all levels, from entry-level to the most senior leaders. NSHA also provides an online repository – or indicator repository – built in Microsoft SharePoint to serve as a one-stop shop to store performance indicators, reports and routine operational data, including clinical care dashboards.

“We’re not expecting our front line staff or managers to go in and query with SQL (structured query language),” he said. “We want to have it in a really digestible format; we’re trying to make sure the information gets shifted to actual insight with the greatest possible ease.”

Predictive analytics and machine learning are “on the horizon,” he added. NSHA analytics teams are already working with statistical and simulation software tools, including Tableau from Seattle-based Tableau Software and FlexSim Healthcare from Orem, Utah-based FlexSim Software Products Inc.

Tableau provides a common visualization platform so that information is consistently displayed across the province, regardless of the hospital department viewing it. FlexSim is used by the Project Services and Performance Improvement team, made up of industrial engineers and project managers.

When Dartmouth General Hospital expanded its surgical suite recently, FlexSim was used as a tool to demonstrate the impact of adding beds, as well as nursing or physician staff. “Using that software, an en-

gineering co-op student developed a model that helped them understand the optimal distribution of resources,” said Murphy, adding that true-to-life avatars of the staff and an exact replica of the unit were used.

NSHA statisticians also use Stata, a general-purpose statistical software package from StatCorp LLC of College Station, Tex., to help predict bed usage. This year, for example, health authority decision-

makers got ahead of flu season by predicting the expected surge in patients and putting a mitigation plan in place.

“We’ve been really focused and intentional about the skill sets we’ve recruited into performance and analytics over the last three years,” said Murphy, noting that the team includes health information management specialists, decision support analysts as well as data scientists.

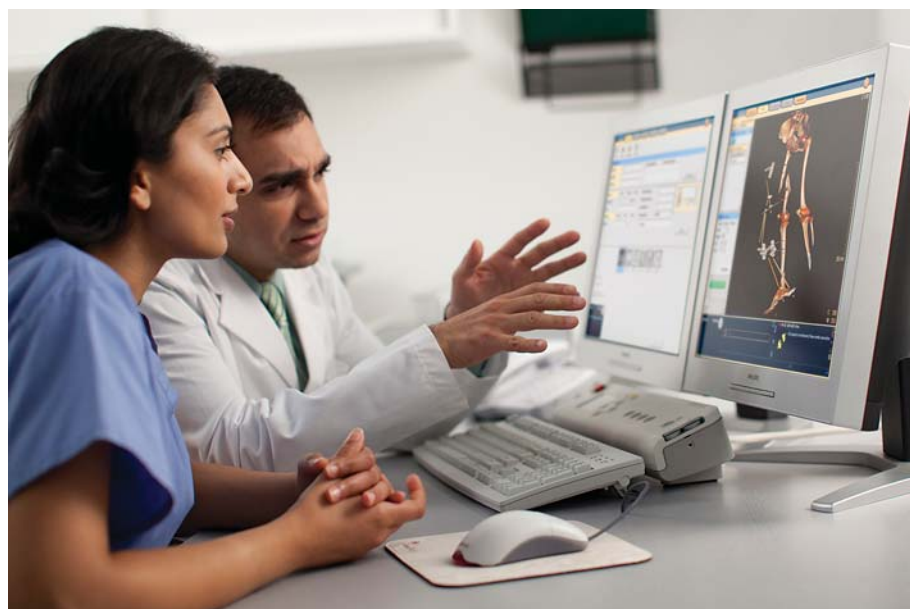
As more healthcare data gets digitized, LeanTaaS Inc., based in Santa Clara, Calif., is positioning itself to meet the need for healthcare analytics. The company was built on the premise that hospitals should use objective data and predictive analytics to match resource supply with demand, similar to the way Uber matches riders and drivers.

Company founder and CEO Mohan

CONTINUED ON PAGE 22

medical imaging

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A new, monthly report on projects, people and investments in diagnostic imaging, interventional radiology and radiation therapy.

Medical Imaging News Canada has been designed to keep professionals up-to-date about the latest developments. The publication is being sent out via e-mail once a month. It will offer news and information on:

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Medical Imaging News Canada is being sent to radiologists and DI department managers across the country, as well as to technologists, radiation therapists, IT directors, health region managers and government health officials.

CANADIAN
Healthcare Technology

Clinical dashboard gives Joseph Brant Hospital a quick view of patient flow

BY JERRY ZEIDENBERG

BURLINGTON, ONT. – Joseph Brant Hospital has created a computerized, clinical dashboard that informs executives, physicians and staff about patient volume and trends in the emergency department and inpatient floors. The system – which refreshes itself every 10 minutes – has been up and running since the spring of 2018 and has become an important tool for keeping managers informed about potential logjams and where to focus their attention.

“The system gives us a quick snapshot, so that people can switch into high-gear, if needed,” said Dr. Joe Cherian, chief of the emergency department. He explained that the computerized tool provides the real-time information that staff can use to make fast decisions about reducing waits in the ED or moving them into beds faster.

Thanks to the colour-coded bars and lines – green, yellow and red – managers can quickly determine if there is a problem that needs special attention. “By looking at the graphs, I can see how many people are registering, how many are waiting, and whether we’ll get caught up or if we should call another physician,” said Dr. Cherian.

The computerized system can be accessed by managers and staff across the hospital, and was built by a small team in just six months. They used software from Information Builders, and met regularly with various members of the ED, medical staff and executives to find out which metrics were most needed. The vendor also



The computerized system can be easily accessed by managers, clinicians and staff across the hospital.

lent support to the project.

Dr. Cherian noted that the ED is like the canary in the coal mine – if there is a backlog of patients there, it probably indicates problems in other areas of the hospital, like patients in need of discharge on the floors.

The system tracks patient flow on various hospital floors, and shows managers where to place resources, such as nursing staff, or how to move patients to free up needed beds.

“This gives us a tool to quantify what we have to do,” commented Julie DePaul, director of health information services.

She noted that there are management huddles three times a week, where deci-

sions can be made about solving patient flow problems. The business intelligence system has been a boon, as it provides hard data about volume in various areas of the hospital.

But the system has also been useful on a day-to-day basis, as it constantly alerts staff about trouble-spots and trends that should be watched.

In the ER, the system notes how many patients are registered; how many have been waiting more than 24 hours; how many have been admitted but are waiting for a bed; and how many haven’t been admitted.

The bars on the display turn red when a particular metric needs attention.

The system also shows how many patients are in triage, how many are waiting to be seen, and the number being seen.

On the medical floors, similar metrics are available. Authorized staff can also drill down further, to see the types of patients in various beds, length-of-stay, what’s needed before discharge and other information. To protect privacy, however, the names of the patients do not appear.

By accessing this kind of data, staff can determine whether various tests and services can be speeded up to move patients into a different part of the hospital or to facilitate discharge.

So far, the tool has been used by management and physicians, but Joseph Brant is encouraging all staff members to view it, especially front-line care-givers. “We want everyone to look at it, to play with it, and to come up with ideas,” said DePaul.

She observed that already, staff members who have used the system have asked that many new features be added. They’ve also used the data to suggest ways of improving processes at the hospital.

In the near future, the team plans to add financial data and metrics to the system. In this way, management will be able to analyze costs on a real-time basis. It’s expected to be a valuable tool to compare projected or expected financial performance with the actual experience.

There is a good deal of discussion about new features and metrics to include, giving it even more usefulness. “It’s a living document,” said DePaul. “There is a lot more to come.”

Alberta uses visual analytics to take action on the opioid crisis

BY DIANNE CRAIG

One grain of carfentanil can kill an adult. It’s ten thousand times more potent than morphine and 100 times more potent than fentanyl. Fentanyl, carfentanil, and other opioids are part of a growing, deadly public health crisis in Alberta and throughout North America.

Getting ahead of growing opioid use across North America is a daunting challenge. In the U.S., there were more than 72,000 drug overdoses in 2017. Of those, more than 49,000 were due to opioids. In Alberta alone, there were 687 deaths by opioids in 2017.

While administering naloxone to react to incidents as they occur helps prevent many deaths, Alberta Health Services (AHS) is now also working to stem the crisis with a proactive approach to monitoring and anticipating needs for naloxone, and managing other care responses through the Tableau business intelligence analytics platform.

Visual analytics are a key part of the arsenal in the province’s response to the opioid crisis.

When an overdose happens, the emergency response is the administration of naloxone. Fentanyl overdoses

might require .8 or .9 mg of naloxone, while a carfentanil overdose might require 2 milligrams.

Speaking to attendees at the 2018 Tableau Software Conference in New Orleans, Dr. Hussain Usman, Executive Director, Public Health Surveillance and Infrastructure, AHS, said that among the coordinated responses AHS is able to launch after using visual analytics are “developing new triggers to send out a higher dose of naloxone – for example, when there is an indication of carfentanil.”

AHS is deploying visual analytics for crafting and disseminating actionable surveillance information to various stakeholders and partners to enable a coordinated response to Alberta’s opioid crisis with measurable impact.

The health system is responding to the opioid crisis by using Tableau dashboard analytics, along with other tools like SAS for Surveillance, Programs, and Program Monitoring.

This has led to a “very efficient response in Alberta,” said Dr. Usman, who has been involved in health surveillance for 20 years and recalls when, “in the traditional world of surveillance,” tables were created in Excel and charts and were put together in reports and distributed.

AHS had already been using Tableau’s business intelligence platform in other ways relating to data management. As Tableau’s largest user outside the U.S., AHS had a lot of experience with that business intelligence platform and decided to also use its visual analytics to help address data related to the opioid crisis in Alberta.

But before AHS could map out a plan for those analytics, they had a number of challenges with which to contend. One of those challenges, said Dr. Usman, was the

Among the useful solutions AHS created was the Alberta Opioid Surveillance Dashboard.

multiple data sources. Information relevant to addressing the opioid crisis was coming from the medical examiner, the emergency department, hospitalizations, physician’s visits, EMS, HealthLink (a service where one can call and talk to a nurse or assistant), and the Take Home Naloxone (THN) Program.

“Multiple data sources adds complexity to managing the data as well as analyzing it,” said Dr. Usman.

Another big challenge, noted Dr. Us-

man, was the dissemination of reports to branch users and diverse users who need them. “We have so many,” he said, adding that timeliness of delivery is also very important.

From paper to an in-house analytics infrastructure: “When I joined AHS six years ago, everything was on paper. Now we’ve developed an in-house analytics infrastructure using Tableau and some other tools,” said Dr. Usman.

Before the shift from paper reports to visual analytics they encountered some initial skepticism. “Leadership thought it was just a concept – and they doubted it would be possible,” recalls Dr. Usman. “The approach we followed was seeing is believing. We created the first dashboard and did the demos to help people understand it’s real, you can use it for your day-to-day work. Once we created three or four good products, it was much easier. Now the tables have turned. Everyone is fully on board.”

Visual analytics provide actionable surveillance information: Among the dashboards AHS developed using Tableau visual analytics was the Alberta Opioid Surveillance Dashboard, which provides up-to-date information just a click away, with an interactive user experience.

One dashboard pinpoints the number

AI implemented for Emergency Department forecasting at St. Michael's

BY SELMA AL-SAMARRAI

TORONTO – When considering a solution for staff scheduling challenges in the bustling emergency department at St. Michael's Hospital, Dr. Muhammad Mamdani suggested artificial intelligence.

St. Michael's is an acute care hospital located in downtown Toronto and had roughly 79,000 emergency department visits in the 2017-18 fiscal year. No two days are alike in the ED and patient flows were typically unpredictable.

In response, the hospital's Li Ka Shing Centre for Healthcare Analytics Research and Training (LKS-CHART), the Information Technology department, and Decision Support team decided to explore using artificial intelligence tools to make patient care more efficient, timely and enhanced.

"Healthcare is so data-rich and there is often too much to process for the average human mind," explained Dr. Mamdani, director of LKS-CHART.

"Artificial intelligence can make meaning out of complex data relationships, which we could then use to guide clinical practice and policy-making in Healthcare."

Ray Howald, clinical leader manager in the ED, uses the hospital's new A.I.-powered tool – dubbed the Forecasting Tool – in two ways. Primarily, it predicts expected patient volumes over the next three days in six-hour intervals, which informs short-term staffing decisions. Secondly, it forecasts patient volumes for the upcoming three months to help with longer-term planning.



Dr. Muhammad Mamdani, director of the team developing artificial intelligence tools at St. Michael's Hospital, is pictured here using the Forecasting Tool with the emergency department's Clinical Leader Manager, Ray Howald.

The tool is automatically updated daily with new patient volumes data and has been demonstrated to have a prediction accuracy of well over 90 percent.

"Having the ability to forecast the volume of potential patients that may be arriving to the ED and their acuity is a valuable tool to ensure we have the correct staffing in place to deal with such demands," said Howald.

"This tool allows me as a manager to make accurate and informed operational decisions, which has a positive impact on patient care."

The tool will be integrated next at the emergency department at St. Joseph's Health Centre, which is part of the newly integrated Unity Health Toronto network that includes Providence Healthcare and St. Michael's.

Another artificial intelligence tool that was created by Dr. Mamdani's team and implemented recently at St. Michael's is the Natural Language Processing (NLP) tool.

Its purpose is to rapidly extract useful information from digital text notes – a process that would normally be done manually. This automated process is useful and important considering the hospital's inpa-

tient admissions and ambulatory appointments for last year stood at roughly 26,000 and 527,000, respectively.

"For example, our vascular surgery group needs to identify specific subgroups of patients at St. Michael's – who may be at higher risk for poor outcomes – to monitor the quality of care provided to them and identify areas for improvement. For the team to do this, they would have to manually read through detailed clinical notes to identify the relevant patients. That's where this tool comes in," explained Dr. Mamdani.

A manual review of a patient's clinical information – usually entered in their digital chart or health record – would typically take between a few weeks to a few months, depending on the volume of information. The NLP tool is designed to mimic human language models, "read" through the patient's clinical notes and extract specific information within seconds.

"There is enormous potential for artificial intelligence to assist our clinicians and managers. We're able to leverage an impressive data infrastructure that is conducive to analytics, a high-functioning data science team that's skilled in advanced analytics including artificial intelligence, and a culture that welcomes innovation – all in an effort to improve the quality of care we provide to our patients," explained Dr. Mamdani.

"Patients should expect the highest level of care when it comes to their lives. As clinicians, hospital administrators, and healthcare researchers our standards should be even higher – and we're using data to help us get there."

of emergency department visits by ICD coding. For example, ICD 10-ICA code T40, Poisoning by Narcotics and Psychodysleptics (hallucinogens), reveals a "many folds increase" in emergency visits involving narcotics and hallucinogens. "You can look at it by age, by sex, by month, by week," said Dr. Usman.

Among other key dashboards developed to address the opioid crisis include the Take Home Naloxone (THN) Kits Surveillance Dashboard, and the Maps for Naloxone Kits Distribution Dashboard.

"These dashboards tell us what is happening in the province regarding opioids," said Dr. Usman. This program monitoring helps with understanding of the scope of the program ... how it is working, how many THN kits are being distributed, how many opioid-related emergency visits are happening and where the deaths are happening.

The dashboards AHS creates have a summary tab with at-a-glance view of information of key interest. They are all helping to enable proper monitoring of the opioid crisis in Alberta communities.

"We have distributed over 80,000 take home naloxone kits in Alberta. Dashboards like "Cumulative count of distributed kits by zone 2016-2018 year to date" and "Cumulative counts of distributed kits by provider" help AHS zero in on where the crisis is greatest and to plan distribution.

Timeliness is also so important, emphasized Dr. Usman. The dashboards help AHS respond to outbreaks quickly and anticipate where needs are going to be greatest. "We are able to very quickly deploy our dashboard because of the system that we have," he said. AHS can quickly develop and deploy dashboards for challenges other than opioids, for example, for other drugs like cannabis, or for events, like fires and corresponding air quality.

"We were among the very early users of Tableau, particularly in Canada," said Dr. Usman, adding that AHS started making the transition from paper-based reporting in general – for health delivery services other than those relating to the opioid crisis – to visual reporting through Tableau about five or six years ago.

"For Public Health Surveillance, this tool is a perfect match. Tableau offers us tremendous flexibility," he said, noting that before they would have four to five reports and now they have 40 to 50 interactive Tableau visual reports. "Now we can have some real-time dashboards updated every 15 minutes," he said.

The dashboards even help hospitals' frontline staff with decisions like when to launch or intensify an anti-opioid campaign by showing when the peak periods are for usage in that area.

The dashboards are readily accessible to anyone permitted to see them. "Once

we've created a dashboard, we can display it to all AHS employees or to a limited number of people," said Dr. Usman. "It's providing a high quality user experience that leads to improved support and program planning."

"Good information leads to informed decisions," he added.

Canada's largest healthcare system: Alberta Health Services (AHS) uses a 'Dashboard of Dashboards' portal to steer and show data reporting. Like many large organizations, AHS, the largest integrated healthcare system in Canada, has massive amounts of operations data from multiple sources to

A 'Dashboard of Dashboards' helps to locate the information or report that is needed.

manage and analyze. In just one year, they have completely revamped their data collection and management with visual analytics to measure financial, operational, staffing, risk, project performance and employee satisfaction.

In August, 2017, AHS formed the IT Analytics Team to measure the performance of the Information Technology Department – which has a \$500 million annual spend and 2,000 IT staff, as well as the CARE Program, with an esti-

mated \$1.5 billion total spend on implementing the Epic EHR system across the province.

Speaking at the Tableau Conference in New Orleans last October, AHS Program Lead, Analytics Centre of Expertise, Jesse Tutt, said that the team's goals were to reduce costs, improve service delivery, and reduce risk transparency.

In the beginning, the new team faced a series of challenges from an analytics perspective, including:

- managing the huge amount of data they have – over 15 petabytes
- the 100s of stakeholders involved
- the number of systems (1,600)
- master data; for example dealing with 20 different names for the same building
- gaining access to data, for example through the cloud; and
- dealing with resistance, including data silos, worrying about transparency, etc.

Among their key enhancements to data management was use of the Tableau business intelligence platform to create a "Dashboard of Dashboards" – which they called the "Information Technology Report Portal." This would mean that when the Executive Team was looking for an important report, they could use a single URL to quickly find the report they need.

The portal is a single source access point for IT analytics reports like CIO Reporting, Applications, Leadership,

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Real-time dashboards help Ottawa paramedics to improve routing

BY NEIL ZEIDENBERG

The Ottawa Paramedic Service (OPS) is using real-time dashboards for hospital notifications and patient distributions to local emergency departments. With real-time situational awareness, OPS can see the actual number of ambulances available for emergency response, how many paramedics are at hospitals and where any delays exist.

“By routing ambulances to hospitals with shorter wait times, we can return paramedics back into service faster to improve overall response times,” said Greg Furlong, Deputy Chief, Ottawa Paramedic Service.

Previously, hospitals didn’t know exactly when ambulances would arrive, the injuries sustained by a patient or what treatments had already been provided.

Area hospitals also used manual processes susceptible to delays; for example, they would call other hospitals and dispatch service to determine system performance.

They required an automated solution that would help them make intelligent decisions based on real-time data, thereby improving ambulance response times and patient outcomes.

The solution chosen is called Qlik Sense from Qlik Technologies Inc., (qlik.com/us), a Pennsylvania-based leader in business intelligence (BI) and analytics. Qlik’s end-to-end data management and analytics platform combines data sources into one easy-to-view dashboard helping users gain greater insight, and make better decisions. It can be used on a desktop, tablet or any mobile device.

Although Qlik is an analytical system, it’s also a Geographical Information Sys-

tem (GIS), and can plot where ambulances are in the city in real-time.

“On our hospital dashboards – after the paramedics depart the scene with a patient – the Emergency Department can (actually) see the location of the ambulance and the estimated arrival time at the emergency

The solution acts as an analytics dashboard, but also as a geographic information system, showing where ambulances are.

department, allowing them to better prepare for incoming patients,” said Furlong.

Ambulances are now being deployed with greater precision and patients are directed to the best hospital for their condition, leading to improved outcomes.

All Paramedic Service vehicles are equipped with AceTech, described as the “blackbox” of an ambulance. It provides location information (GPS/AVL) and other tools like temperature monitoring and accelerometers. The GPS/AVL data from each Paramedic Unit is being used to develop an application to better deploy ambulances for the next emergency response.

Currently, about 75 people are utilizing the Qlik environment. They include frontline superintendents, dispatchers and management teams. At the time of this article, frontline paramedics had yet to begin using the system.

When asked what the reaction has been like from hospital staff, Furlong said, as with any new solution it takes time to reach full adoption. “We continue to work with the hospitals on utilizing the system. A new version of Hospital Dashboard was set to go live in early January, which includes a new mapping feature and estimated arrival times. It will also use Qlik’s NPrinting tool, an advanced customizable reporting and distribution solution to notify hospitals of incoming paramedics.”

Use of this technology has brought the OPS closer to their goal of reducing response times by five minutes – that’s 38,000 more minutes per year to get the sick and injured to the best possible caregiver.

Ottawa hospitals have more time to prepare for patients with specific injuries. “Now there’s awareness across the entire organization as to how the system is performing, where resources are located and where any pain points exist,” said Furlong.

Alberta tackles opioids with visual analytics

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Performance, Projects, Risk, Utilization, and information regarding the Connect Care Portal.

Since August, 2017, AHS has created a new team and a data warehouse, ingested data from 95 different systems, completed 100 presentations and sessions, developed 50 Tableau dashboards viewed more than

Since 2017, a team at AHS has used a data warehouse to ingest information from 95 different systems.

10,000 times by more than 600 people, saved 1 FTE (Full-time Equivalent, 1 employed person) automating reports, identified underutilized resources, and developed a reporting supporting process improvement which resulted in:

- a 15% reduction in open service requests

- an 82% reduction in open hardware and software service requests, and
- a 34% reduction in open incidents.

“We’ve developed 50 Tableau dashboards, and are looking about 1/3 penetration (viewing) so far,” said Tutt.

Among the lessons learned from this experience, said Tutt, are to first find the ‘pain’, take Prosci Change Management Training, create a small team, find a ‘visible’ sponsor – someone recognizable in the organization who will get behind the initiative, create a placemat (a single presentation slide printed on paper) to present and share your vision, share your placemat with your organization’s influencer(s), prioritize your work using a Scrum Backlog (a prioritized features list containing all functionality desired), create a ‘dashboard of dashboards’, and measure who is using your dashboards.

“Our value (using visual analytics) is really correlating data across systems and finding new information. We’re doing it with an open mind and finding data we didn’t expect,” said Tutt.

Analytics predict demand for services

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Giridharadas is on a mission to build a software platform that applies lean manufacturing principles to service delivery environments like healthcare. One of the first problems solved by the company’s team of mathematical experts was how to optimize chemotherapy scheduling at the Stanford Cancer Center, leading to the development of iQueue for Infusion Centers.

“It took us six months to get the mathematics right and six months more to stabilize it,” said Giridharadas. “Once we did, we realized we had actually solved a very hard problem: how do you optimize the asset of a chemotherapy chair?”

Since 2014, the company has focused exclusively on healthcare and is in the process of reaching out to Canadian hospitals, with satellite offices expected to launch in On-

One of the first problems solved by the company’s math experts was how to optimize chemotherapy scheduling.

tario and B.C. It tackles hospital challenges by applying sophisticated supply-demand matching algorithms, similar to the way each service is “perfectly optimized and perfectly synchronized” in a busy airport.

“Imagine if the baggage handling crew at JFK airport decided they needed five less trucks to meet their milestone,” said Giridharadas. “That would be disastrous. The fact that health systems tend to allow departments to plan their own activities, staffing, machines, refurbishments and upgrades creates this dependency problem... everything interferes with the order of everything else.”

“If you can do to a health system, what happens above the wing and below the wing in an airport, it’s magic,” he added.

The theory behind LeanTaaS is that the analytics problem has to be solved one healthcare asset at a time, applying a deep level of math. The company sells its products using a Software-as-a-Service model, priced per asset per month, and is currently beta testing a product for clinic environments.

“Our vision of the world is we will crack the mathematics on the 10 big assets that matter in a hospital and then automatically we have air traffic control for the hospital to help it see more patients with the same assets, with less wait time and at a lower cost,” said Giridharadas.

New opportunities

CONTINUED FROM PAGE 16

whether defining clinical roles by type of equipment should be favoured over a common set of competencies or skillsets. To that effect, the CAMRT is proposing a unique set of competency profiles that will create incentives for educational institutions to re-think their programs in a more holistic way.

Advanced Practice Roles: The CAMRT defines advanced practice in medical radiation technology as a higher level of practice wherein clinical responsibilities routinely exceed the current principal expectations of practice. Advanced practice roles require analytical skills to synthesize evidence-based knowledge to autonomously work towards optimal patient outcomes.

Advanced practice by this definition

has existed for some time, first emerging in the UK about 30 years ago. Advanced practice roles in radiation therapy exist here in Canada, having been developed in the province of Ontario through Cancer Care Ontario initiatives. Today, 15 years since the first roles appeared, there are about two dozen radiation therapists working in advanced roles across the

Advanced practice roles have been showing demonstrable gains for patients in access and quality.

province. Evidence has shown that these roles help to improve access and make healthcare systems more efficient.

One striking example is the Quick Start program at Princess Margaret in Toronto for patients with breast cancer.

In this model, the Advanced Practice radiation therapist leads the same-day simulation and treatment process. Outcomes for patients are very impressive: an 11-day reduction over the standard process in the treatment pathway, with treatment delivered the same day! Advanced practice roles in other areas like palliative radiation therapy also show demonstrable gains for patients in access and quality.

Together, technological advances and evolving dynamics in healthcare put MRTs at the forefront of change in the healthcare system. As professionals, they are poised to play an essential role in enhancing imaging and therapeutic services available to patients of the future.

Francois Couillard is CEO of the Canadian Association of Medical Radiation Technologists (CAMRT). The association is headquartered in Ottawa.



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