



# CANADIAN Healthcare Technology

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## INSIDE:

### FOCUS REPORT: EDUCATION PAGE 14

#### Cloud-based QA

Real Time Medical is now providing small and large hospitals with a subscription-based peer review service. It is available for specialists such as radiologists, cardiologists, pathologists and ophthalmologists. **Page 6**

#### Appropriate ordering

St. Michael's Hospital, in Toronto, is running a research project with 80 physicians to analyze the DI ordering habits of doctors. The sys-



tem will also advise family doctors about the most appropriate tests to order for patients. **Page 6**

#### Information governance?

With the explosion of computerized and paper-based data in healthcare organizations, it is more important than ever to develop information governance standards. A group in Canada has been launched to do just that. **Page 13**

#### Innovation showcase

DI vendors often wait until the end of the year to unveil their newest technologies at the RSNA conference. The meeting in November



2016 offered a look at many new solutions, including a self-compression system for mammography and a twin C-arm for angiography. **Page 22**



PHOTO: COURTESY OF THE RSNA

## Will radiologists be needed in era of AI computers?

Computers can already recognize faces better than humans, and systems using Deep Learning and Artificial Intelligence are developing the ability to spot diseases in diagnostic images and provide possible treatments. How long will it be before such systems are as good as radiologists? The question intrigued DI experts at the recent Radiological Society of North America conference, in Chicago. **SEE STORIES ON PAGES 4 and 17.**

## Mackenzie Health devises new workflows for 'smart' hospital

BY JERRY ZEIDENBERG

**R**ICHMOND HILL, ONT. — Mackenzie Health is set to go live in July with its Epic Electronic Medical Records (EMR) implementation, an advanced, "end-to-end" installation that will be used by clinicians and patients alike. The new EMR, for example, will not only enable surgeons to schedule time in the Operating Room from their offices, but it will also allow patients to book follow-up appointments at times when the encounters are most convenient.

And while the Epic system is one of the top EMRs available, Mackenzie Health CEO Altaf Stationwala recognizes that "one vendor can't solve all of our problems." Indeed, the hospital has an ambitious plan to use

technology to dramatically improve the delivery of healthcare, and it's integrating a host of solutions around the core Epic system to reduce bottlenecks and clear logjams.

Those solutions will first be deployed at the existing Mackenzie Health site in Rich-

**The hospital is using the Internet of Things to build intelligence into clinician workflows.**

mond Hill; they will then be rolled out at the new hospital that Stationwala and his team are building in nearby Vaughan, a \$1.6 billion investment that will open its doors in 2020.

"The number one complaint we've heard from clinicians is the amount of time it

takes to use passwords to log in and out of different systems," said Stationwala. When clinicians want to check information in different systems, it's just too difficult and time-consuming to leave one application and get into another.

For that reason, Mackenzie Health will make use of Imprivata's single sign-on solution, including 'tap-and-go' technology, when the Epic system fires up in July. Not only will clinicians be able to access all applications with a single password and sign-on, but they will be able to walk from one computer to another, tap their badges, and resume where they left off on the new computer.

That wireless app also recognizes the mobile nature of the work physicians and nurses are performing — they're walking

CONTINUED ON PAGE 2

# Mackenzie Health's Epic EMR implementation is set to go live in July

CONTINUED FROM PAGE 1

from room to room in the hospital, and not staying in any one place.

But the high-powered Epic system, and the solutions that are being added to it, wouldn't work well without a high-speed network.

That's why Mackenzie Health is investing in an incredibly fast Cisco network. "We need the fastest network possible," said Richard Tam, Executive Vice President at the hospital. So Mackenzie Health is installing a 10 gigabit/second wireless network, and a 100 gigabit/second wired system.

"They will be the fastest hospital networks in Ontario," said Tam.

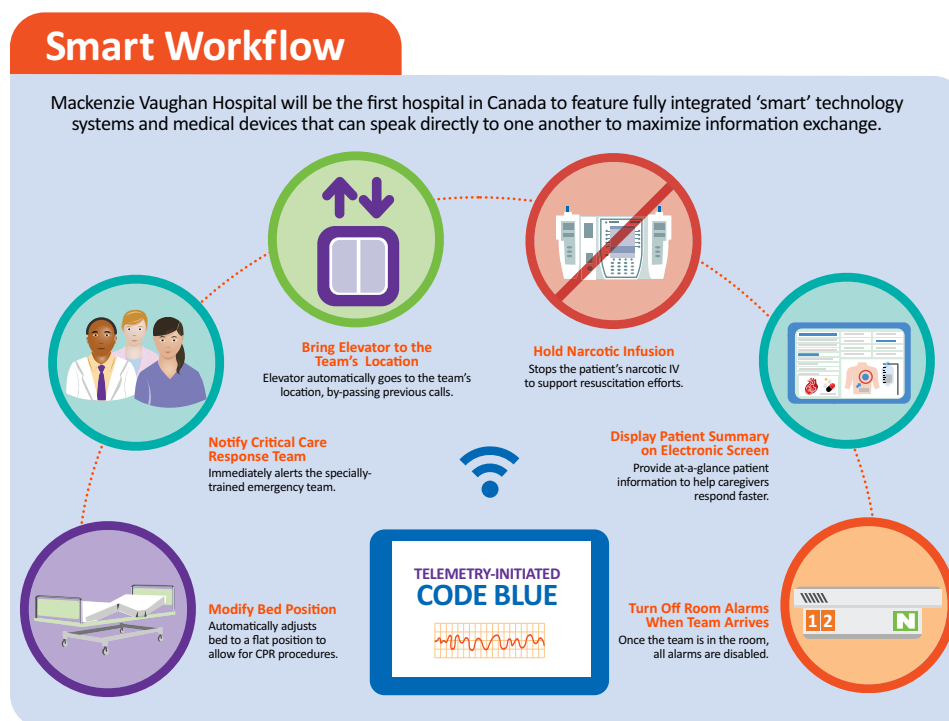
Stationwala explained, "We could put Epic in without these steps, but it would run as slow as molasses. A high-speed network, with zero lag time, is a must."

These systems will be at the heart of the "smart hospital" that's being invented at Mackenzie Health.

The new, hospital of the future is being created through strong partnerships – with the builder Plenary Health, and with Philips Canada, which will handle the procurement of all technology going into Mackenzie Health. (While much of the technology will be from Philips, a good deal will be from other vendors – it's another facet of the best-of-breed philosophy.)

Another key partnership was recently signed with Compugen, a systems integrator and IT solutions provider that happens to be locally based, in Richmond Hill. Compugen is one of the biggest systems integrators in the country, with 1,400 employees across Canada; it will help the hospital get all of its systems up and running smoothly.

It has also been enlisted to help Mackenzie Health produce some of its own technology – in particular, systems that will improve workflow. Most of these



solutions are so advanced, they're not available from commercial vendors.

"Compugen will be co-developing 75 smart workflows with us," commented Stationwala.

For example, one of the workflows is being designed to help with Code Blues, the alerts given when a patient is having a cardiac arrest or severe pulmonary problems. There are typically three to four of these each week, and when they happen, loud alerts are sounded over the public address system, specialists drop everything and rush to the scene, getting there as fast as humanly possible.

Using the new workflow, silent alerts will be sent out to members of the Code Blue team, via smartphones, so that patients and other clinicians are not disturbed.

As well, "the system will talk to the patient's infusion pump and stop the med-



Altaf Stationwala



Richard Tam

ications that are being delivered," said Stationwala. That's a safety precaution that's normally not performed until the team has arrived on the scene. With smart pumps and intelligent networks, it can be done ahead of time.

Further, using the Internet of Healthcare Things (IOHT) framework, elevators nearest the Code Blue team members can be dedicated to those members only – smart location technology can do this, sensing where the team members are, and shutting off access to others.

Even the patient's bed can automatically convert to cardiac arrest mode, with an alert from the smart Code Blue system.

"All of this saves precious seconds," said Stationwala.

In future, Mackenzie Health may make use of the Code Blue scoring system contained in Epic, which automatically collects vital sign data from sensors and determines whether a patient's cardiac health is deteriorating.

"This can trigger the system to alert the critical care resource team," said Tam.

"They can descend on the patient before an incident occurs."

The smart alerting system can also be adapted for Code Pink, Code White and other emergencies, Stationwala said.

"Once they are developed, the applications will mushroom," he said.

Nursing workflows will also improve with Epic and the new systems that are being built. For example, Mackenzie Health is switching to charting at the point of care close to patients, on wall mounted computers. "No longer will nurses write down notes on paper at the patient bedside, then re-enter the information on a Workstation on Wheels (WOW) in the hallway," said Tam.

They will be doing their charting in the patient's room, on 24-inch monitors that are wall-mounted. Nurses and doctors will also have computerized decision support on these systems, right at the point of care.

Various bedside monitors, moreover, will be integrated into the

EMR, to improve workflow. As an example, Tam noted that OB traces, typically printed out on paper and then scanned into the EMR, will electronically feed information right into the system.

And a closed-loop medication management system will be introduced, to improve patient safety.

In all, it's a huge task, but Stationwala and Tam believe they will be successful – largely because they have the support of clinicians.

The project is under the direction of the medical chief of staff, Dr. Steven Jackson, and all clinical department heads have agreed with the choice of the Epic system and the 'smart hospital' roadmap. "Every single chief has bought into the plan," asserted Stationwala, saying this will prevent the mishaps that have struck some other large-system implementations in Canada.

Indeed, the choice of systems has been driven by clinicians themselves, through tests at Mackenzie Health and site visits to actual implementations of EMRs at other hospitals in Canada and the United States.

Still, a great deal of training and change management will go into the move to Epic and the new systems. Stationwala says the solutions will be tested and perfected over the next four years at Mackenzie Health's Richmond Hill site before the new hospital opens in Vaughan.

By that time, staff and physicians will be well acquainted with the new systems. "They will only have to get used to the new space, not to the clinical systems," said Stationwala.

## Technology buying trends in U.S. hospitals

In advance of the HIMSS 2017 conference and trade show, scheduled for Orlando February 19-23, HIMSS has released information about technology buying trends.

Storage. According to HIMSS Analytics, healthcare organizations are struggling with a data explosion, and 39% are planning storage investment. Of those storage buyers, 14% are planning VNA, while 12% are planning cloud.

Pharmacy technology. 56% are plan-

ning investment in pharmacy technologies. Nearly one-third of those buyers are investing in carousels or high-speed packagers, and more than one-third will invest in multiple pharmacy technologies.

Security. 78% of U.S. hospitals planning IT security investments will be looking to biometrics.

Auto ID. Auto identification technology was one of HIMSS Analytics's top techs to watch in 2017, with 22% planning to invest in RFID for the first time.

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# PHILIPS

# New wayfinding app follows patient's progress through the hospital

BY NEIL ZEIDENBERG

When a patient arrives for an appointment at a large hospital, they're often in a hurry and may be unfamiliar with the exact whereabouts of their doctor's office, the lab, or various clinics. There may even be more than one parking area, and advance knowledge of this can be the difference between arriving on time or not. What if you could engage with patients when they enter hospital and put the help they need right on their smartphones?

Telus Health has partnered with Aruba ([www.arubanetworks.com](http://www.arubanetworks.com)), a Hewlett-Packard Enterprise company, to introduce a mobile solution that provides patients with this kind of information. Using the Aruba Meridian platform and free guest Wi-Fi (ClearPass Guest), visitors can quickly log-in to a hospital portal and locate points-of-interest like public washrooms; the gift shop, cafeteria, or admissions department.

"Guest access is very easy to deploy using a single portal, and portals can be customized in one hour," said Jason Fernyc, Consulting System Engineer, Aruba. "Aruba is compatible with everything in your current network, so there's no need to install or learn a new platform."

Moreover, Aruba is already in use in more than 1,300 healthcare organizations around the globe. A few of the latest Canadian facilities to sign on with Aruba include Sunnybrook Hospital and The Scarborough Hospital.

To help visitors find their bearings,



Aruba's Jason Fernyc discussed the new wayfinding system at the top of Toronto's CN Tower, in November.

some hospitals offer wayfinding solutions (a kiosk) near a building's entrance, but it can only guide visitors as far as a person's memory will take them. However, Aruba takes it a step further by using a real-time location system (RTLS) to give users turn-by-turn instructions to their destinations – right on a person's mobile device.

When hospitals install Aruba Bluetooth Low Energy (BLE) beacons throughout its complex, Meridian can identify persons logged-in to the hospital portal to pinpoint their exact whereabouts. The wayfinding app can also locate a doctor or

a specific piece of equipment. Doctors can use it on their smartphones to determine the exact room their patient is in, and to obtain access to their medical record (Apple iOS, Samsung).

Once a person has connected to the hospital portal, an auto check-in mobile app can be used to help manage their appointments. Alerts can update patients on how long they'll wait before seeing their doctor. "This benefits the patient by giving them the option of taking care of important tasks, visiting the washroom, cafeteria or gift shop, prior to rushing to the waiting area," said Fernyc.

Once in the waiting room, connected patients can use various apps to keep their minds off their appointments by playing games, read about news and special events, and they may be encouraged to watch health videos such as proper hand-washing techniques or a free flu shot clinic. Further apps may encourage visitors to participate in surveys or provide feedback about their latest visit.

Fernyc mentioned the potential to have code announcements in a hospital done more effectively – and far more quietly. "Code notifications can be made without disrupting patients and staff who don't need to hear the announcement, but rather alert only those in a position to help."

Visitors and staff can connect to the portal using a hospital's own network or the Aruba network. You can buy a subscription to the Aruba Meridian platform for use on your own network, or you can pay for installation of the Meridian platform using the Aruba network. For more info, visit <http://www.arubanetworks.com/support-services/>

Once people are using the technology, analytics can help put it all into perspective. IT administrators can use the data to determine how many people used the apps and what apps were used most or least. They can also obtain patient feedback. It all comes down to improving the patient experience. A good mobile engagement solution, Fernyc noted, can help to lower stress and anxiety and makes for a better overall patient experience.

## How do radiologists remain relevant in an era of machine learning?

CHICAGO – With the rise of enterprise viewers and high-powered networks, many doctors are reading diagnostic images on their own, and bypassing the radiologists. Moreover, machine learning is being applied to radiology, and threatens to automate much of what radiologists now do.

So the question many radiology leaders are asking is, How does radiology stay relevant and important as a medical specialty?

"Radiologists were instrumental in the past. How do we ensure this is the case in the future," asked Dr. Richard Baron, president of the Radiological Society of North America during his address at the annual RSNA conference here in November.

Dr. Baron urged radiologists to have more personal interaction with other physicians, so they can provide insights to their colleagues on a formal and informal basis. They can also learn from their fellow physicians, in this way, too.

Something has been lost, he noted, with the tendency of radiologists to isolate themselves in reading rooms and send off reports via computer networks.

"Technology has removed the need for face-to-face encounters," said Dr. Baron. "Today, radiologists can work in a vacuum."

Ideally, radiologists should be working in teams with other doctors, and in close proximity, so there are easy interactions.

He pointed to hospitals at the University of Colorado, the University of Chicago and Johns Hopkins as forward thinkers. "They've moved their radiologists nearer to the consulting physicians, to be closer for collaboration."

As well, radiologists should strive to add more value to the reports they send to referring physicians – helping with the understanding of the patient and the possible treatments. "We need to provide more value, and not just write descriptions of what we see."

To ensure complete diagnoses and reports, he advised radiologists to make use of the RSNA's template library.

But he also noted that to answer complex questions, radiologists will have to develop expertise in additional areas, such as genomics. To do this, they must become more proactive, making the effort to constantly learn about new diseases, classifications and therapies.

"Radiologists must again become renaissance physicians," said Dr. Baron.

He called for continuing innovation, saying that innovation in radiology has slowed recently, and that the position of radiologists as leaders in medical innovation has been challenged by other spe-

cialties. He called for more research to be done, especially large-scale, multi-centre trials.

Overall, he said that everything should be considered in the context of patient-centred care. "All decisions should be made on the basis of what is best for the patient – not what is most convenient for the radiologist or what is most lucrative."



Dr. Richard Baron

When it comes to patient-centred care, Dr. Baron mentioned a recent Israeli study that found when a radiologist has a picture of the patient in front of him or her, the accuracy of the work being done rises significantly. That's because the photo is a powerful reminder that the work is being done for a real human being. In a keynote address on machine learning in medicine, Dr. Keith Dreyer, vice chair of radiology at Massachusetts General Hospital, observed that computers are now able to identify photographic images, such as faces, better than people can.

At its booth at the RSNA conference, IBM demonstrated its progress in this

area. It showed how Watson could evaluate images, and consider other clinical data such as the personal history of the patient, and lab and medication reports, to make inferences and provide possible diagnoses.

One such system, called Avicenna, provides the diagnosis and shows the clinician how it arrived at the finding. The clinician can then agree or disagree with the diagnosis. In this way, the system becomes a radiologist's assistant.

Some are asking whether Deep Learning systems of this sort will ultimately replace radiologists. Most expert observers agree that this is unlikely to happen.

"We see the technology as empowering a radiologist to see deeper, see more when solving puzzles," said Dr. Eldad Elnekave, a radiologist and chief medical officer with Zebra Medical Vision, a Tel Aviv-based company that has produced computer systems that can diagnose CT scans and other images.

Dr. Elnekave says the process of reading images, combining the information with other data and arriving at a diagnosis is more complex than it may appear. "I have been trained by radiologists who have put together seemingly unrelated information to arrive at a correct diagnosis," he said. "I can't fathom a computer doing this."



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# 80 family physicians to participate in study of DI ordering patterns

BY KELLY O'BRIEN

**T**ORONTO – St. Michael's Hospital plans to install a clinical decision support system in the hospital's family practice clinics to study how to improve the appropriateness of imaging tests ordered by physicians.

Healthcare providers across the country suspect a large number of MRIs and CTs ordered and performed in hospitals are unnecessary.

As imaging technologies have advanced, more and more detail has become visible on the scans they produce. This sometimes leads to additional scans for things that aren't clinically relevant, driving up imaging costs on a per-patient basis.

"Unnecessary tests will also contribute to longer wait times and potentially decrease access for patients who need the tests urgently," said Kate MacGregor, the Quality Improvement and Radiation Protection Manager in the Department of Medical Imaging.

"Unnecessary tests can also potentially put patients' health at risk," she said. "Some tests use ionizing radiation, so from that standpoint it's a public health problem."

The clinical decision support system will service 80 family practice physicians and 60,000 patients. The system will use OrderWise software, developed by the Toronto-based company MedCurrent, to gather additional information from family physicians to determine if the test they want to order is appropriate.

"In imaging, sometimes the dilemma is when you think someone has a problem, what's the best test to do?" said Dr. Bruce Gray, a radiologist at St. Michael's and one of the project leads. "When it's decided

that an imaging test will be useful for the management of the patient, it raises the question: Is that really true? What is the evidence?"

The concept of the clinical decision support system is relatively simple. When ordering a test, clinicians will enter patient information into a computer, such as symptoms and relevant medical history. The software will then display whether the test should be ordered, or whether a different test would be more appropriate. The clinician will have the option to override the recommendation.

"We'll then be able to identify how often each clinician is overriding the system, and what types of cases they are overriding most often," said Dr. Gray. "When we see they've been overriding, we can ask, why is that? Maybe they have a legitimate reason for overriding it. We hope to make this a positive and engaging experience for the family practice physicians."

The tool is designed to be combined with the patient's electronic health records, said Dr. Gray, with only a few clicks needed to determine whether a test is appropriate.

A number of hospitals throughout North America use OrderWise or similar software to determine whether an imaging test is appropriate. What's different about the St. Michael's project, according to Dr. Gray, is that it will be the first site in Canada to use a clinical decision support tool embedded with appropriateness rules tailored for the Canadian context.

The system will also improve the ordering process for imaging tests for both patients and clinicians. Currently, the ordering of imaging tests is almost entirely paper-based and goes through a number of people and departments before an ap-



Dr. Bruce Gray is a radiologist at St. Mike's, and one of the leaders of the appropriate image ordering project.

pointment is scheduled.

The clinical decision support system will be added to the ordering process electronically in order to give the patient an appointment at the same time the test is ordered.

Dr. Gray said this increase in efficiency will be a main selling point for family physicians to use the system.

But before the group leading the project can assess the effectiveness of the clinical decision support tool, they first have to determine what the current ordering patterns are.

"One of the biggest problems in radiology is a lack of standardization with regard to how doctors order tests, typically they give very vague reasons on the request form, and then those request forms are scanned in, they're not put into a database of any sort," said MacGregor.

"Then when the radiologist dictates the report, after reviewing the imaging tests, there's no structure for that either, everything is free text. So there is no way to fully understand what the current ordering patterns are, and whether or not they're appropriate."

The team is using a natural language processing tool called Montage to understand these baseline ordering patterns and better evaluate the effectiveness of the clinical decision support system when it's installed in the spring.

Using Montage, the team is finding patterns in the tests ordered by the family health team and individual physicians. They hope to use this information to see if patterns change after the clinical decision support system is installed in the spring.

## Cloud-based peer-review, feedback available for medical specialists

**T**ORONTO – Real Time Medical has announced the launch of DiaShare, CloudQA: the first Canadian peer review subscription service for specialists such as radiologists, cardiologists, pathologists and ophthalmologists.

Now experts across Canada can participate collaboratively and confidentially to review each other's work by providing their diagnostic feedback.

This means CloudQA helps physicians improve their skills while providing quality assurance oversight to benefit patients. Physicians with matching subspecialty skills can review each other's work anonymously, across large-scale peer review networks. The cross-section of peers and level of objectivity using CloudQA would not be possible within a single hospital or clinic.

Hospitals and individual physician groups can avoid incurring the large capital expense associated with acquiring individual solutions on their own, as CloudQA is accessed as a monthly subscription.

Signup is reasonably priced and subscription costs are determined from vol-

ume, or on a per-user rate based on length of subscription.

"Our affordable yet comprehensive approach to peer review benefits all Canadians by eliminating many of the barriers and deficiencies found in traditional approaches," said Real Time Medical CEO, Ian Maynard.

Unlike traditional solutions that require users to adopt system-wide sampling rates for all exam types, despite individual needs, CloudQA sampling allows physicians to get feedback relative to each subspecialty and exam type.

Some solutions even use an arbitrary one diagnostic case per day sampling rate regardless of the number of cases an individual generates. However, CloudQA uses statistically valid, random sampling providing participants with more useful, individualized information as a basis for their continuous quality improvement programs.

"A valid approach to diagnostic quality improvement for physicians and patients must begin with statistically valid, individualized results," says Maynard. "Results must be valid if they are to be taken seriously, or provide value to participants.

"Non-statistically valid approaches fall far short of the benefits envisioned for the implementation of quality assurance solutions."

Maynard adds, "They can also create a dangerously false impression of quality assurance improvement for the participants and the patients they serve."

CloudQA enables physicians to sign up as individuals, groups, hospitals or

**Large-scale peer review is available for large and small healthcare organizations, at an affordable price.**

groups of hospitals, enabling quality oversight and peer review for even the smallest operation. This is particularly important for radiology given that 50 percent to 60 percent of all exams in Canada are performed in small, private clinic settings staffed by one or two radiologists, which is insufficient to establish objective peer review and collaboration.

Establishing large-scale peer review for both big and small diagnostic opera-

tions means affordable quality oversight for the entire exam pool that Canadians depend on for diagnosis and treatment.

CloudQA is PHIPAA compliant. It is housed on Canadian soil and runs out of the same highly secure data centre used by large institutions, such as banks.

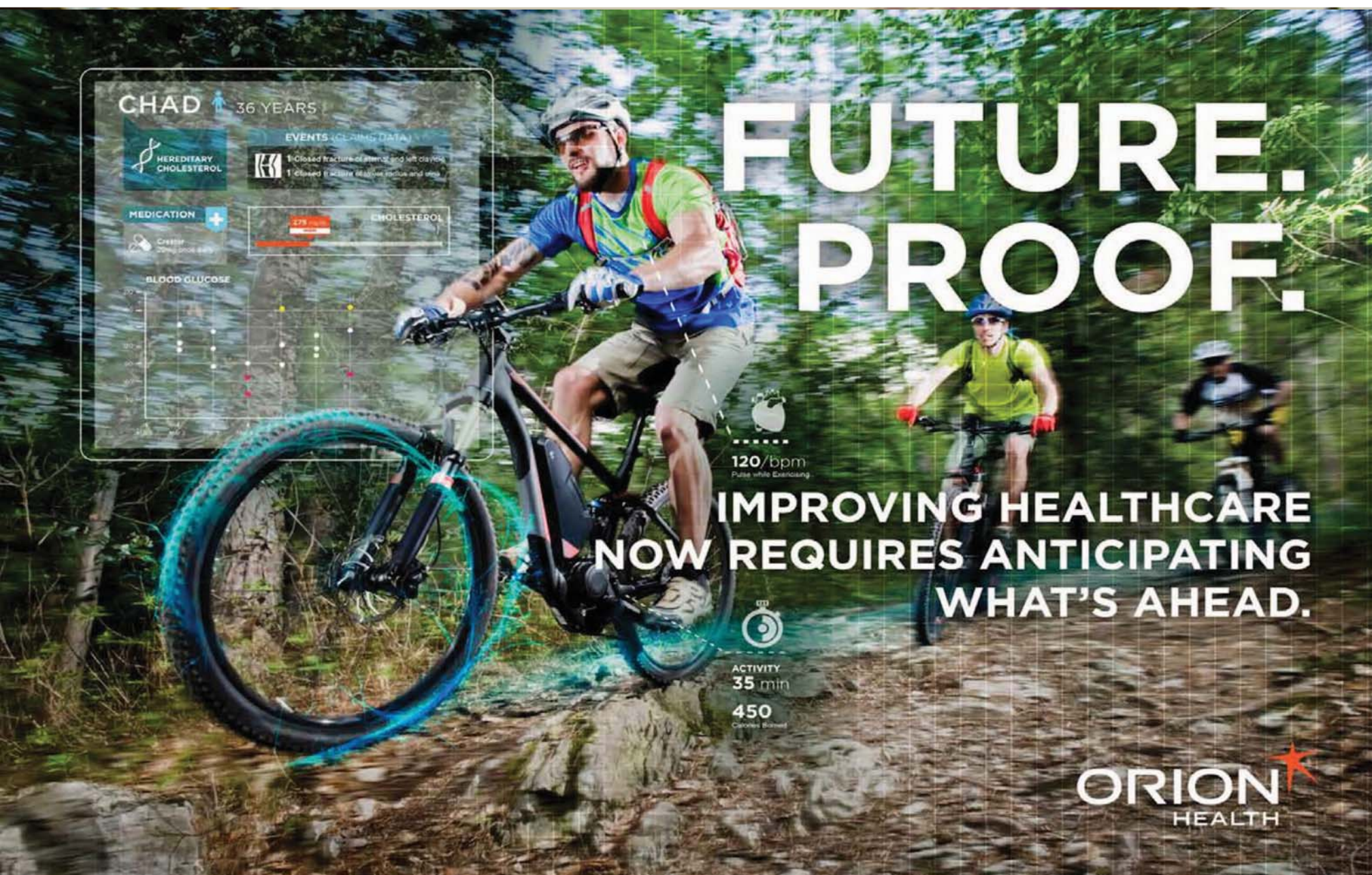
As with cloud-based peer review, Real Time Medical was also first to create and deploy prospective peer review – an approach that enables physicians to detect potential diagnostic errors before they occur.

Early adopters of the first Canadian cloud-based diagnostic peer review will benefit from incentive pricing with no long-term commitments.

Real Time Medical is a diagnostic workflow innovation company. It develops vendor-neutral, context-aware workflow management software solutions. These solutions organize diagnostic reporting services across medical disciplines.

Real Time Medical's diagnostic sharing platform, DiaShare, improves the timeliness, efficiency and quality of service delivery to patients. To find out more, visit: [www.realtimemedical.com](http://www.realtimemedical.com)





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# R&D initiatives set to strengthen Canada as a leader in brain science

BY DIANNE CRAIG

**T**ORONTO – Two exciting informatics projects have been launched in Toronto that are expected to have fast and possibly profound effects on brain health. The Centre for Addiction and Mental Health is developing a Neuroinformatics Platform to sift quickly through big data to facilitate research sharing and accelerate investigations.

As well, IBM is working with the Ontario Brain Institute and the University Health Network (UHN) on systems that apply AI through machine learning to Parkinson's research to accelerate drug development.

**Neuroinformatics:** CAMH is developing an open source brain-research platform, scheduled for launch in summer, 2017, that will enable investigators to easily integrate and analyze large sets of research data from across the organization.

This will speed up research efforts, while also fostering collaboration with national and international databases for greater discovery and better patient care.

Ontario is well established as a leader in brain science and neuroinformatics. "There's a tremendous amount of effort at the University of Toronto, and hospitals, in terms of harnessing big data," says Dr. Etienne Sibille, Head of CAMH's Neurobiology of Aging and Depression Laboratory. He is also the Campbell Family Chair in Neuroscience.

The new project will build on the recent release of new 'big data' secure storage servers at CAMH, supported by the Canadian Foundation for Innovation. "The general idea for developing a research platform was from a necessity in the field to broaden this technology. There's a huge amount of data – a wealth of information we were not fully using," says Dr. Sibille.

In the beginning, he says, CAMH man-

agement talked about the best way to develop the platform. "Do we set up a platform in our own organization or go to a company to help?"

David Rotenberg, Manager, Scientific Computing, in the CAMH Information Management Group (IMG), determined the Ontario Brain Institute could help and he reached out to the OBI two years ago with the intent of finding a consolidated approach for handling and harmonizing research data.

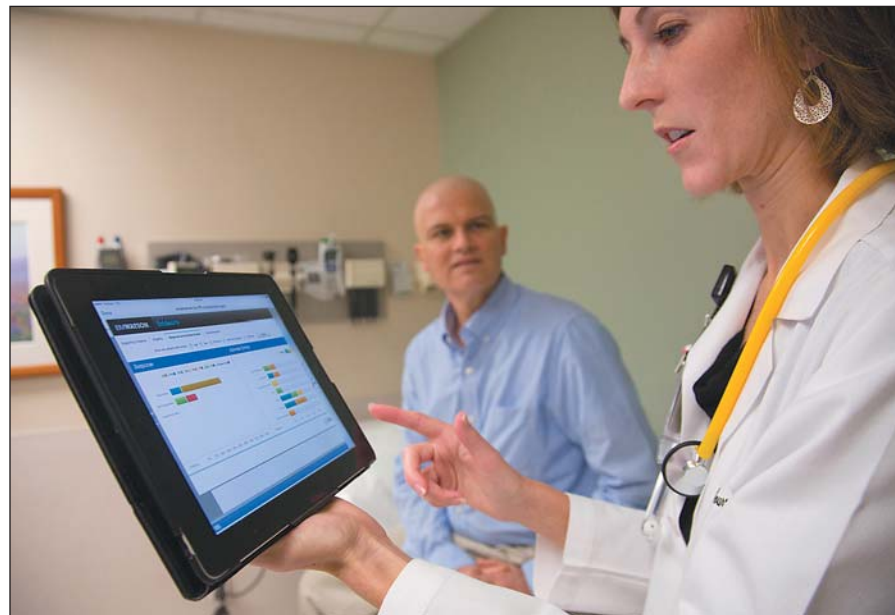
"Turned out they had the solutions we were looking for, because they had designed it to contain data from provincial institutions, so we are able to adapt it specifically for our hospital," he says.

With the goal of enabling research to easily integrate and analyze large sets of data from across CAMH, speeding up investigations, the R&D platform and its federated database will bring together all of CAMH's past/present/future 'omics' (technologies used to explore molecules that make up the cells of an organism).

The platform will then enable researchers to interrogate those combined datasets, and integrate them with multimodal data from other CAMH researchers.

"The platform has user-friendly databases. Researchers can see the data and learn everything about it," says Rotenberg, explaining that the data types will include imaging information, genetics information, and clinical information. "If you have one researcher working on brain imaging on a molecular basis, (and) combine that molecular data with imaging data, the molecular data is going to inform analysis of the imaging data."

The CAMH Neuroinformatics Platform is based on OBI's Brain-CODE platform. "The Brain-CODE platform is sophisticated," notes Rotenberg. "Typically researchers had to spend a lot of time looking for the data, instead of focusing on the



CAMH is developing an open-source brain research platform that is scheduled for launch in summer, 2017.

science," he says, adding that the new platform should cut that time in half. "Researchers can write in a query, look for relevant data, look for a gene, etc. Before, they would collect the data from disparate sources," says Rotenberg.

"Other than the OBI, no one is successfully combining all of these data types. The main goal of our institution is to have a larger pool with thousands of participants," says Rotenberg. "We want to develop an Open Source platform that other places in Ontario could access."

"We hold a dedicated infrastructure for this platform. A redundant infrastructure with two servers for imaging, genetics, and clinical data," he says. There is also a central database that links everything together.

The new databases will connect to the CAMH Compute Cluster. "It serves our needs now," Rotenberg says, adding that they are in the process of "building a Hadoop

cluster – we need to mine it effectively so we can analyze the data in real time."

Asked about the investigations, Dr. Sibille said, "the studies are quite complex and require handling large amounts of data. Just to get the data in shape – preparing it, etc., takes weeks."

One of the key areas of focus for Dr. Sibille is depression as it relates to aging and the molecular pathways that are involved. He wants to use that approach to identify new targets for treatment or prevention of depression.

Asked if the new CAMH neuroinformatics platform would be applied to this pursuit, Dr. Sibille said "Yes, we'll use it for pretty much everything. We might identify genes that change with age."

He indicated they will look at the genetic makeup in those genes and "create composite scores or genetic scores that could pre-

CONTINUED ON PAGE 23

## Heart-SIGN will help arrhythmia researchers find and share answers

**T**ORONTO – Solving cardiac arrhythmia research queries, like many other types of medical research probes, can take years. The Cardiac Arrhythmia Network of Canada (CANet) has partnered with IBM on a mission to change that with a new cloud-based research platform designed to speed query time from a matter of years to just minutes.

Called Heart-SIGN (System for Information Gathering and Networking), the new analytics platform will manage, monitor, store, correlate and analyze data from all CANet research projects. Most important, it will facilitate sharing of findings between researchers.

CANet, based at the University of Western Ontario in London, Ont., is a multi-disciplinary network that brings together families, government and leading hospitals and universities, including University Health Network, Hamilton Health Sciences, Sunnybrook, and others. They fund a number

of research initiatives across Canada.

"The concept is that instead of doing the research individually, they wanted a platform for sharing of results," says Nathalie LeProhon, Vice President, Healthcare, IBM Canada.

CANet is using IBM BigInsights, a set of cloud-based analytical tools that are open source, explains LeProhon, plus IBM's Watson Analytics to build an informatics platform to help spark new ideas and share research related to heart rhythm disturbances.

This combination of IBM cloud technology and the cognitive computing power of Watson Analytics will enable researchers and clinicians to quickly sort through data in a single interface and find in minutes what previously would have taken years.

The faster route from query to insight is a key benefit, but so is the idea of easier sharing of information, which will likely result in better, deeper insights. Findings will come from and be used by

CANet's network of more than 100 healthcare professionals, patients, academia, government, and industry experts. As LeProhon notes, once you have 100 healthcare professionals putting their data on the platform, you can do so much more.



Nathalie LeProhon

Cardiac arrhythmia is a set of conditions that include irregular heartbeats, or a heart beating too fast or too slow. It dramatically affects productivity and quality of life, and can cause sudden cardiac death. In Canada, arrhythmia takes the lives of approximately 40,000 people per year. Other disorders, such as atrial fibrillation, also stem from the condition and affect 350,000 Canadians.

Over the next three years, CANet has

planned a strategic focus on three major cardiovascular research challenges – diagnosis, recognition, and treatment.

This cloud-based research platform will integrate the research strengths of CANet with the analytical strengths of IBM to transform and accelerate the way arrhythmia research is performed.

The sheer volume and continuous growth of complex, big data has been overwhelming for the healthcare industry. LeProhon has observed that this platform will mean "less time sifting through data, and more time gaining insights, and for delivery transformation where it's needed the most." The platform should help deliver faster, more cohesive clinical outcomes.

Heart-SIGN is another example of the power of this type of technology to change the future of healthcare. "This is not about machine replacing man ... it's about embracing, leveraging doctors' and researchers' capabilities through the power of machine," says LeProhon.



# CPhA ensures critical Canadian drug and therapeutic information is available at the point-of-care

The Canadian Pharmacists Association is working with the healthcare community to integrate their drug and therapeutic content into Clinical Management Systems (CMS). For over 55 years, Canadian clinicians have relied on the Compendium of Pharmaceuticals and Specialties (CPS) as their trusted source for drug information.

CPhA also publishes primary care therapeutic information in the *Compendium of Therapeutic Choices (CTC)* and the *Compendium of Therapeutics for Minor Ailments (CTMA)*. Authored by expert physicians and pharmacists, this content provides current, evidence-based therapeutic information to help health care providers make the best possible therapeutic decisions at the point of care.

“For over 10 years we have been providing our drug and therapeutic content online through e-CPS™, e-Therapeutics™, and now through our new platform, RxTx™,” says Lyndon McPhail, Senior Product

Manager at CPhA. “As the only fully Canadian solution offering bilingual, Health Canada–approved drug monographs and therapeutic content, our content is critical to clinicians treating patients, and thus, our online user-base continues to grow.”

With a reported reach of over 200,000 healthcare practitioners who perform over 5 million



searches annually in RxTx, it is clear that this solution commands the respect and confidence of Canadian clinicians.

Although the content is readily available through print, online and mobile solutions, there is no doubt that accessibility during patient encounters could be improved. “There is incredible pressure on healthcare practitioners to provide quick and efficient therapeutic decisions while maintaining safe, quality care and optimal health outcomes,” explains McPhail. “With multiple standalone clinical decision-support tools, the expectation to assess, diagnose and determine the best course of treatment, all within a 10-15 minute appointment window, can sometimes make it a challenge to provide adequate information and counselling at the point-of-care.”

For over 10 years we have been providing our drug and therapeutic content online through e-CPS™, e-Therapeutics™, and now through our new platform, RxTx™

— Lyndon McPhail,  
Senior Product Manager at CPhA

## Introducing the RxTx™ Integration Solution

CPhA reports that its integration solution will give healthcare professionals immediate access to vital drug and therapeutic content within their EMR, EHR or pharmacy dispensing system without having to interrupt their encounter or dispensing workflow. “Any field in the practitioners’ CMS that captures or stores drug and therapeutic data can incorporate the RxTx™ integration feature,” states McPhail. “By selecting the RxTx icon or menu option, their CMS will make a call to RxTx and will return specific clinical information based on the information present in the field.” Imagine a physician, nurse practitioner or pharmacist needs to find out if there is any risk to a patient continuing a current medication now that she is pregnant. This solution allows the user to select the integration button beside the drug(s) listed in the patient record, immediately view the product monograph and then click the “Warnings and Precautions” section to

view the Pregnancy and Breastfeeding information. “The desired information is displayed in just two clicks with no searches required,” explains McPhail. “Effortless access to critical information is what clinicians can look forward to once this solution is installed in their CMS.”

In addition to on-demand access to the clinical information, the solution will automatically scan all drugs recorded in the patient chart and identify any Health Canada advisories, warnings or recalls associated with that drug, thus eliminating the need for clinics and pharmacies to establish or maintain manual processes for internal distribution and information retention.

So the obvious question is: When and how can I get this? CPhA explained that the development work is complete and they are now reaching out to pharmacy and EMR vendors to discuss the integration process and determine potential timelines within their development roadmaps. “CPhA has done all the heavy lifting on

development for this integration solution. We knew that in order for 3rd party vendors to get this into their roadmaps in a timely fashion, it must be a quick development cycle. I believe that we have accomplished that,” asserts McPhail. “Vendors have many

As the only fully Canadian solution offering bilingual, Health Canada–approved drug monographs and therapeutic content, our content is critical to clinicians treating patients, and thus, our online user-base continues to grow.

competing priorities, and based on personal experience, development priorities are often based on value and user demand.”

Access to CPhA drug and

therapeutic content is subscription-based; however, a recent agreement with Joule™, a Canadian Medical Association (CMA) company, now provides a CPS drug content subscription to CMA members as an exclusive benefit.

The RxTx Integration Solution fully supports the Canadian healthcare market’s transition from the adoption of EMRs to ensuring meaningful use. “Adopting evidence-based medicine in practice has a direct correlation to better health outcomes,” says McPhail. “With such high demands for patient visits, it can be difficult for health care practitioners to keep up with the current therapeutic evidence and Canadian guidelines. Ensuring these clinical decision-support tools are available directly at the point-of-care, without interruption of practice workflow, is critical for both the practitioners and their patients.”

For more information on the RxTx Integration Solution, visit [www.pharmacists.ca/rxtxhct](http://www.pharmacists.ca/rxtxhct).



# Evolving Alberta Netcare eReferral benefits patients and physicians

BY HUGH MACKENZIE

EDMONTON – Now in its second year, the Alberta Netcare eReferral program has shown promising results. A notable feature is the addition of an “advice request” referral rather than a full in-person referral.

“We were told that about 30 percent of the time for non-urgent patients, specialists feel that they could have given an opinion without seeing the patient,” says Dr. Allen Ausford, a family physician and proponent of the eReferral solution.

“Adding a feature where care providers

could simply seek advice, rather than delaying a patient’s care with an unnecessary visit, could fix a lot of the gaps in care and increase in-person referral capacity to see more urgent patients.”

Dr. Ausford is also an expert in clinical information systems, and recently partici-

pated in an Orion Health webinar outlining the Alberta experience with eReferral. Orion Health, a leading provider of population health and integration systems, has partnered with the province in building the Alberta Netcare eReferral solution.

Alberta aimed for an electronic system which would be user-friendly, requiring only three minutes for GPs to complete a referral, on average, along with the ability to track a referral’s progress through the system.

They also wanted it to connect to the Alberta Netcare system, a healthcare network that reaches tens of thousands of clinicians throughout Alberta. Moreover, the designers sought to include analytics capabilities so they could identify workflow and information bottlenecks.

The addition of the ‘advice request’ feature, mentioned above, is an example of how workflow – and patient flow – has been streamlined.

Another new feature involves blocking the submission of a referral unless all the information a specialist needs has been included.

Traditionally, when doctors used faxes to communicate, up to 30 percent of referrals were incomplete.

“The main complaint we’ve heard was that care providers don’t receive enough information. So they have to send the referral back to the primary-care physician with questions,” commented Dr. Ausford.

This led to a lot of back and forth, resulting in longer waits for patients to see specialists.

Some of Alberta’s hip and knee replacement clinics have reported that an incomplete referral results in the patient waiting an additional six weeks for an appointment.

But by converting from faxes to computerized referrals, many of the delays can be avoided and the risk of losing referrals is reduced.

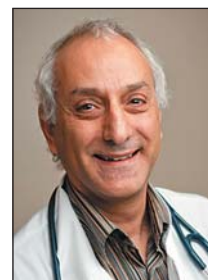
Another feature of eReferral allows users to update an active referral as a patient’s condition changes, so the patient can be further moved up the waiting list.

Dr. Ausford recounted a story of one of his patients who was dealing with a sore hip for some time as a result of arthritis. A referral for a hip replacement was done by eReferral.

The patient initially started as a low priority for hip replacement, but when his pain increased to the point of needing daily narcotics, his situation was updated in the electronic system.

The referral’s status was changed to a higher priority, resulting in a reduced wait for consultation.

In Alberta, the eReferral system is being steadily accepted by GPs and specialists across the province. It is now servicing referrals for medical/radiation oncology, (breast and lung cancer), hip and knee joint replacement and nephrology (advice request only).



Dr. Allen Ausford



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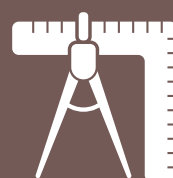
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# Technology and humans can delay the roll-out of large-scale clinical systems

BY JERRY ZEIDENBERG

Electronic patient records in Ontario are reaching a critical juncture. For years, eHealth Ontario has labored to connect hospital systems, DI and labs. It's pretty much accomplished this with the three regional repositories.

Now, however, the focus is on moving to link the records of community physicians into the repositories.

"We started with hospital systems, but now we're shifting focus to physician systems," said Cynthia Morton, speaking in November at Infoway's Partnership Conference in Toronto. "There are billions of

data points to take into account. "And the quality of the data will make or break the system."

Morton noted that policy makers and system designers alike have recently started paying attention to data quality issues. Without high quality data, clinicians cannot make informed decisions.

Moreover, if the quality of the data is low, so is the value of the system – which nevertheless may have been installed at great cost.

The potential value of the data that's stored in the systems of GPs and specialists is vast. "80 percent of the data in EMRs is at the community level," said Sarah Hutchison, CEO of OntarioMD.

She noted that 13,000 Ontario physicians are now using EMRs, and 7,000 of them are now receiving hospital reports and discharge summaries, along with e-notifications and alerts when their patients are admitted to hospitals and when they leave.

She observed that when it comes to electronic solutions, getting things right and providing workable solutions is paramount. "Physicians do not have a high tolerance of risk," she said.

Dr. David Daien put it succinctly: "When the technology fails, the physicians will walk – and so will the patients."

That means there is enormous pressure to ensure computerized systems work the way they are supposed to. As well, clinicians must understand how they work and what they're supposed to deliver.

Dr. Daien asserted that experts used to say the technology isn't important, it's the

**Eighty percent of the data in electronic medical records is at the community level, says Sarah Hutchison, CEO of OntarioMD.**

business case that matters. But in fact, the technology is very important.

Often enough, systems are piloted in hospitals and clinics, but they don't work the same way when they're rolled out to a wider audience.

"Production environments need to be identical to test beds. And the rollouts need to be flawless."

In the real world, however, things are seldom perfect. No wonder change management services are so important, something that was emphasized by Hutchison.

Nevertheless, non-technological factors can also screw-up a technological implementation. Dr. Daien observed that in many cases, when a project was ready to go live, he has seen it pulled back by the lawyers.

"Lawyers don't like data sharing," he said. "I've seen numerous instances of last minute delays because the lawyers weren't comfortable."

Dr. Daien sees that as a problem. When it comes to privacy and security, "we have to change the mantra. We have to put the power back into the patients' hands."

In particular, he noted that proper testing of systems has been a problem because vendors and development teams often are not permitted to use real-world patient data in test systems. That means they don't get a real sense of how the systems will work in a production environment.

Unfortunately, the systems tend to hit unexpected glitches and roadblocks when they go live.

## Insights from a patient-centred Infoway conference

A RECORD NUMBER OF DELEGATES from across Canada participated in the annual Infoway Partnership Conference, in Toronto November 16 and 17, during Digital Health Week.

Partnership 2016, A Conversation about Digital Health, embodied the theme in every sense. Not only did the sessions focus on patient-centered digital health, digital health innovation, interoperability and medication management, the discussions both on and offline mirrored those sessions and reflected collaborations that are just beginning or are ongoing across the country.

"It was both encouraging and inspiring to see patients, clinicians, vendors, government and other industry leaders championing the call for improved patient and consumer access to health care," said Dr. Keith Wilson, Family Physician and Associate Professor, Family Medicine, Dalhousie University. "Patients first by design resonated in this conversation, as demonstrated in the key words that were tweeted."



A patient and caregiver panel shares consumer insights with delegates at the 2016 Infoway Partnership Conference. (Left to right) Shelagh Maloney, Vice President, Consumer Health, Communications and Evaluation Services, Canada Health Infoway, Jilliane Code, patient, Brian Penner, patient, and Sara Kearley, caregiver.

Digital health leaders from the United States, the United Kingdom and throughout Canada shared experiences and best practices about clinical leadership, serving the needs of Canadians, inter-jurisdictional collaborations, opioid misuse, patient safety and e-prescribing.

Shelagh Maloney, Vice President of Consumer Health, Communications and Evaluations at Infoway, indicated a notable change from past conferences was the 'Pa-

tient Included' designation. "We wanted to demonstrate a commitment to incorporating the experience of patients as experts", she said. "Digital health innovation helps drive better patient experiences and outcomes; patient as well as clinician insights from real world experience are critical as we work toward a more effective health care system." For more information on the Infoway Partnership Conference, visit <http://bit.ly/2fUstmX>.

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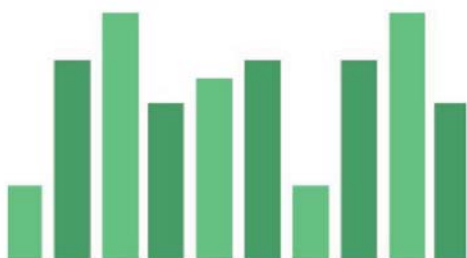
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# CHIMA aims to boost awareness of Information Governance issues

BY ROSIE LOMBARDI

Everyone says healthcare information is as precious as financial information – but is it actually protected with the same bullet-proof safeguards? This was one of many key issues discussed at the first-ever Canadian Healthcare Information Governance (IG) Summit held recently in Edmonton, Alberta, under the auspices of the Canadian Health Information Management Association (CHIMA).

Many emerging trends, from the Internet of Things to consumer demand for healthcare information, are creating new risks because healthcare information is spilling out of its previously protected domains, said Andrea Bacqué, Director of Canadian Solutions at Iron Mountain, a global business dedicated to storing, protecting and managing information and assets.

Bacqué is co-chair of the IG Summit's Steering Committee, along with Kathleen Addison, Board Chair, CHIMA and Senior Provincial Director, Health Information Management at Alberta Health Services (AHS).

"We don't have or apply standards in consistent ways for managing information across the healthcare ecosystem. Provinces are being driven to develop these themselves, but each province has their own view," said Bacqué. "That might not be the best scenario for a Canada-wide e-health objective."

Addison noted that policies are fragmented at the organizational level, too. "Many pockets within organizations manage their healthcare assets properly, but there's very little formalized rigor and consistency in the way these assets are treated across organizations," she said.

To help get everyone on the same page, many believed a conference where views could be exchanged would be a good idea.

"Information Governance is broader than Health Information Management," said Addison. "We wanted to assemble a think tank of thought leaders around IG so we could collaborate and identify whether Information Governance is an emerging discipline in the Canadian healthcare context."

Several healthcare information experts and leaders from a number of Canadian organizations attended the IG Summit, as well as members from the American Health Information Management Association (AHIMA), which has made IG a priority in recent years.

To be sure, said Bacqué, IG needs more attention in Canada. "CHIMA, with the support of Iron Mountain, created a Steering Committee and held the Summit because we felt that this topic needed to be elevated across Canada."

Proper IG is important as the use of systems and devices expands and become more interconnected.

Agreed-upon rules and standards are needed to ensure trust across the healthcare sector as information flows in and out of disparate systems and organizations.

The current state of neglect is creating problems that will be difficult to address in the future, Bacqué said. For example, one issue that Summit participants dis-

cussed was the application of data-mapping standards when moving to the e-health record state.

"What are the data fields and related data mapping standards that we want to consistently apply to the e-health record so that when we're searching for information

on a patient across a province or region, we can expect to find similar patient information? At present, nobody is leading in developing Canada-wide data mapping standards. And each e-health system vendor will have their own approach. This makes it a challenge when you're trying to create

one record with multiple systems in play."

Some domains of IG are more mature than others, said Addison. For example, an incorrect patient name in a hospital database holds risks – it can prevent searches for the right patient's records, which in

CONTINUED ON PAGE 17



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# A new approach enriches the role of medical radiation technologists

The objective is to promulgate a 'culture change' among technologists.

BY ANDY SHAW

Radiology has long been lauded as an early adopter of technology; and diagnostic imaging departments are among the most technologically advanced in hospitals. Yet, in many cases, it's the human touch that can add value to radiology, and to medicine in general. Closer interaction with patients, and other healthcare professionals, is resulting in better outcomes.

Moreover, spreading the word about best practices and new ideas can also have a tremendous impact.

To that end, Paul Cornacchione, the senior director of imaging for the tri-hospital Joint Department of Medical Imaging (JDMI) in Toronto and others at JDMI have been developing a new program. It offers technologists at Sinai Health System, University Health Network, and Women's College Hospital the benefits of academic research, best practice education, and continuous improvement incentives.

The objective is to promulgate a 'culture change' among technologists. It is a culture where the norm is not just to capture excellent images, but to go further clinically using new-found knowledge and newly acquired skills to help raise patient care to a safer, higher level.

To illustrate how that can work to the point of even saving lives, Cornacchione tells the story of a recent event at Women's College Hospital, which touched him deeply.

"The imaging technologist there was performing a CT scan on a male patient's brain," recalls Cornacchione. "In the past a technologist, as I once was, would have followed the basic routines to conduct the scan."

But this JDMI-educated and trained technologist acted differently. To start with, before the exam he took time to look at the patient's history carefully. That extra care with his work pointed to a possibly severe eventuality for the patient. So the first benefit was that technologist knew exactly what malady in the brain he was trying to find and capture with his imaging.

"Then after the exam, instead of letting the patient walk away, the technologist asked him to hold on, saying he thought he spotted something in the image that he should check out further," says Cornacchione.

Sure enough, consultation with a radiologist confirmed the technologist's suspicions that the patient had a potential "bleed" in his head. One that if he had just walked out, could have soon killed him.

"In the past and even now, the routine is for some technologists to pass the images on to radiologists without comment who, in turn, might take up to 24 hours to report their findings. Then it's another 24 to 48 hours before the patient's referring doctor gets the results. So as many as three days or more might pass before the patient finds out about his dangerous condition," says Cornacchione. "And from what we now know of that particular case, the patient in the meantime would very likely have died."

Happily, the technologist's intervention did not let that happen. Nor did he let the patient leave Women's College Hospital until he had ordered up an ambulance that sped the patient across-town to Toronto Western Hospital's neurological department

— where the patient immediately received successful aneurysm repair.

"What's important to note, is that rather than just handing the patient off to someone else, the technologist actually took care of the patient," says Cornacchione. "Indeed, the technologist noticed the patient wasn't doing well even in the waiting room and might have soon died without really knowing anything was wrong with him because there is no pain associated with a potential bleed in the brain. In short, the technologist took ownership of that patient, and as a result, saved his life."

It's just that kind of care that JDMI is striving to instill, first of all in its own medical radiation technologists. To that end, the organization conducts a regular lecture series featuring leading academics, researchers, and other figures to unlock the potential of imaging professionals and encourage them to go the extra mile.

Participants have included the Ottawa-based Canadian Association of Medical Radiation Technologists (CAMRT) and its CEO, François Couillard, who was the main attraction at a recent after-hours

best in the world when it comes to working closely with physicians and medical physicists as a collaborative team to deliver better care," says Couillard. "So as an organization CAMRT is doing a lot to foster this type of inter-professional collaboration with radiologists as well."

One way is by encouraging imaging technologists to take advantage of their teaching hospital environments and do publishable research in CAMRT's own Scientific Journal or present at its annual conference.

"The year before, our JDMI people had nothing submitted to the annual CAMRT conference, but last year, in 2016, we had 16 abstracts submitted from JDMI staff and 14 accepted for presentations. So we are thrilled with that," said Catharine Wang, JDMI's Executive Director.

Wang addressed her remarks to the audience attending Couillard's talk, a group that attended the meeting at the Toronto General Hospital from hospitals across the Greater Toronto Area.

Couillard also applauded the 16-abstracts accomplishment, no doubt the result of Wang's constant efforts at encouraging and facilitating more interaction between researchers and JDMI's 600-member staff.

"What we are doing here may not be for everyone," admits Wang. "We want technologists working at JDMI who really want to find constant improvement in their work and are willing to look for new ways of doing things that research has shown have proven merit. But not all technologists, I know, are like that."

Those who are content to just produce good images and pass them on, may be challenged by this direction."

Couillard agrees that the JDMI approach is not for all, but for different reasons.

"A program like the one JDMI is developing is something we at CAMRT certainly applaud. And similar programs would be absolutely the thing for other large teaching hospitals to model themselves on," says Couillard. "But for smaller hospitals, or in rural areas, or in some other parts of the country, needs out there can be quite different."

Nonetheless, Couillard and Wang are agreed that new imaging techniques, new approaches to radiologist-technologist collaboration, even new clinical procedures

that may see imaging technologists doing unprecedented tasks like inserting lines into patients could well trickle out to healthcare institutions of all sizes across the land.

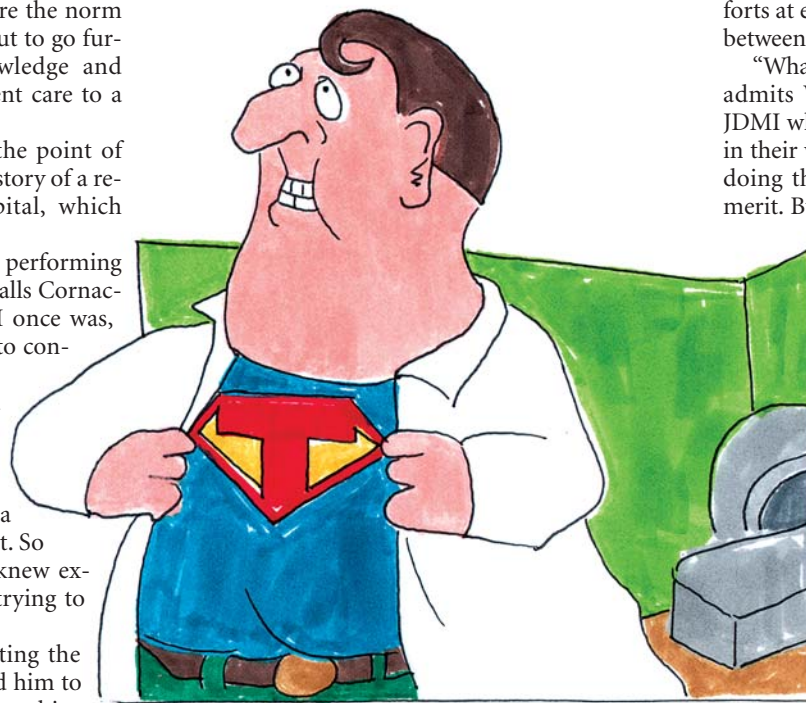
Certainly, future medical radiation technologists of all stripes at all levels will have to be more multi-skilled.

"One of the trends we see emerging is toward 'hybridization' as it's called," says Couillard. "We know about this thanks to CAMRT's Future Advisory Council, which we formed a few years ago."

The Council invites radiology equipment vendors to meet with it one at a time behind closed doors and brief the Council on future trends. Based on those predictions, CAMRT makes decisions about changing its educational and other programs to meet our members' needs.

So once there was just CT, but now as Couillard points out, there is hybrid PET/CT, CT/Angiography and SPECT/CT. Where there once was just MR, there

CONTINUED ON PAGE 23



JDMI lecture on the evolution of medical radiation technologist practices.

"It's important to understand that medical radiation technologists are mostly of two breeds. We have as CAMRT members both imaging technologists and radiation therapists who work very closely with physicians, including radiologists, radiation-oncologists and interventional-radiologists in their work. And we also have imaging technologists, who don't. At least not so much anymore," says Couillard.

"Back when we used film, the technologist and the radiologist had to get together to look at the film. So they did collaborate. But now, all the imaging technologist has to do is acquire the image and pass it on to a radiologist who may be as far away as India."

The CAMRT is also intent on returning imaging technologists to their former closer ties with physicians.

"Our radiation therapist technologists, who make up about 10 percent of our members, are much further down the road. As a group, they may well be the

# Cloud-based system gives clinicians fast access to EHR training assets

BY DIANNE CRAIG

London Health Sciences and local partner St. Joseph's Health Care are among the most computerized hospitals in the country. Indeed, within a short timeline, LHSC and St. Joe's implemented Computerized Physician Order Entry (CPOE), Closed Loop Medication Administration (CLMA), electronic Medication Reconciliation, and also documented Best Possible Medication Histories to all of their facilities.

The implementations have gone well – indeed, in the past year, the organizations have seen a 40 percent decrease in medication adverse events.

Clinicians believe the addition of Cerner's cloud-based, eCoach educational tool has helped fill a gap in their learning system. The solution was installed about a year ago, and has been re-named "LearnNow" inside the two organizations.

LearnNow gives doctors, nurses, pharmacists, and other healthcare professionals quick, one-stop access to every conceivable type of EHR training resource. It has enabled 'just-in-time' training and education, when and where the clinicians need it.

With the touch of a button, clinicians can find out how to perform admissions, create care plans, order medications and exams, and many other procedures.

Prior to the launch of LearnNow, clinicians were sometimes unsure of the correct place to find the most up-to-date training tools for electronic solutions. It took time to locate the right training resources – in some cases, clinicians just didn't bother.

That all changed with the arrival of LearnNow, which allows training and educational assets to be searched without requiring a sign-in or connection to the organization's internal network.

"I wish this had been available sooner," says Dr. Robin Walker, Integrated Vice President, Medical Affairs and Medical Education.

In particular, he noted the challenge of working in a high-stress environment and having to go outside the system to find learning materials and related information.

"In areas where the pace is fast, you really don't have time to search for information, to call someone," he says, citing the OR and critical care units as examples.

Clinical Informatics Instructor and RN, BSCN, Stephanie Aldridge agrees. "It's nice to have everything in one spot." Prior to deploying LearnNow, she explains, they used to have the information in about six different places.

The system is itself 'intelligent', and has the ability to perform contextual searches specific to the user's role in the hospital. For example, Aldridge says, if there were two quick guides relating to one topic – one on how to order, and one on how to administer, the user would see on screen only the guide that related to his or her role.

"It's very easy to access. The user just clicks on LearnNow, and will see videos and quick guides on what they're working on," says Maureen MacPherson, Professional Staff Relations Specialist at LHSC. "They can click on LearnNow and get the information they need, when they need

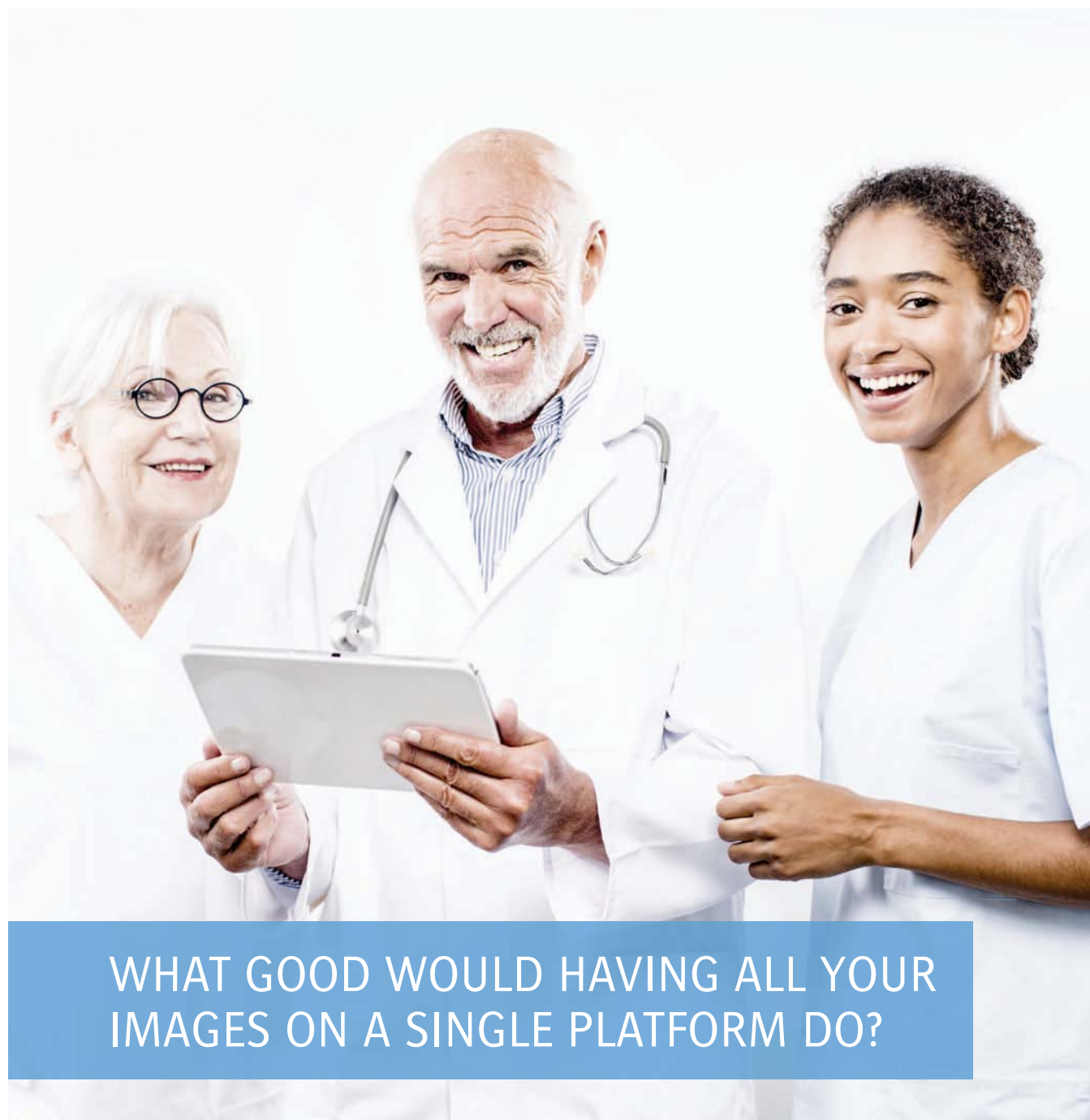
it," she says, adding that often leads to a huge sigh of relief.

There are multiple search options for finding educational resources in the LearnNow library. Users can perform a full site search using key search words that appear in document names or contents;

browse by role by clicking on the navigation link that best describes their role in the facility. The tool will also bring up recent searches, showing the last two areas a user was working on.

LearnNow can also be used to promote specific content, or new initiatives. When

asked if the LHSC has been using that capability, Aldridge said, "Yes. We can promote content. If there are consistent problems or issues – for example if something wasn't done properly, I can take an education document and put it on a 'carousel' that appears as a spinning, clickable image."



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# Doctorpreneurs need to know about financing when they launch companies

Fundraising can be done through a variety of measures.

BY DR. SUNNY MALHOTRA

**M**any doctors have excellent ideas for apps and medical devices and are thinking about creating products and companies. Doing so, however, often requires funding – many projects go beyond tinkering with software and hardware in the basement. You may need to hire programmers, engineers, designers, business developers and marketers. This can be expensive.

Doctorpreneurs are not always familiar with the fundraising process. Some questions that need to be answered first include: Why am I raising funds? When do I need to fundraise? What are the stages of fundraising? Who are my potential sources of fundraising? How much do I need to raise and in what form? Fundraising is a time limited process that should be started to reach milestones instead of surviving a time period or run rate.

Doctors who become entrepreneurs, who I call 'doctorpreneurs', need to understand the fundamental stages of fundraising. These stages include: family and friends, government funding, seed round, series A, series B, etc.

The family and friends round is a way of collecting small amounts of capital to create a minimum viable product. This can often be blended into a seed round where a minimum viable product is used to begin testing your startup hypothesis and create a business. These range from \$25,000 to \$250,000 depending on the run-rate (expenditure) of the company and costs incurred to find product-market fit or to achieve milestones.

Series A rounds are for companies that have reached a level where they have fine-tuned their product and have found product-market fit. These companies are at a growth stage and are looking to expand after optimizing their key performance met-

**Hiring programmers, engineers, developers and marketers can be costly. Doctors-turned entrepreneurs must know how to raise funds.**

rics. This can be used for marketing, sales and hiring new employees as an example.

Fundraising can be done via different measures. These include: equity investments, convertible notes, grants and venture debt funding.

An equity investment is when money is invested in a business by an entity for common stock which is not returned in the normal course of the business. Investors recover it when they sell their

**Dr. Sunny Malhotra is a US trained cardiologist working at AdvantageCare Physicians. He is an entrepreneur and health technology investor. He is the winner of Best in Healthcare - Notable Young Professional 2014 and the national Governor General's Caring Canadian Award 2015. Twitter: @drsunnymalhotra**



shareholdings to other investors or an asset is liquidated/exited.

Convertible notes are for seed investors investing in startups who wish to delay in establishing a valuation for that startup until a later round of funding, or a milestone is reached. These are often to offset situations where the value of a company is difficult to determine. When a milestone is reached or future round has been established, the notes convert to equity. There are often additional advantages such as caps and discounts when a certain valuation has been reached.

Grants can be obtained as government and non-government loans or full grants for companies that are innovating and disrupting a certain area of need in healthcare.

Venture debt is a debt financing tool provided to back companies to find working capital or capital expenditures. Venture debt is available to startups and growth companies that do not have positive cash flow for significant assets for collateral purposes.

The process of fundraising can be cumbersome and distracting to the operations of any business. First, you must understand the questions to be asked and then why you need the funding. Once these questions are answered, you need to dedicate a block

of time to achieve your goals. It is important to focus the team and provide deadlines and milestones as the process can become drawn out and your business can suffer.

## Healthcare needs to measure, prove and demonstrate value

BY SHIRLEY FENTON, SUZANNE SCHELL, AND HÉLÈNE CLÉMENT

**A**ll types of performance improvement projects have been undertaken by healthcare organizations in Canada – and many of them have failed to live up to expectations. What is needed is a systematic approach to improving healthcare, using a proven measurement and evaluation process that generates viable outcomes.

Clearly, healthcare organizations want value for their investments. While 'showing the money' is the ultimate report of value, leaders recognize that they must also show value as perceived by all stakeholders.

Organizations need a methodology that:

- Identifies where and how to improve programs
- helps improve investment decisions
- identifies barriers and enablers of success
- measures the monetary value re-

ceived for investing in programs and projects

- identifies intangible outcomes for patients and stakeholders.

Many organizations all over the world use the Phillips ROI Methodology, which is a straightforward step-by-step process to show the value that generates a balanced set of data that is believable, realistic and accurate – particularly from the perspective of sponsors and key stakeholders.

The ROI Methodology is a comprehensive measurement and evaluation process that collects, analyzes and reports data in a consistent manner (see Figure 1).

Several types of measures are collected, including participant satisfaction with the program, changes in knowledge, skills, and attitudes related to the program, changes in on-the-job behaviour or actions as the program, and changes in business impact variables.

The process also compares monetary benefits to the costs of the program, project or improvement

initiative (Return On Investment) and measures that are not converted to monetary values (Intangible Measures).

This balanced approach to measurement includes a technique to isolate the effects of the program, project or solution.

Healthcare organizations, which have used ROI studies to evaluate

**Healthcare leaders recognize they must show value as perceived by all stakeholders.**

projects, have realized the benefits. In one study, a Health Authority Physician Compensation Planning and Initiatives department was formed in 2011 based on an Internal Audit recommendation.

After a few years, the staff believed that the department had a significant financial and non-financial impact on the organization but

wanted to undertake an evaluation to tangibly confirm this belief.

An ROI study was undertaken and confirmed that the Physician Compensation Planning & Initiatives department had a significant financial impact, confirmed by an ROI of 631 percent, which also produced a number of intangible benefits for the organization and its stakeholders.

As a result, recommendations included continued support of the team's mandate and dedicated program resources; expansion of the team's philosophy and collaborative approach to other program areas; and the creation of a similar team in other Health Authorities based on the demonstrated results.

In another example, an organization undertook an initiative to provide patients with a better experience, including: reduced length of stay, reduced chance of infection and increased comfort.

ERACS Pathway (Enhanced Re-

CONTINUED ON PAGE 23

# Deep Learning and machine intelligence poised to take on radiology

BY JERRY ZEIDENBERG

**C**HICAGO – In this new era of computers powered by Deep Learning, many at the Radiology Society of North America meeting last November were nervously joking about whether the machines will replace physicians in the future. Most agreed that computers will remain assistants to radiologists and other doctors, at least in the near term.

But already, computers are making diagnoses. In November, Zebra Medical Vision, based in Israel, launched a free service called Profound (<http://profound.zebra-med.com>) that enables patients to upload diagnostic images to its cloud server, where an artificially intelligent system will make a diagnosis.

It's aimed at patients in Europe, Asia, the Pacific Rim and Latin America. All you need to do is upload CT scans or mammograms and the system will scan for problems. It serves as a second opinion, and also as a way of identifying key issues that may have been overlooked by busy radiologists.

"It's not that radiologists aren't doing their jobs," said Zebra's chief medical officer, Dr. Eldad Elnekave, an interventional radiologist working in Israel. "The radiolo-

**While Deep Learning machines won't replace radiologists in the near term, they can serve as effective screening systems.**

gist might be focused on appendicitis, and will not be looking for other problems. He identifies appendicitis, and his job is done."

However, the Profound system, using Deep Learning, may spot any number of other issues in the scans, including:

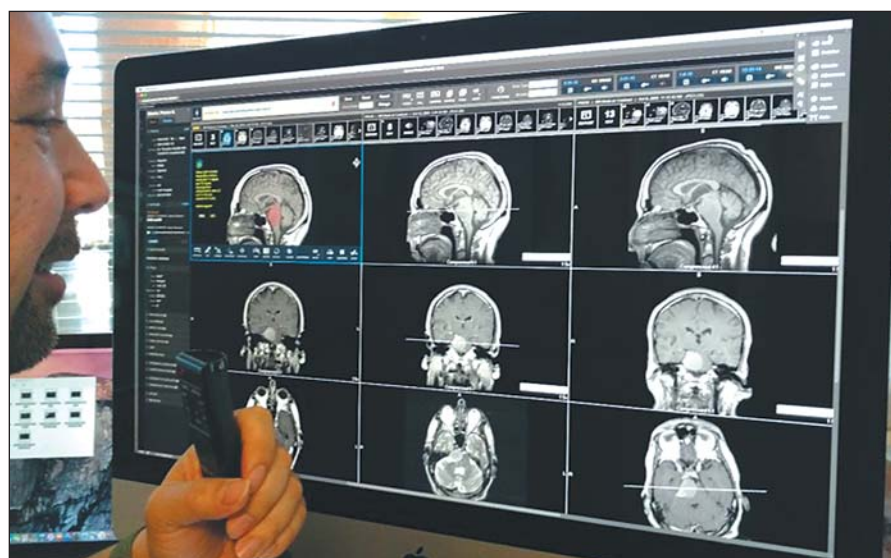
- Aortic aneurysms
- Emphysema
- Osteoporosis
- Compression fractures
- Fatty liver
- Coronary calcium
- Breast cancer (Zebra Medical has announced breakthrough algorithms for breast cancer, and will be adding them in future to the Profound system.)

Zebra Medical was started just two years ago, and has a team in Israel developing algorithms for medical image analysis. For breast cancer alone, it is using an anonymized database of 344,000 images. The company is backed by venture investments from computer industry titans like Marc Benioff, the CEO of Salesforce, as well as contributions from Khosla Ventures and the InterMountain Healthcare Innovation Fund.

Dr. Elnekave doesn't believe that computers on their own can make accurate diagnoses, each and every time. Instead, they can act as screening tools and intelligent assistants for radiologists.

"We see the system as empowering a radiologist to see deeper, to see more and to solve puzzles," he said. "I've always been trained by radiologists who have been able to put together seemingly unrelated information to arrive at a diagnosis. I can't fathom a computer doing this."

However, he asserted that Deep Learning



IBM's Watson Health Imaging showed how it can diagnose medical images and suggest possible therapies.

systems allow radiologists to provide more services to growing populations. It could become a 'killer app,' as demand for diagnostic imaging is expanding faster than the cohort of skilled physicians able to do readings.

Elnekave highlighted the ability to flag problems that are often overlooked in daily practice. For example, in the United States, nearly 2 million osteoporotic bone fractures occur each year.

"After a hip fracture, 30 percent of patients die within a year, and 50 percent are no longer independent," said Dr. Elnekave.

Osteoporosis can be identified and treated, but the bone density exams that are required have a low compliance level.

Zebra Medical has devised an algorithm that can spot osteoporosis in CT exams when patients are being scanned for other conditions; the radiologist is then alerted in the course of his or her reading. The algorithm is now being used in the United States by radiologists at USARad.com, a telemedicine company that provides DI readings in 50 U.S. states and 10 countries.

Zebra Medical is providing its software and services to other organizations, as well, that are using it for clinical decision support and automated second opinions.

Deep Learning assistants can also be of great help to radiologists who are overloaded with readings: "A radiologist at 5 pm is not the same as he was at 8 am," observed Dr. Elnekave. The AI-powered computer can ensure that he's spotting everything that he should.

Of course, at the RSNA meeting a great deal of the buzz about Deep Learning focused on IBM's Watson Health, which is considered the leader in applying artificial intelligence to medicine.

The team at Watson has been devising radiology assistants and clinician assistants, both powered by the Watson supercomputer and its artificial intelligence. Real products are scheduled to appear this year, in 2017.

Of note, is a peer review system for radiologists that could be used by radiologists to scan and provide feedback on each and every exam read by a radiologist, thereby providing continuous education and support.

Most peer-review systems today use working radiologists to assess the exams of

their colleagues, but only one study a day might be checked. Computer-powered Watson could do every exam, experts at IBM noted.

IBM recently acquired Merge Healthcare, which gave it a collection of 35 billion images to use for developing computerized expertise in analyzing images. The repository of images has been a boon to Watson, which uses Deep Learning to provide diagnoses and suggested therapies.

IBM demonstrated at the RSNA how the system works – analyzing images and patient records to produce diagnoses, which are also scored to show their likelihood of accuracy. A clinician can then agree or disagree with the diagnosis.

Another titan that's targeting Deep Learning in medicine is GE Healthcare. GE has launched its own healthcare cloud, and it is also devoting resources to artificial intelligence.

One artificially intelligent system is prioritizing exams for radiologists on the basis of urgency. GE Healthcare is working on this now in research projects with

Boston Children's Hospital and the University of California at San Francisco.

"We know that 85 percent of lung exams are normal," said David Hale, president of Enterprise Imaging Care Delivery Management at GE Healthcare. "We are using machine learning at UCSF to determine which are urgent and which are not."

In that way, radiologists can first concentrate on the 15 percent of exams that appear abnormal.

And at Boston Children's, the project is creating an expert system that can lend assistance to other hospitals – or countries – experiencing a shortage of expertise in pediatric brain imaging. "We're also tying the diagnoses to outcomes, so we have a better understanding of treatments that are most effective," said Hale.

For its part, Agfa HealthCare demonstrated a tight integration to IBM's Watson Health that automatically culls a patient's electronic health record and brings up relevant information when a radiologist – or a cardiologist – is looking at images. It's part of Agfa's new partnership with IBM, and it deploys Watson for this purpose.

"It's very useful to see a patient summary, but 90 percent of the time, radiologists and cardiologists won't go into the EHR," said Brad Generoux, product manager, Enterprise Imaging, Clinical Analytics at Agfa HealthCare. "It's too much trouble to go into another system, and they're under time constraints."

However, Agfa is now using Watson to bring that information into the workflow. For example, if you're a radiologist doing a prostate study, Watson will be sure to include a history of lab results in the summary.

"Watson is looking at whether you're a radiologist or a cardiologist, and brings you a one-page summary based on what you need," said Generoux.

"And we've reduced the time it takes to one mouse-click," commented Jason Knox, Solutions Manager, Enterprise Imaging, at Agfa HealthCare.

## CHIMA aims to boost awareness

CONTINUED FROM PAGE 13

turn can compromise patient safety and have other adverse effects.

"There's a lot of emphasis on the privacy and security domain, but if you look at data quality, there's a huge amount of work there.

Common data standards, with the appropriate metadata, are ultimately needed to enable systems to interoperate."

Three central questions were discussed by participants of the IG Summit:

- Why is healthcare IG important in Canada and why do we need it now?
- What should be included in the Canadian IG definition and framework?
- What recommendations can be made to the CHIMA board to help them champion and examine this domain of practice?

The participants provided a great

deal of valuable input, said Bacqué.

"What we plan to do next is to create a positioning paper on the insights gathered at the Summit that can be delivered to various healthcare governing bodies. The IG Steering Committee,

CHIMA and Iron Mountain plan to further develop recommendations brought forward at the Summit, specific to championing an IG definition and framework."

Various parties need to collectively come together at the federal, provincial, regional and local levels to help develop IG, she adds.

"Ideally, there would be national support on the creation and/or adoption of the standards that should be adhered to on how to govern and manage information across Canada. This isn't anything we need to create from scratch, as there are already international models we could use as starting points."



# Canada trails US and other countries in decision support for diagnostic imaging

Addressing inappropriate imaging could improve patient outcomes, save money and speed up wait times.

BY DIANNE DANIEL

A 56-year-old patient visits her family doctor to discuss a recent decline in her short-term memory. She leaves the appointment with a handwritten requisition for a CT scan. Delve beneath the surface and you learn the patient suffered a closed head injury in a motor vehicle accident 25 years earlier and remained in a coma for six days. The treating neurologist at the time mentioned early onset of dementia as a possible future outcome.

Review the best evidence and guidelines for ordering imaging tests, including the latest research connecting dementia to traumatic brain injury, and you find that perhaps a CT scan is not the most suitable exam under the circumstances. When her results come back as “unremarkable,” you can’t help wondering if she could have avoided the test – and its accompanying radiation exposure – altogether.

In other words, was the right imaging test requested at the right time?

Appropriateness of diagnostic imaging is a complex issue that various Canadian medical groups are examining. Though no large-scale study exists, research suggests the number of inappropriate imaging referrals carried out in this country ranges from 2 percent to as high as 30 percent, depending on the type of test and jurisdiction. Removing even a small percentage of those exams is expected to deliver cost savings, improve patient safety and ensure that limited resources are put to the best use.

Appropriate Use Criteria (AUC) is a starting point and several organizations are currently involved in creating guidelines to promote appropriate use of diagnostic imaging exams. Compliance, however, remains a struggle.

“We’ve had referral guidelines out for many years. We’ve revised them but the reality is they sit on the shelf or they sit in a computer – they just don’t get used,” says Dr. William Miller, president of the Canadian Association of Radiologists (CAR).

CAR is hoping to change that. The association is currently in discussion with Canada Health Infoway and others, including peer associations around the world, to discuss the possibility of partnering to work on appropriate use solutions. One answer is to offer referral guidelines in digital format at the point of care; this would be done by adding a decision support component to the computerized physician order entry (CPOE) portion of electronic medical records (EMRs).

In the scenario of the patient suffering short-term memory issues more than two decades after her head injury, a decision support tool would intervene at the point of care to alert her doctor to pursue a different line of testing. The CT scan request would be placed electronically instead of on paper and would be instantly vetted against a set of robust guidelines in the context of the patient history. The doctor would be presented with an alternate recommendation based on the best evidence.

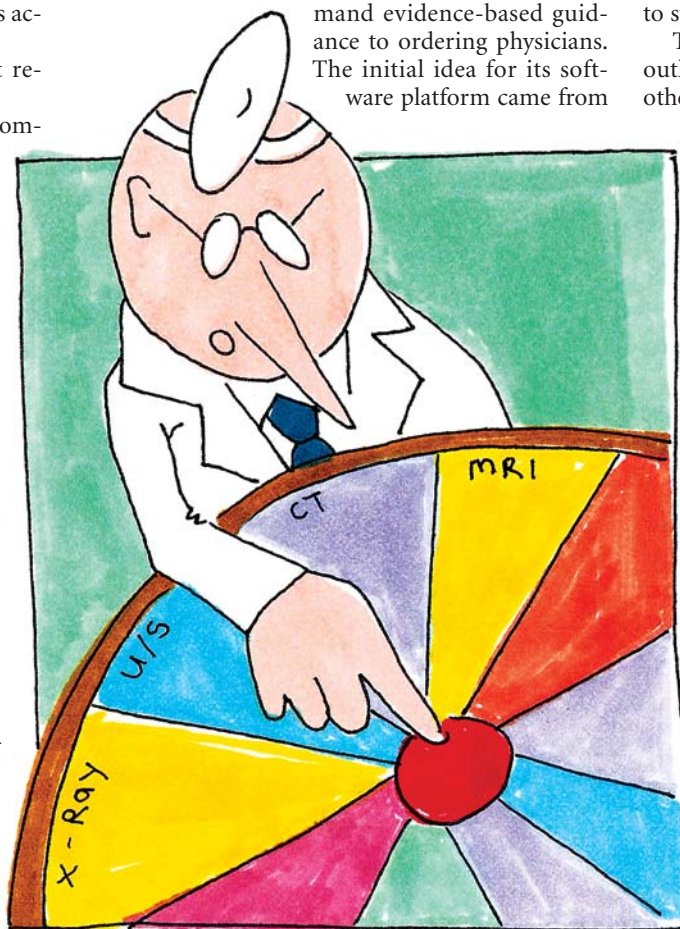
“The idea is that this becomes the normal workflow,” says Dr. Miller. “There’s obviously change management that has to go on for people to learn and ac-

cept how to work in this system, but it’s being done in many places in America now and it’s working.”

In the U.S., providers must meet requirements of the AUC program initially set forth in the 2014 Protecting Access to Medicare Act (PAMA). By January 1, 2018, they must consult a clinical decision support system for advanced diagnostic imaging in order to receive reimbursement.

Canadian providers aren’t faced with the same compelling business case, but the consensus is that more appropriate use of diagnostic imaging will lead to better outcomes for patients while reducing unnecessary risk from radiation. It will also help to curb instances of benign ‘incidentalomas’ – incidental findings that must be investigated once discovered, leading to further testing since clinicians face the challenge of proving they are harmless.

Toronto-based MedCurrent Corp. is one decision support software company working to deliver on-demand evidence-based guidance to ordering physicians. The initial idea for its software platform came from



founder and chief medical officer Dr. Stephen Herman, a veteran thoracic radiologist who currently serves as associate professor at the University of Toronto Faculty of Medicine.

While reporting CT scans at The Princess Margaret Hospital in 2003, Dr. Herman noticed a significant number “didn’t seem to be helpful for the patient.” After enlisting the help of a colleague to conduct a detailed study on a specific patient group, and finding similar results, he identified an opportunity to present referral guidelines to ordering physicians in a far more efficient manner, with the goal of ensuring the right test is ordered at the right time.

MedCurrent’s Orderwise platform is based on three essential components: ordering, analytics and authoring (customization). First and foremost, and

under the banner of ordering, the software is integrated with existing EMRs such as Cerner, Epic and GE Centricity, so that a screen pops up within the EMR at the time a request for an imaging test is made.

At a high level, integration means the screen is already populated with relevant patient information gleaned from existing health records and that any new information collected throughout the process of conducting the exam is passed back to the EMR to become part of the patient’s permanent record.

From the start, MedCurrent developers worked diligently to structure existing referral guidelines in a manner that makes them more accessible to physicians, including limiting the number of questions asked to determine the most appropriate test for a patient. “We virtually never ask more than two questions in order to get to the recommendation,” explains Dr. Herman. “It’s often one, sometimes two, but never more than two steps. That was a big effort to structure the knowledge in that way.”

The platform also provides a brief explanation to outline why one imaging test is preferred over another. Physicians can click on the explanation to view the underlying reference information applied to the guideline.

“It’s very important for the ordering physicians to understand why the system may be asking them to change from what they thought was the best test to what is the best test,” says Dr. Herman. Because of that feature, the software is approved for Continuing Medical Education credits by the Royal College of Physicians and Surgeons of Canada, he adds.

The two other primary features of Orderwise – analytics and authoring – refer to the system’s ability to capture and analyze information related to system utilization, and its ability to allow for local customization by authorized users. “There’s often some grey to these guidelines; they’re not absolutely black and white,” he says, noting that one group of physicians may prefer ultrasound to investigate a particular indication while another group may prefer MRI or a CT scan. “If you find a lot of people are disagreeing with a particular guideline, or a lot of doctors are ordering tests that there are no guidelines for, you might want to adjust the guidelines or write new ones,” he adds.

Medicalis Corp. is another company working to tackle appropriate use challenges related to imaging. Headquartered in San Francisco with a Canadian office in Kitchener-Waterloo, Ont., it offers imaging workflow, decision support

and referral management solutions designed to automate and manage the process of getting the right imaging test referred for the right patient at the right time. Medicalis chief medical officer Dr. Jonathan Darer agrees that physician engagement is imperative.

“One of the big dangers for decision support implementations is when everybody views this as a simple IT project and they hand the keys over to a bunch of IT people and say ‘It’s perfect, just put it in,’” says Dr. Darer.

Part of the problem boils down to semantics. Rather than using words like decision support, Dr. Darer suggests focusing on quality improvement, referring to implementations as “low back pain quality improvement projects” or “headache improvement projects,” for example. “It’s about clinical care, and we’re going to focus our attention on making sure we all have the

right information needed to assess the patient's status and whether or not imaging is appropriate," he says.

Similar to MedCurrent, Medicalis focuses a great deal of effort on both developing and interpreting evidence-based guidelines, and building the logic to translate that information into clinical recommendations. The company's imaging learning network meets weekly to discuss current best evidence and how it impacts clinical activity.

"A neurosurgeon who is seeing a patient with a headache is a very different clinical task than a primary care doctor seeing a patient with a headache," explains Dr. Darer. "You want to be able to adjust your workflow to both the provider and the patient need."

Medicalis places a priority on integration, using existing data assets from EMRs and other sources to automatically populate its decision support tool with relevant information, which in turn helps with indication capture. "When we get into interacting with the physician, we don't want to do it as a static process based on guidelines, we want to do it as a dynamic process based on who that doctor is and who that patient is," says Dr. Darer. "There's nothing more demoralizing for a provider than to see that a patient is a smoker in their chart and be forced to answer that question in a decision support tool. It should know that already."

In 2016, neither Medicalis nor MedCurrent reported a Canadian customer, but both companies indicated a high degree of interest from Canadian hospitals in their product offerings. One reason for slower adoption rates in Canada compared to the U.S. is the lack of a clear business case, since Canadian healthcare organizations do not face the same deadline as set out by PAMA, says Dr. Herman.

"One, healthcare is extremely slow in adopting technology as an industry. Two, I don't think people have appreciated the size of the problem. And three, it's not a clear business case here just because of the way healthcare is funded," he says.

Even if the instance of inappropriate ordering of imaging tests is as low as 2 percent on average, significant savings are available if the issue can be addressed through decision support, he adds. The Los Angeles County Department of Health Services is using MedCurrent technology in its hospitals, for example, and recently reported a savings of US\$900,000 in one year solely by applying decision support to help guide MRI requests related to the investigation of lumbar spine pain.

"The use of a system like this is good for clinical reasons, for financial reasons, for political reasons," says Dr. Herman. "If the government says we're making a cut to payment for healthcare, people will get up in arms. But if it says we're not paying for services that don't help the patient, it's hard to argue about that."

Dr. Miller believes one development that may prove to kick-start decision support implementations in Canada related to imaging workflow is the sheer penetration of EMRs. Canada Health Infoway reports that electronic health record data is now available for 93.8 percent of Canadians, with 77 percent of primary care doctors using EMRs to record patient encounters.

"We've been talking to Canada Health Infoway and we could partner with them

in the process because they're interested in the same outcome: to have the most appropriate request coming forward and to make clinical decision support available to the largest share of family physicians as possible," he says. "We think they may have the reach, the network and the ability to help us get this out across Canada."

CAR has also been invited to collaborate with other associations to develop a

robust and thorough set of guidelines, including the American College of Radiology and European Society of Radiology.

"The process is resource intensive and for everybody around the world to be doing it separately doesn't make sense anymore," says Dr. Miller.

Both MedCurrent and Medicalis allow for the use of multiple guidelines, according to user preference. MedCurrent ex-

tends beyond radiology to include cardiology and cancer care rules, and is currently talking with a partner regarding rules for laboratory tests as well.

"If you're a hospital that wants to put it in for radiology, before you buy a system make sure you get one that can be extended because we believe the odds are good that doctors are going to want that," says Dr. Herman.



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# RSNA 2016: Some hits, a few fumbles and squandered opportunities

BY THOMAS HOUGH

I attended the annual Radiological Society of North American conference in Chicago last November. To be succinct, in my opinion, it was neither a boom nor a bust. However, from the perspective of healthcare IT in diagnostic imaging, there were a number of hits and fumbles. Here is one person's observations.

Hits this year include:

- Karos Health, from Waterloo, Ont., and Vital Images joining forces in a buyout to offer a solution with advanced functionality. In my opinion, the system surpasses many other vendors in the VNA and zero footprint web-viewer market;
- TeraRecon is now offering 3-D printing direct from their server-based zero-footprint apps, which is changing the diagnostic and surgical planning process significantly. It will have huge patient outcome benefits going forward for years;
- McKesson has Conserus to image-enable the EMR and provide optimized imaging workflows and clinical effectiveness. This is one of the better image/report distribution web-viewers (zero-footprint) available on the market today;
- Intelrad continues to offer one of the most cost-effective VNA and image viewing solutions, and it attracts many radiologists to Intelrad once they see the applica-

tion. The net result? It is worth your time to call them for a look at the benefits of superior workflow, diagnostic applications, and low capital and operational costs on this Canadian built solution.

- Lexmark continues with content management and one of the most well-developed VNAs in the marketplace. Nevertheless, Canadian institutions appear to be slow to adopt this approach, even though it a proven technology with overall cost reductions.

- Carestream has added a check-in kiosk to improve staff productivity and workflow, resulting in less time spent by patients;

- Visage Imaging, with their enterprise-wide imaging and advanced imaging applications, are now starting to make some traction in Canadian hospitals. It is a hit to see Canadian institutions seeking out and embracing vendors with different approaches to solving long-standing problems, and Visage has new solutions.

Interesting!

- The best-executed strategy seen at RSNA 16 is from IBM and the partnering they have done with a large number of OEM vendors. They are providing Watson across a wide variety of DI applications, thus not forcing clients into buying from a single vendor in order to get access to Watson and the different applications and functionality it can be configured to offer.

- And excitement is building at Siemens

about the Healthineers spinoff. The company will be able to do its own thing as an independent, and says it will have faster product launches and more innovations. We'll see what the future holds.

Fumbles?

- Fuji – In 2015, the company demonstrated a compelling shift in their technology with server-side, web-enabled rendering of all applications for RIS, PACS, Advanced Visualization and VNA, thanks to their acquisition of Teramedica.



Thomas Hough

At RSNA 16, when visiting their booth, their messaging was confusing, resulting in a missed opportunity. Fuji didn't even confirm if the RSNA 2015 apps were delivered by RSNA 2016. Oops!

- Philips – For me, it was a surprising disappointment. It appeared to be a great job of re-packaging what they have had for the past couple of years under new names and with a different message. Some might ask, "Where's the beef?", to use an old advertising phrase.

Meanwhile, GE and Agfa kept their annual tales current with incremental improvements and changes in the realm of healthcare IT. An evolutionary strat-

egy rather than revolutionary – so no big surprises;

RSNA officials chose not to provide daily attendance updates, but instead provided only an advance-registration number: 48,888 for total advance registration and 23,656 for the professional advance registration sub-segment. These numbers likely increased slightly by the end of the conference.

2015 and 2016 were similar in attendance volumes but lower than 2014 attendance. However, there may have been differences in how the numbers were aggregated since 2014, so it is difficult to make a true comparison.

What is of real interest this years and shows the health of the industry is the growing number of exhibitors at RSNA 2016: 691 companies. And 105 of the companies were first-time exhibitors. This compares with 656 vendors at RSNA 2015, of which there were 94 first-timers. It suggests the start-up innovator companies are increasing; to be sure, some new entries into the market can only be a good thing.

My prediction for RSNA 2017? Kazan – constant and never ending improvement on all fronts.

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## New tools will assist radiologists in an era of increased pressures

BY DR. DAVID KOFF

PACS: the final frontier. The Imaging Enterprise mission is to explore new functionalities, to improve life and to boldly go where no radiologist has gone before. Does it sound familiar? With the fantastic new capacities of our enterprise imaging solutions, we are now reaching the edge of the galaxy, incorporating new functionalities which will contribute to improving the patient imaging journey.

The leading theme at RSNA 2016, held last November in Chicago, was "Beyond Imaging: The Future of Healthcare Delivery". Much of the buzz was about Watson and the amazing developments in Machine Learning and Artificial Intelligence.

A Watson demonstration on the show floor invited radiologists to compete with the machine to see how effective a computer could be at processing textual and non-textual information when reaching a diagnosis.

Will the radiologist ultimately be replaced by a machine? That was the theme of an overcrowded debate, and even if some are worried about losing their jobs, the overall impression is that machine learning will help and not replace the radiologist.

Less spectacular but more practical is a breakthrough development, focused on implementation, which has helped

greatly in reaching the new frontier: FHIR, which stands for Fast Healthcare Interoperability Resources.

FHIR is a next-generation standard created by HL7 for exchanging healthcare information electronically, in order to make Electronic Health Records easily available. FHIR combines the best features of HL7 v2, v3 and CDA, while leveraging the latest web standards.

FHIR is constituted of Resources, which combined, address most of the common use cases. FHIR can be used for a wide array of applications: mobile phone applications, cloud communication, Electronic Health Records data sharing, etc. (For more information, see FHIR: <https://www.hl7.org/fhir/summary.html>)

Easier and faster access to and exchange of information are making new applications part of the patient journey, improving efficiency and efficacy before, during and after imaging.

**Before imaging:**

- e-Scheduling: why can we book a flight easily on-line and not a radiology appointment? More radiology clinics and hospital departments are offering this type of service and this will certainly expand quickly, even if complex procedures will still require interaction with a booking clerk. More importantly, in a country where wait times for CT and MR are so long, in the absence of private sector alternatives, e-Scheduling will help to book

the first available appointment in the region by giving access to multiple providers.

- e-Referral: tied to Clinical Decision Support, and integrated within the EMR, e-Referral solutions allow healthcare professionals to order the right test at the right time for the right patient, in the larger context of personalized medicine. e-Referral is tied to other applications which will bring the relevant information required to the physician and radiologist, such as creatinine levels, eGFR, etc.

Clinical Decision Support has been in the works for many years, but new developments and country-wide initiatives will make it real.

- e-Protocolling: A key improvement to quality and appropriate exam referrals is protocolling, which is tied to e-Scheduling and e-Referral. This tool allows radiologists or technologists to protocol studies according to the level of priority (urgency as well as WTIS Priority) and the type of imaging protocol required to make sure that the right test is performed with the appropriate imaging protocols. This reduces the need to call patients back for additional exams or contrast-enhanced studies. It also ensures that the right per-



Dr. David Koff

sonnel are available to perform the exam and that the appropriate time has been scheduled, which helps with efficient use of costly imaging equipment, such as MR and CT.

- Workflow Management: with increasing pressure on radiologists, from increasing volumes to faster turn-around time expectations, intelligent load balancing is becoming a requirement to improve efficiency in busy radiology departments, leveraging on available capacity to complete the work.

**During imaging:**

- EHR integration: with a considerable step forward in HL7 communication, data aggregation is now much easier and a number of applications can now appear in the front end, providing the radiologist with clinical information and data from multiple sources, such as EHR, EMR, RIS, PACS, LIS, etc. Filters can be applied to ensure relevance, improving efficiency for the radiologist, who doesn't have to go through multiple interfaces anymore.

- Foreign Exam Management (FEM): seamless integration of exams performed at other institutions in the reporting radiologist workflow is a must to perform side-by-side comparisons and assess disease progression. All aspects of FEM must be taken into consideration, such as pre-fetching, patient reconciliation and purging from the local database.

- Peer-Learning (or Peer-Feedback,

# JDMI's peer review system gaining traction at hospitals across the province

BY JERRY ZEIDENBERG

**T**ORONTO – The Joint Department of Medical Imaging, which manages Diagnostic Imaging and Interventional Services for three downtown Toronto hospitals, has not only developed its own peer review software system for radiologists, it has also expanded the system to embrace technologists, as well.

That's expected to expand the level of expertise among the JDMI's DI professionals, who are already considered among the most advanced in radiology in Canada and around the world.

"All imaging activities need to have some form of quality control," says Catherine Wang, the Executive Director of the JDMI, which includes the University Health Network, Sinai Health System, and Women's College Hospital. "This is determined by the image quality from technologists and the accuracy of the image interpretation by the radiologists. Our peer review program, called Coral Review, supports multidisciplinary continuous learning for technologists and radiologists in quality improvement."

Not only will the system be used to identify misses and near misses made by radiologists and technologists, but it is also an effective way of spotting best-practices

formerly Peer-Review): Peer-Learning is a preferred term, as it outlines the need for the process to be educational and non-punitive. It is not designed to single out poor performers but instead to make the radiology community benefit from common errors and make sure that they don't get repeated. This is a requisite for Quality Improvement and even if we are still waiting for formal provincial recommendations, more and more sites are implementing Peer Learning in their radiology workflow. The ideal electronic Peer Learning solution must be prospective or timed retrospective, distributed, and anonymized.

## After imaging:

- Communication of critical test results: this is a major priority for healthcare providers. Communication of urgent critical test results is usually not such an issue, as radiologists communicate directly with the Main Responsible Physician (MRP) following a process which ensures that the communication has been appropriately delivered and acknowledged. However, it becomes much more difficult when it comes to communication of non-urgent critical test results, such as the incidental finding of a lung nodule on a test performed for another reason. We need to ensure that the information is delivered to the right person, acknowledged in a timely fashion and acted upon with appropriate treatment and/or follow-up.
- Region-wide access to images: once the imaging studies are reported and



Leon Goonaratne, Catherine Wang and Paul Cornacchione are leaders of the Joint Dept. of Medical Imaging.

and spreading the word among imaging professionals.

That's because reviewers will see the highest-quality exams, too, said Wang, and they can learn how the images were captured at the regular Quality Rounds. These

stored, they now have to be made available to the healthcare community, including the report. Regional repositories and Vendor Neutral Archives must now provide zero footprint viewers that are easy to use and can be accessed widely.

- Multispecialty and cross domain communication: diagnostic imaging does not function in isolation anymore, and multiple specialties share the same need to communicate and share information. New solutions must ensure that all relevant information is made available seamlessly, and again this is a priority for the patient-centric medicine of the future. Cross-domain collaboration is a new trend and a welcome opportunity for IHE (Integrating the Healthcare Enterprise).

- Patient portals: last but not least, in a world where patients are more educated and empowered, it is necessary to give them access to their medical information, as ultimately they may have to make informed decisions. Patient portals will certainly keep growing, which may change the way patients communicate with their doctors.

In conclusion, technology is progressing very fast and it is likely that the way we practice in healthcare will change more in the coming 10 years than in the past 100 years. Is the next frontier beyond the galaxy?

*Dr. David Koff is Chief of Diagnostic Imaging, Hamilton Health Sciences, and Chair, Department of Radiology, McMaster University.*

results can be discussed by Quality Leads and shared amongst technologists.

Paul Cornacchione, Senior Director of Imaging Operations for the JDMI, observed that reviews of the work of radiologists and technologists are now being done each day.

As the reviews of technologists are new, having just started in 2016, the system only looks at X-ray technologists. However, it will soon be expanded to embrace other modalities, as well.

And another innovation being pioneered at the JDMI is an alliance with the Michener Institute, an educational centre, to teach technologists how to review their peers effectively.

"The idea is not to be punitive, but to foster improvement," said Cornacchione. He noted the work with the Michener Institute, which was folded into the University Health Network last year, will include workshops and simulations, where Quality Leads can learn useful methods of reviewing their fellow technologists.

Cornacchione said that issues for technologists often include the proper positioning of patients, optimal or sub-optimal imaging, and studies that are missing images.

The reviews are also a form of clinical quality control – when images are found to be missing from a study, they can be tracked down and appended to the file.

Cornacchione commented that UHN, through the expanded peer review program, is acknowledging the importance of technologists in diagnostic imaging. "Not only does the quality of imaging depend on the techs, they are doing more and more," he said.

Technologists are giving clinical feedback to radiologists, in some cases, where they spot unusual things in images. As well, techs are being trained to do a wider range of procedures, such as inserting vascular lines and performing biopsies.

They're highly trained to begin with – often they are graduates of four-year-long educational programs. And by con-

ducting more procedures, they are taking the pressure off overloaded physicians and nurses.

"There's an enormous amount of training involved for technologists," said Wang. "And they're providing a critical function."

But as with all clinical processes, the JDMI believes the continuous oversight and improvement will help all involved – technologists, radiologists and patients.

The JDMI developed Coral Review in the same way it created its own workstation for diagnostic imaging – it was dissatisfied with the systems that were available in the commercial marketplace.

So a team led by Leon Goonaratne, Senior Director of Informatics, JDMI, produced its own solutions. These systems have proved so useful that other hospitals are now deploying them.

Trillium Health, in Toronto, is now using Coral Review, as is the Niagara Health System. Moreover, North York General Hospital and St. Michael's Hospital also adopted the solution in 2016.

Wang noted that the Ontario government is eager to see quality controls implemented in radiology and other hospital departments across the province, and Coral Review may help.

The plans include more than diagnostic imaging, too. Goonaratne says there have been discussions to expand the use of Coral Review to include pathology and cardiology.

The peer review system can be customized to suit various 'ologies', as well as to the needs of various hospitals and health regions.

"The software lets you do reviews based on rules," observed Goonaratne, and those

**The Coral Review system is being used to enhance the expertise and abilities of technologists, along with rads.**

rules can be modified to suit the needs of the users – in various regions and for different clinical purposes. As well, a data analytics system can be attached, to capture knowledge about how clinicians and technologists are functioning as individuals and as a group.

Coral Review appeals to other hospitals on a financial basis, as the JDMI isn't running the effort as a profit-making business. Instead, is geared toward system-wide improvement.

"We don't charge for the software, but users do pay for the costs of implementation," said Goonaratne. "We're charging just enough to have a little to put back into development."

He said that all users are given software updates and improvements, which come out on a continuous basis. As well, the development team at the JDMI accepts requests for new features from the new users, which helps with the overall quality and usefulness of Coral Review.

"We could charge more, but our aim isn't to make profits," says Wang. "It's to improve the quality of care and patient safety throughout the province."



# Vendors showcase innovations at the RSNA conference in Chicago

**C**HICAGO — At the RSNA conference last November, which attracted some 50,000 attendees, Toshiba introduced new products in four different modalities — angiography, CT, MR and ultrasound. The angiography announcement attracted a good deal of attention — the Infinix I Sky+, a ceiling-mounted system that features a double sliding C-arm. It's the first of its kind in the market, and enables clinicians to increase their coverage, speed and patient access. The new C-arm has 210 degrees of anatomical coverage on both sides of the patient and a high-speed 3D rotation of 80 degrees per second. (When you see the C-arm move, you realize it's very fast!)

John Morra, a senior clinical consultant at Toshiba Canada Medical Systems, noted the Infinix I Sky+ provides near CT resolution, in 3D, while clinicians are working in the operating room or radiology suite — meaning the patient doesn't have to be moved for a CT exam, or given a CT study later to check on the quality of the procedure. It can all be done while the patient is having the procedure performed.

In keeping with the move towards dose reduction and 'imaging wisely', the Infinix I Sky+ has automated and user-selectable dose management tools designed to minimize X-ray exposure to patients and clinicians.

With its new Vantage Galan 3T MR, Toshiba is offering an immersive in-bore MR Theater option. As the images displayed appear to be much farther away than the actual bore, the MR Theater provides a more comfortable experience, encouraging patients to relax and stay still during the MR exam. (This writer, placed inside the machine, found the experience to be interesting and relaxing — and a real change from being inside a typical MRI bore.)

The 71-cm bore is wider than most MRIs, and Toshiba's Pianissimo technol-

ogy reduces noise levels significantly — according to the company, noise levels are just above ambient rooms levels. Traditionally, MRI noise has been a complaint of patients and staff working with the technology. Toshiba says image quality has also been improved in the Vantage Galan 3T, and the system offers non-contrast blood vessel imaging from head to toe.

In CT, the company announced the Aquilion ONE GENESIS Edition, its premium offering. The new system is aimed at research centres and acquires 640 slices with every gantry rotation — the rotation speed is .275 seconds. The bore is very wide, at 78 cm, and the bed is able to accommodate patients weighing up to 694 lbs.

Software available with the system utilizes forward projection iterations to deliver high-quality images with up to 85.3 percent dose reduction, compared with previous CT exams. A full volumetric reconstruction (320 images) for routine clinical use can be obtained as fast as three minutes.

Toshiba also launched new ultrasound machines at RSNA, the Aplio i-series 700 and 800. The systems offer new technological advances and ergonomic improvements.

**F**or its part, GE Healthcare announced the industry's first self-compression solution for mammography. The Senographe Pristina system has been designed in France with the help of clinicians, technologists and patients; it helps reduce the pain, discomfort and anxiety that women experience when undergoing mammograms by enabling them to control the compression of the machine against their breasts. The patient uses a remote control to adjust the amount of pressure, with the help of a technologist, so she can set what feels right for her.

Claire Goodliffe, global marketing director for women's health at GE Healthcare noted that better images have been obtained when women control the com-



GE Healthcare has devised a self-compression mammography system, said to be an industry-first.

pression — they are actually compressing more than technologists, resulting in higher resolution pictures.

It's believed that compliance with mammography exams will go up, too, as there is less anxiety about the exams when women feel they have more control over the procedure.

Other ergonomic features have been added to the system, too. The gentle, rounded corners of the bucky, where the breasts are positioned, were designed to help reduce discomfort. Instead of women tensing pectoral muscles while grabbing the conventional handgrips, which can make it hard to acquire good images, they can lean comfortably on armrests, relaxing the muscles to simplify positioning, compression and image acquisition. GE Healthcare noted the system is undergoing FDA review in the U.S. and is not yet for sale; Canadian sales are also awaiting regulatory approvals.

At the RSNA meeting, GE Healthcare unveiled Freedium, a magnet technology designed to use one percent of the liquid helium typically used by conventional MRI magnets. Instead of the average 2,000 liters of precious liquid helium, Freedium is designed to use only about 20 liters.

MRI uses superconducting magnets cooled to -452 degrees F in order to take high-definition pictures of a patient's brain, vital organs, or soft tissue. The only way to keep MRI magnets currently in clinical use that cold is by using thousands of liters of liquid helium mined from below the earth's crust.

Helium has gone through two shortage crises, impacting hospitals and patients around the globe. The helium supply appears to be finite and demand has been rising over the past decades.

Magnets with Freedium technology are designed to be less dependent on helium, much easier to site, and eco-friendly. Thanks to Freedium technology, hospitals would no longer need extensive venting that often necessitates siting a magnet in a separate building or newly constructed room.

"Venting pipes for helium can sometimes be more expensive than the magnet," commented Ioannis Panagiotelis, chief marketing officer, global MR business, at GE Healthcare.

Additionally, a Freedium magnet would

not need any refilling during transportation nor throughout its lifetime. Therefore, when the Freedium technology is integrated into a commercialized product in the future, it could make MRI more accessible and less expensive to site and operate. This is particularly important in developing regions that lack necessary infrastructure, and in major

**Siemens is spinning off its health technology division as Siemens Healthineers, giving the unit more independence.**

metropolitan cities where siting a magnet can cost more than the magnet itself.

GE Healthcare notes that Freedium is not yet a commercialized product, but rather a technology that is still under development.

"It's a revolutionary advance for the industry and we look forward to integrating Freedium technology into MRI systems so clinicians and their patients can benefit from it in the near future," said Stuart Feltham, magnet engineering leader of GE Healthcare MR. "There is still more than 70 percent of world's population with no access to MRI. Our vision is to leverage this low-helium technology to increase world-wide accessibility of MRI so that more people can benefit from its diagnostic capabilities."

GE Healthcare has been building its cloud and Deep Learning capabilities, and has launched partnerships with the University of California at San Francisco and at Boston Children's Hospital. The systems being tested are designed to lend expert advice to radiologists — for lung screening at UCSF and pediatric brain imaging in Boston.

These systems may prove to be of enormous help in future, with growing demand for diagnoses but a severe shortage of radiologists, especially sub-specialists, commented David Hale, president and CEO of enterprise imaging care and healthcare IT at GE Healthcare.

Deep Learning systems can screen the exams for radiologists, enabling them to concentrate on the most urgent cases first. They can also help radiologists spot problems in the exams, thereby boosting the quality of their readings.

Overall, GE Healthcare will be accenting



Toshiba demonstrated the Infinix I Sky+, an innovative angiography machine with a double C-arm.

the role of smart systems and analytics as a way of enhancing patient care around the world. In Canada, new projects are on the go, including leading-edge work at Toronto's new, high-tech Humber River Hospital, called North America's first "digital hospital".

And as Heather Chalmers, general manager of GE Healthcare Canada notes, "so much healthcare is happening outside the walls of hospitals, in long-term care and home care, that it is important to be connected to it." For that reason, Chalmers likes to use the term "intelligent healthcare" as the mission going forward.

At RSNA 2016, Siemens Healthineers announced its robot-supported ARTIS pheno angiography system, which was developed for use in interventional radiology, minimally invasive surgery, and interventional cardiology. Because it can scan up to 15 percent faster in the body area than prior Siemens Healthineers systems, the system's syngo DynaCT clinical software application can produce 3D images that use less contrast media, thus decreasing the load on the patient's kidneys.

The ARTIS pheno's C-arm is 5 inches wider than its predecessor system, the Artis zeego, and has a free inner diameter of 37.6 inches, which offers more space for handling adipose patients and enables use of longer instruments. The system's multi-tilt table is designed to accommodate patients up to 617 pounds.

The end of the table can tilt up and down to stabilize patient blood pressure or facilitate breathing, for example. And like the Artis zeego, the ARTIS pheno's robotic construction provides a flexible isocenter, so it can follow all table positions while representing the patient's target area from virtually any angle.

Surgeons must be able to work easily while standing so they can perform lengthy operations without fatigue. They also must maintain optimum access within the operating area. Recognizing these needs, Siemens Healthineers designed the easy-float tabletop of the ARTIS pheno multi-tilt table to be easily moveable, regardless of the tabletop's tilt or the patient's weight.

The ARTIS pheno recognizes the tabletop's position at all times and automatically aligns to the tabletop. The memory positions allow the system to move the C-arm out of the operating area quickly and move it back to the same position for further imaging, so surgeons can check results directly during the operation.

Optional application packages can be used with the ARTIS pheno to accommodate requirements in complex cases, including spinal fusion procedures. Up to 10 vertebrae can be visualized in 3D imaging using syngo DynaCT Large Volume.

Syngo Needle Guidance then allows the user to plan extensive procedures using screws or needles.

Clinicians can precisely plan screw paths, and the Automatic Path Alignment function automatically aligns the C-arm to follow those paths. The laser integrated with the system's image detector displays the planned surgical path, helping to improve accuracy and speed in the OR.

At Chicago's McCormick Place, the separately managed healthcare business of Siemens presented itself for the first time under its new brand name, Siemens Healthineers. According to the company, the new name underlines the company's pioneering spirit and its engineering expertise in the healthcare industry.

# A new approach enriches the role of radiation technologists

CONTINUED FROM PAGE 14

is now hybrid PET/MR and on the horizon, MR-Linac.

"So what does all that hybridization mean?" Couillard asked his attentive Toronto audience. "Well, likely most of you were trained in just one discipline, but from now on you'll need to be flexible. You'll need to learn and you'll need to do things differently. Or you might need to become an 'uber specialist' in one narrow discipline like PET/MR."

Those multi-skill or narrow prospects may be upsetting to some, but the good news, predicts Couillard, is imaging technologists won't lack for work in future.

He asked his lecture audience what they thought the percentage was of imaging equipment buyers that are not imaging departments.

No audience guesses came close.

"I have it from a senior sales executive from one of the big three imaging vendors in the world who spoke candidly to our Future Advisory Council, that today about 75 percent of all new imaging equipment is sold outside of radiology departments. They are selling the great majority of their imaging equipment these days to neurology, to cardiology, to orthopedic surgeons, and the like. But those guys know nothing about how to operate that equipment. So they are going to need you, the imaging technologist, and you will have to figure out a way to work with them."

Figuring out how imaging technologists can work better with an ever-widening range of users to achieve a higher level of care across the board is squarely within the wheelhouse of the JDMI.

And its importance is something that is burned deep into the consciousness of JDMI's senior director, Paul Cornacchione, as he reflects candidly on that imaging technologist who saved a life at Women's College Hospital and who didn't just acquire an image and pass it off to the radiologist. "I admit that back 20 years ago in my time as an imaging technologist, I would have known basically what task I had to perform. I would have welcomed

the patient, maybe asked him a few questions, but then I'd have taken the images, thanked the patient, and likely escorted him out, without further thought."

Cornacchione, Wang, and Couillard are taking steps to ensure that technologists are going beyond image acquisition;

they're encouraging a closer working relationship with patients and physicians. And they're fostering the spread of best practices and technologist-based research and publishing. It's an innovative approach, and one that's aimed at the goal of better patient outcomes.

## R&D set to strengthen Canada as leader

CONTINUED FROM PAGE 8

dict the level of function of those genes."

As Dr. Sibille and his team work on identifying the cellular and molecular basis of depression, they want to shift the way disease is diagnosed, so it is "more informed by biological data and symptoms. The future is to have an integration of biology into the diagnosis that will help with the delivery of care."

The new CAMH Neuroinformatics Platform, with its ability to quickly sort through big data will be a huge advantage. Rotenberg

**Watson Health will be used in Canada for discovering new drugs and therapies for Parkinson's Disease.**

says his pet peeve is "wasting data" – having pools of data that are not managed. "This is a model we think all hospitals should adopt. We hope it sets a precedent."

**Watson and Parkinson's Disease:** Five years ago, Jonathan Rezek, an executive on IBM Canada's National Innovation Team, had a life-changing diagnosis after a fall when cycling. "I had a bad fall, broke my arm badly, and I had shaking in my arm when I started riding my bike again. Handwriting diminished. Visited a neurologist and was diagnosed with early-onset Parkinson's," says Rezek.

"It's a very slow-progressing disease – and that makes it tricky to do research on," says Rezek, noting that symptoms can include stiffness, cramps, shaking,

and depression.

As a member of the Innovation Team he knew he was in a good position to engage IBM Watson to discover new drugs to help combat Parkinson's. Cloud-based IBM Watson, a supercomputer that makes use of analytics and artificial intelligence, could make a huge difference in the process of drug development, for example.

Now IBM's Watson Health, the Ontario Brain Institute (OBI), and the Movement Disorders Clinic (MDC) of the University Health Network (UHN) have announced IBM Watson Drug Discovery for Parkinson's. This research project, a first in Canada, will harness Watson's cognitive computing power to uncover previously hidden data and find faster paths to insights, breakthroughs, and treatments. Since the process of drug discovery has traditionally been long and costly, the potential to significantly accelerate it could deliver significant benefits.

Asked how he helped bring IBM and UHN and OBI together, Rezek said, "I reached out to data scientists at IBM Research, and asked for presentations to be made to MDC about what we're doing with Watson," says Rezek. "Watson can do things on a massive scale," he said, explaining that Watson can look at 26 million medical tests and find relationships.

"One of my colleagues is closely affiliated with the Ontario Brain Institute," he says. "They've developed a platform called BrainCode." They thought BrainCode could work well with Watson.

IBM Watson Drug Discovery for Parkinson's is set to transform how researchers discover new drugs, and which ones could be repurposed in the fight against the disease, far faster than traditional methods. The team put together a project where they look at the potential of repurposing certain drugs, for blood pressure, for example. One of the advantages of focusing on repurposing drugs for Parkinson's, notes Rezek, is that those drugs already have been approved for use in humans.

The platform is just launching now, says Nathalie LeProhon, IBM's Vice President, Healthcare, adding that UHN's MDC will feed the queries. "There are three main areas of focus: diagnosis, recognition and treatment," she says.

IBM Watson Drug Discovery uses machine learning to find answers with unprecedented speed. When queries are made, and Watson provides answers, experts can determine which answers are good, and the system bases future answers on knowledge gained from those learning experiences. "You have to train it," says Rezek, of the machine-learning aspect of Watson. "Watson will be tremendous for Parkinson's disease."

"It's fast computing power that can make connections humans cannot make," adds LeProhon.

## Healthcare value

CONTINUED FROM PAGE 16

covery After Colorectal Surgery) was implemented. Based on data collected on 16 patients that have been through colorectal surgery using the ERACS Pathway, it was shown there was not only a monetary impact and ROI, but there were also several intangible impact measures at the hospital level. They included an increase in staff engagement and common understanding from staff from all areas.

As a result, there was less chance of infections, and patients were happier and more comfortable following surgery. ERACS showed a positive ROI of 118 percent, including development and documentation costs.

Healthcare represents one of the largest expenditures in our economy in Canada. Healthcare organizations and executives are constantly seeking methods, programs and processes that allow

them to continue to deliver high quality patient care while keeping costs under control. The investment in improvement initiatives is growing and the investment is focused on enhancing the patient experience and care while reducing or controlling costs.

Adopting ROI methodology will enable healthcare organizations to gener-

**Healthcare executives are seeking methods that allow them to continuously deliver high-quality patient care.**

ate data to help with decision making on how to allocate funds to programs, projects and improvement initiatives that deliver the highest value.

*Shirley Fenton is VP, National Institutes of Health informatics; Suzanne Schell is CEO, ROI Institute Canada; Hélène Clément is an eHealth Consultant.*





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