



CANADIAN Healthcare Technology

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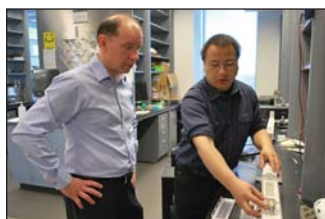
CPOE across PEI

Before implementing CPOE at all of its hospitals, the province of PEI did extensive planning, particularly in the area of order sets.

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Innovation powerhouse

In recent years, Sunnybrook Health Sciences, in Toronto, has built extensive laboratories capable of taking ideas from concept to prototype. The facilities include a GMP



room that's ultra clean and can produce devices that can be safely inserted into the body.

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Danielle Martin's views

High-profile physician executive Danielle Martin, who has battled politicians in the US Senate, recently spoke about Canadian medical care and technology at a Toronto event.

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Robots rule?

Thanks to the rapid rate of technological progress, some experts believe that robots will be able to



conduct surgeries as well as humans. Three Canadian leaders in the field of surgical robotics debated this possibility, and what it means for physicians and patients, at the recent OCE Discovery conference, in Toronto.

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PHOTO: COURTESY OF JOINT DEPARTMENT OF MEDICAL IMAGING, TORONTO

Cutting-edge imaging will reach patients sooner

A new project at the Peter Munk Cardiac Centre, in Toronto, is using two high-powered CT scanners from Toshiba as a way of speeding the transfer of imaging innovations to patients receiving clinical care. Pictured are project leaders Dr. Narinder Paul, Dr. Barry Rubin and Dr. Lawrence White, and Jens Dettmann, General Manager of Toshiba of Canada's Medical Systems Division. **SEE STORY ON PAGE 10.**

HHS connects vital signs monitors to its EHR

BY JERRY ZEIDENBERG

Hamilton Health Sciences has gone live with a system that automatically feeds data from over 400 vital sign monitors into the electronic medical records of patients.

HHS, which comprises seven hospitals and over 1,100 beds, plans to soon add another 200 monitors to the system.

The hospital corporation created the integrated system in less than three months by using a software solution from Iatric Systems, of Boxford, Mass. It went live in January of this year.

Mark Farrow, vice president and CIO at HHS, explained that the Iatric system is a technological platform that's capable of integrating any type of device with the hospital's electronic health records, including

smart pumps and ventilators, both wired and wireless.

The plan at HHS is to use the Iatric Systems platform to tie together many types of devices, so they feed data directly into the electronic records of patients.

"Whenever you can re-use a platform for other purposes, you're ahead," noting that fi-

The new solution has enabled a quantum leap in analytics and patient safety at the hospital.

nancial pressures are forcing all hospitals to work smarter and to seek more bang for the buck when installing new systems.

The vital sign monitors that were recently integrated are located in the hospitals' ICUs, CCUs and Neonatal Unit. Among other ben-

efits, it means that nurses in these units no longer need to spend time scribbling notes onto scraps of paper and transcribing them into computer workstations.

Moreover, the flow of data between devices and the Meditech EHR system is two-way, with ADT data being pushed to the devices.

That reduces the need for clinicians to enter patient data into the monitors at the point of care, saving time and reducing the chance of error.

Significantly, the investment in the Iatric Systems solution has enabled a quantum leap in analytics usage and patient safety at HHS.

The platform in conjunction with Iatric's Visual Flowsheet, is capable of powering the hospital's Hamilton Early Warning Score (HEWS), which uses real-time information

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Hamilton Health Sciences ties data from vital signs monitors to EHRs

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from devices such as blood pressure cuffs and EMRs to predict which patients are at risk of a medical emergency. When this occurs, the appropriate clinicians can be alerted, enabling them to provide care before it is too late.

"You can predict, for example, a respiratory issue or a severe infection ahead of time," said Farrow, adding that the HEWS solution makes use of predictive analytics.

"It's not good enough to import your data four hours later, and to see that your patient is getting into trouble. And that, by the way, the patient had a cardiac arrest or 'code blue' which could have been prevented if the response team had been alerted."

The HEWS team has produced an algorithm made up of seven different vital signs. The system scores patients on the wards, continuously and in real-time.

"It has translated into real-world improvements," said Farrow. "We've seen a reduction in code blues and unplanned ICU admissions. It is now unusual to hear code blue called at the General site."

Jeff McGeath, senior vice president of software solutions at Iatric Systems, noted that HHS has created a visual interface for HEWS that will allow members of the critical care response team (called the RACE team) to easily monitor the status of critical care patients.

He explained that analytics have evolved in recent times through three phases, and that HHS is now developing solutions for the third and most useful phase.

The first type of analytics is 'descriptive' and consists of simple reporting, he said. The second consists of predictive analytics – systems that can forecast what is likely to happen. And the third phase is prescriptive; it not only predicts but also makes recommendations. "It's where you're also prescribing a course of action," said McGeath.

Farrow noted, "That's what we're trying to get to."

The potential benefits of such systems are enormous, as they will enable caregivers to prepare for incidents before they occur, and to use 'best evidence' databases to take effective actions.

An additional facet of the Iatric Systems



Mark Farrow, VP/CIO at Hamilton Health Sciences.

platform is its benefit to biomedical engineers and clinical informatics specialists. The integration of medical monitors and devices allows them to remotely diagnose and repair the hundreds of devices spread across the seven HHS sites.

Indeed, it was the need to maintain a fleet of monitors that spurred HHS to implement Iatric Systems in the first place.

That's because last year, Philips Medical announced it would stop supporting the

vital signs integration engine used at HHS at the end of 2014. To keep its monitors communicating with the EHR, Farrow and his team had to find a support solution.

They found it in the form of the Iatric Systems platform, and were able to connect the Philips monitors to the new solution in less than ninety days. Next, HHS is looking to add their SpaceLabs monitors and potentially Welch Allyn devices to the platform.

Other devices, such as smart pumps and ventilators, will also be connected. "We needed a solution that was multi-vendor, and multi-modality," said Farrow. "And we found it."

Interestingly, the Iatric Systems software server solution cost only about \$60,000. That investment will form the cornerstone of a system that ties together all medical devices in the organization and integrates them with the hospital's electronic medical records.

It is also a key element of the HEWS drive in analytics and patient safety.

And of course, it is enabling engineers and clinical informatics specialists to keep close tabs on the functioning of the devices and interfaces.

All in all, it's performing a lot of work. As Farrow says, the ability to accomplish all of these tasks on one platform is having a significant impact on the hospital. "It's a very big deal," says Farrow.

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Coming in September: Feature on integration

IN THE SEPTEMBER EDITION of Canadian Healthcare Technology, we look at different approaches to interoperability. While some organizations have implemented integration engines, others are scrapping old systems and standardizing on a single solution. Still, there are many niche systems, and paper will continue to come through the doors of healthcare providers. Will Vendor Neutral Archives, with enterprise document management abilities, save the day? We profile current and upcoming solutions.

In addition, in the September issue Canadian Healthcare Technology will include a feature on Privacy and Security Issues in Healthcare, with a look at how hospitals are coping with employees who share passwords. This technique is seen as a time-saver by clinicians and staff, but it causes trouble for managers who are trying to keep a lid on security and must be able to conduct audits.

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Prince Edward Island's 'rolling' rollout creates provincial CPOE system

BY ROSIE LOMBARDI

A hospital that runs an electronic health record (EHR) platform without a computerized physician order entry (CPOE) system is only half-pregnant. It isn't a truly electronic system

until the thousands of paper order entries that flow around the hospital outside the EHR system are incorporated into it.

In 2010, Prince Edward Island's Health Ministry made it a priority to implement CPOE systems across the province's seven hospitals after they'd implemented their

Cerner Millennium EHR platform. The project was completed in 2014, and has eliminated almost all of the acute-care paper orders generated in the past. More importantly, diagnostics and medication orders have been speeded up considerably, and there is now an electronic mechanism

for preventing and tracking medication errors and other potential problems.

"Implementing CPOE is the tipping point, because ordering is such a fundamental aspect of care delivery," explains Liam Whitty, CIO at Health PEI. "Every decision a doctor makes triggers one or more orders. Without CPOE, an EHR is just a paper-based system supported with some electronic tools."

But implementing CPOE is tricky business, precisely because orders are an integral part of the hospital's workflow. "It's like changing out the engine of a car while you're driving it. When you're switching over from paper to electronic, you don't want to lose any orders. You have to maintain your care delivery," says Whitty.

Some hospitals have made headlines because they had to revert back to paper orders after their CPOE implementations went very wrong, he adds.

To minimize risk, Health PEI devised a multi-pronged strategy to tackle several potential failure points.

Before they even touched the technology, the multi-disciplinary project team worked out paper versions of order sets for common conditions, like congestive heart failure, by collecting all the orders typically involved in treatment. Then they worked out how this data would flow through CPOE to catch bottlenecks and glitches. "We did a lot of testing ahead of time so it would be safer to go live," says Whitty.

Once they were satisfied with the workflow, the team began what it calls its 'rolling rollout' implementations, switching on their Cerner Millennium CPOE modules one by one at each of the Island's seven hospitals. CPOE is embedded in Millennium's platform and requires licensing and configuration to switch on – but the change management challenges that ensue can be intense.

To ensure a smooth transition with knowledgeable staff, Health PEI created a provincial support team. "We don't have the extra people or funds that larger jurisdictions have, so we pulled together a team from all seven hospitals. When we went live at hospital number one, people from hospitals two through seven helped with the planning and go-live support."

Another prong of the strategy was going electronic with orders by type. "As there are so many different types of orders – diagnostic imaging (DI), laboratory orders, medication orders, and so on – we broke the project up into two parts to allow the different types to be done in phases. For example, in phase one we only had lab, DI and consult orders."

Whitty says it's best to tackle simpler orders before inputting the more complicated ones. "We got some of the easier ones like lab and DI out of the way first, then did the harder ones like medication orders once we were a bit more robust."

Doing it by category makes managing paper orders and electronic orders concurrently during the transition easier, he adds. "Once you turn on lab orders, for example, the lab stops taking paper orders and that stream of paper disappears. However, the pharmacy would still be taking paper medication orders. So essentially you'll have

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Experts forecast future of surgical robotics at Discovery conference

BY JERRY ZEIDENBERG

TORONTO – The day will come when robots will perform prostatectomies, liver and kidney surgeries and more, with better results than living and breathing surgeons, says Dr. Christopher Schlacta, director of CSTAR at London Health Sciences and a leading authority on surgical robotics.

“Will robots become better surgeons than us?” he asked. “I’m sure that will happen.”

Dr. Schlacta participated in a discussion about surgical robotics and tele-surgery at the OCE Discovery Conference, held at the Metro Toronto Convention Centre in May. The gathering was combination conference and trade show for start-ups and technological innovators, sponsored by the government of Ontario.

For his part, Dr. Schlacta conducted the first single-port robotic surgery in Canada, when in 2013 he removed the gall bladder of a patient through one tiny hole in the belly button. Traditionally, robotic surgery requires four incisions for the catheters carrying instruments, lights and cameras.

He explained that a ‘perfect surgery’ could conceivably be monitored and recorded by cameras and sensors, and the data could be uploaded to a computer-driven surgical robot. The machine would then be able to repeat the optimal surgery pretty much on its own, time after time.

With a robot, quipped Dr. Schlacta, “You’re never getting a surgeon with a hangover or with marriage problems.”

However, one of Dr. Schlacta’s interlocutors strongly disagreed. Dr. Mehran Anvari asserted that a robot can often be of tremendous help, but will never perform as well as the best surgeons. “Robots won’t remove the need for surgeons,” he said, “just as calculators didn’t eliminate accountants and bookkeepers.”

Instead, he said, robots can improve the performance of an unskilled or inexperienced



Pictured (l to r): Dr. Reiza Rayman; Dr. Mehran Anvari; Gillian Sheldon, Ontario Centres of Excellence; moderator Dr. Fayaz Quereshy, minimally invasive surgeon with the UHN; and Dr. Christopher Schlacta.

surgeon. “We know that in every hospital, there are good and not so good surgeons. And if it’s my daughter who needs an operation, we know who to go to and who to avoid.”

Dr. Anvari is a professor of surgery at McMaster University, and CEO of the Centre for Surgical Invention and Innovation, in Hamilton.

“A surgical robot can turn a poor performer into a high-level performer,” he added.

Dr. Anvari has been working with surgical robots for the past 25 years. His centre is developing its own medical robots, including the Image Guided Automated Robot (IGAR), a device that works in conjunction with an MRI scanner to help surgeons conduct more accurate breast cancer operations. It is currently in trials and awaiting regulatory approvals in the United States. Some \$30 million has been invested in IGAR.

He also conducted the world’s first com-

plete tele-surgery, in 2003, when he performed surgery on a patient in North Bay while in Hamilton, 400 kilometers away.

Tele-surgery can also benefit from robotics, he said, as human surgeons have difficulty adjusting to latency – the delays in images that are transmitted over telecommunication lines – while computers and robots can easily make the necessary adjustments.

While robotics and tele-surgery can deliver top-tier medical skills to remote regions that are often without the services of an experienced surgeon, most rural and isolated areas haven’t benefited, as the technology is expensive.

Surgical robots like Intuitive Surgical’s da Vinci, the leading system on the market today, require multi-million dollar investments in equipment and specialized training.

Governments and health regions across Canada have been loath to make these investments when pressed 12 different ways

for funding for nurses, long-term care, home care and other needs, not to mention deteriorating buildings.

Still, the prices of surgical robots are on the verge of falling, while the technology becomes even more adept.

Toronto-based Titan Medical has been developing a surgical robot that will sell for only \$800,000 – less than half the cost of a da Vinci system. It will also provide the surgeon with unsurpassed flexibility while conducting operations, due to the invention of a new, snake-like technology that enables a single entry point while carrying all of the cameras and high dexterity instruments that are needed.

The SPORT robot enables ‘single port’ surgeries, meaning that only one small incision needs to be made. Titan’s founders believe it is a major improvement over other systems on the market, as it offers much better flexibility and superior imaging.

“We developed a very flexible arm, with seven plus one degrees of freedom,” said Dr. Reiza Rayman, president of Titan Medical. Moreover, the single port system carries not one but two cameras for extra-precise imaging.

“This 3-D view allows for more accurate surgeries,” said Dr. Rayman, explaining that poor imaging in other systems has led to less than ideal outcomes in some cases.

Prototypes of Titan’s SPORT robot will soon be available, and testing on humans is expected to begin in 2016. The system is scheduled to be commercially available by mid-2017.

Not only is the device less expensive than other surgical robots, but it will also have a smaller footprint, allowing it to be moved from one OR to another or to ambulatory settings.

All three speakers agreed that major technological changes and cost reductions will have a huge impact on the medical sector, with surgical robots entering the operating room like never before.

Innovators produce headband to detect and monitor epilepsy seizures

TORONTO – A start-up company called Avertus has produced the world’s first ‘Holter monitor for the brain’, a headband that monitors brain waves and is capable of detecting the onset of epileptic seizures.

The novel device is made up of interlocking pieces, each containing a sensor and small circuit board, enabling all processing to occur right in the headband itself. Bluetooth is used to transmit data to a nearby personal computer or tablet, which can keep an automated logbook.

The headband can be fashionably hidden by a hat, so a person could wear it all day without feeling conspicuous.

“Today, people with epilepsy keep diaries to log their seizures. But they can have cluster seizures at night, and by the morning they may have forgotten all about them,” said Ron Gonzalez, PhD, the president of Avertus.

The Avertus headband can automati-

cally chart epileptic events and alert patients and family members to the start of a seizure. That can provide a great measure of safety and security to patients and their loved ones; it can also help with medication dosing and the data needed by researchers to produce better treatments in the future.

Gonzalez said the Avertus Smart Headset represents a breakthrough in measuring brain waves in a portable device that can be used by consumers. The company has filed six patents and has had three issued.

Avertus showed its technology at the OCE Discovery conference, an annual meeting that brings together Ontario innovators in various areas, including healthcare, and connects them with government and private sources of funding, as well as other organizations that are seeking to commercialize new technologies.

For its part, Avertus is seeking to fur-

ther develop and commercialize technology that was created by Dr. Berj Bardakjian, an electrical engineering professor at the University of Toronto, and through a later partnership with Dr. Peter Carlen, a neurologist at the University Health Network.

The Avertus Smart Headset can automatically chart epileptic events and alert patients and family members.

The company is being run by four PhDs, including Gonzalez, and operates in close collaboration with ZBx Corp., a Toronto-based biomedical company.

Gonzalez said the two-year-old company first looked for an existing headset that was sensitive enough for its purposes, but couldn’t find one. By neces-

sity, Avertus decided to create its own.

They came up with an original design. “All the parts are 3D printed,” said Mirna Guirgis, PhD, a biomedical engineer who is part of the Avertus team. “It’s modular, and if one piece breaks, you simply replace that one part, not the entire headset.”

It is also adjustable, comfortably fitting adults and children by adding or replacing pieces. Avertus has received \$350,000 from public sources, and has attracted close to \$500,000 in private funding. Recently, it received an order for \$100,000 worth of devices from an out-of-province customer. The headset will undergo clinical testing this summer at the Toronto Western Hospital, part of the University Health Network. Guirgis said in the future, sensors and algorithms could be developed to monitor other conditions such as sleep apnea, depression and Alzheimer’s.

Sunnybrook Research Institute is a commercialization powerhouse

BY JERRY ZEIDENBERG

TORONTO – An advanced laboratory is at the heart of Sunnybrook Research Institute's success in converting ideas about image-guided therapeutic devices into real-world products and solutions. "It's unique in Canada and possibly in the world," commented Kevin Hamilton, director, strategic research programs at SRI. "No one else has an integrated facility like this."

The 10,000 square foot lab sits at the top of a seven-storey tower, and contains everything from machinist's lathes to 3D printers and a current Good Manufacturing Practices (GMP) centre, an ultra-clean facility for producing devices that can be inserted into the body.

Called the Device Development Laboratory, "It's got anything you'd need to build a device or product," said Hamilton, who noted the lab can quickly turn an idea into a prototype, ready for testing.

What's more, the lab has a core of skilled developers who work closely with scientists and clinicians.

"We have many clinician-scientists who come up with ideas and want to turn them into products, to benefit patients," said Hamilton. "Some of them have created companies, and work here to produce prototypes."

At the same time, he noted that representatives from private companies are often visiting, as they're meeting with scientists, developers and clinicians as part of the commercialization process.

"We can churn out prototypes in days, as opposed to the weeks this process usually takes," said Anthony Chau, a machinist at the Device Development Lab. Chau also has training in electronics.

He observed that rapid prototyping of medical devices can be done at the DDL

not only because the machine tools and facilities needed are all in one place, but because talented people with a wide variety of skills are working together.

"SRI combines all the skills that are needed," said Chau.

Sunnybrook Research Institute has become a powerhouse in the creation and commercialization of image-guided devices for researchers and clinicians. In recent years, the organization has formed partnerships with more than 18 private-sector companies and has refined 23 image-guided technologies, some of which are now being sold internationally.

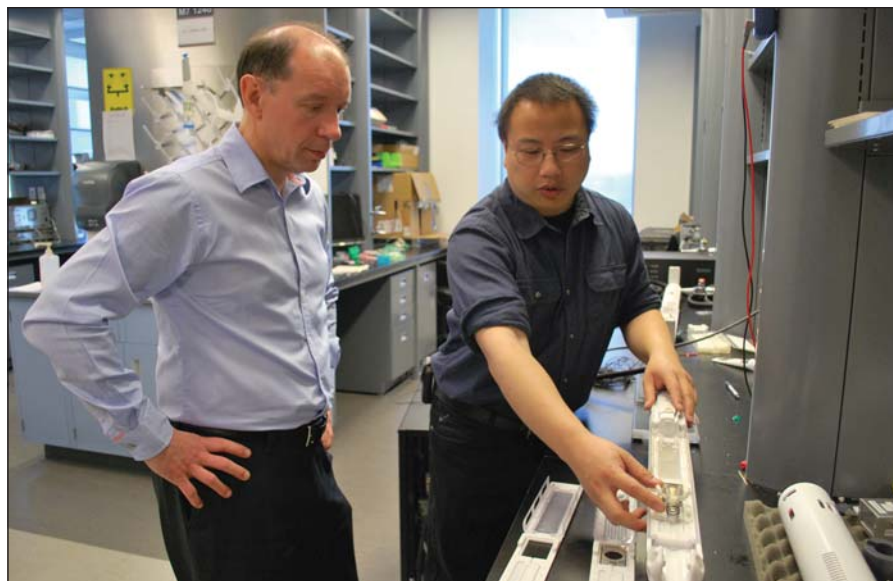
A \$74.6 million award, the largest grant in the hospital's history, was announced in 2008 by the Canada Foundation for Innovation's (CFI) Research Hospital Fund, and was used to establish the Centre for Research in Image-Guided Therapeutics.

In 2012, the government of Canada's FedDev Ontario provided funding of \$6.9 million, which was used to help commercialize promising technologies.

And in April of this year, FedDev Ontario strengthened the image-guided medical device cluster at SRI with a \$20 million grant, a sum that will lead to more than \$40 million in total investments through matching contributions from industry partners.

The money will be used to spur the commercialization of 28 different technologies, through collaborations with partners that include up to 28 businesses and four other universities – Western University, University of Toronto, Queen's University, and Ryerson University.

Hamilton explained the new money will largely be used to attract skilled people needed to further develop promising technologies and help bring them to market. If the lab and panoply of equipment are at the heart of the SRI, people are still the brains that come up with the ideas and



Anthony Chau (right) demonstrates new technology to Kevin Hamilton at the Device Development Lab.

bring them to fruition. "It's all about the people," said Hamilton.

Many of the technologies developed at the centre involve the use of ultrasound or MRI, two of the dominant imaging modalities used today. SRI has MRI scanners from GE and Philips, and will soon add one from Siemens, the third major maker of MRI technology. Hamilton notes that will help researchers and developers, who like to ensure their solutions are compatible with all of the leading brands.

Some of the technologies and companies that have been spun out of research at SRI, and that will be further developed, include:

- Calavera Surgical Design Inc., which has developed patent-pending technology and methods to help surgeons create custom patient-specific implants in the operating room using a compressive mold system. This technology will be marketed as two products: a kit for skull and face implants and a kit for eye socket implants.

The technology is also suitable for other applications such as forming surgical guides and templates.

- Focused Ultrasound (FUS) Instruments, spun out of research done in the lab of Dr. Kullervo Hynynen, director of Physical Sciences at SRI, is developing a novel focused ultrasound phased-array system that allows noninvasive and precise delivery of ultrasound through tissue without mechanical motion.

- Harmonic Medical Inc. is developing three novel clinical beta-prototype focused ultrasound systems for noninvasive surgery and precise delivery of energy to ablate tissues deep in the body. The unique features of different anatomical targets are used to design, construct and test devices for the treatment of uterine fibroids, back pain and vascular diseases.

- Innovere Medical Inc. is a start-up company established by researchers Drs. Kevan Anderson and Garry Liu, working in the lab of Dr. Graham Wright, director of the Schulich Heart Research Program at SRI. Together, they invented a wireless headset system to facilitate audio communication between clinicians and research teams working inside a noisy magnetic resonance imaging (MRI) scanner suite and the adjacent console room.

- PathCore Inc. is a startup company in Toronto that was created in 2011 by Dr. Anne Martel, a senior scientist in the Odette Cancer Research Program at SRI, and Danoush Hosseinzadeh, a former SRI research engineer.

The company is creating an integrated platform capable of storing and serving whole-slide histopathology images for analysis of tumour burden, tissue damage, and other pathological features. It is also the first software company in the world to offer a DICOM (digital imaging and communications in medicine) compliant server for digital pathology.

Hamilton observed that SRI is advancing patient care in hospitals, including Sunnybrook, through its innovation, and is also creating economic benefits through its research activities. "We've created 14 spinoffs in the last 12 years, and all are alive," he said. A few have been sold to larger companies, but the manufacturing facilities have remained in the Toronto area.

PEI's rollout

CONTINUED FROM PAGE 4

paper and electronic side-by-side – but it's for completely different categories."

In addition, Health PEI broke up order entering into two phases by staff category. "In the first phase, it was largely nursing staff entering orders into the system on behalf of doctors, who were still using paper orders. That allowed them to learn the system and work out the bugs.

"In phase two, the physicians started doing electronic orders themselves, but their trained colleagues could provide support. It's really much less risky to have the nursing staff go first."

Once CPOE is fully implemented in a hospital, order processing is speeded up considerably. "Orders are entered electronically right off the bat at the point of care, and they go instantly to wherever they're supposed to go," says Whitty. "The hospital workings become less about pushing paper around the system and much more about fulfilling needs. You get faster diagnoses

and more responsive care."

In addition, the CPOE now issues automated alerts that notify clinicians of important information, from supporting safer medication administration to highlighting overdue patient care activities.

Whitty says getting hard numbers about time savings is difficult, as there's no accurate pre-CPOE baseline for processing paper orders at most hospitals. "Also, because we phased it in gradually, we didn't

"We've seen a 34 percent improvement in medication reconciliation at our largest hospital."

have a particular go-live date to measure before and after. And there was no system to track medication errors before."

However, Health PEI has been able to measure some aspects. "We've been able to take an hour off the delivery time for non-stat antibiotic orders. We've also seen a 34 percent improvement in medication reconciliation at our largest hospital."

Whitty says he would recommend

PEI's phased, gradual approach by order type and staff category to other hospitals planning their CPOE implementations, as there were virtually no glitches in PEI's rollout. "PEI is a small place, so everything gets reported on in our newspapers. But our CPOE implementation didn't make the news at all."

The PEI CPOE project team won the 2014 Canadian Health Informatics Award for its efforts. "This is a tribute to the people behind the technology," says Jim Shave, president of Cerner Canada. "Cerner's partnership with Health PEI has helped establish a robust EHR system for the residents of PEI."

There's a positive trend afoot as more and more hospitals are going live with CPOE systems, adds Shave. "Over the past two years, we've gone live with CPOE at more than 30 sites, representing more than 13,000 clinical end-users across Cerner sites in Canada. When we get to this level of automation, then we can start to set our sights on more complex areas like population health management. I can't wait for us to be in a position to use the data we're collecting to advance healthcare in new ways."

McMaster Healthcare IT diploma provides tools for improving care delivery

BY TERESA PITMAN

The problem is not that we don't have enough data, it's that we don't always know what to do with the abundance of data we have. Michael Quinn, one of the facilitators of McMaster University's Centre for Continuing Education Health Informatics (HI) diploma program, hopes to help solve that problem.

Health Informatics as a field focuses on understanding how healthcare data can be extracted, understood and used to analyze, assess, predict and plan in a wide variety of situations.

Quinn's had a 25-year career using health information built on a Master's in Healthcare Administration. Like other facilitators in the program, he approaches his subject matter with both theory and practical experience. He teaches Health Information Systems and Data Analysis, one of eight courses required for the diploma.

"There's a tremendous market for healthcare professionals with informatics knowledge," Quinn says. He points out



Michael Quinn

that while people tend to focus on hospitals when they think of the healthcare industry, it is much broader – and the need for an understanding of health informatics is vital in many areas. One particularly valuable aspect of this diploma, Quinn

says, is that it is geared towards the Canadian healthcare system, with its variations from province to province. "I describe tools and techniques that the students can then decide if they want to put into their professional toolbox. I don't give a how-to one-size-fits-all methodology because it simply will not translate to every situation and every context."

Over nine weeks, students are asked to watch nine recorded modules, complete some readings and join their classmates – who may be spread out across Canada – in weekly discussions. They'll also complete individual and group assignments. Having most of the coursework online gives those who are working full-time more flexibility.

While most of the students who enroll in the Health Informatics diploma program work in healthcare or information technology, future graduate (summer 2015) Yvan Foster's experience shows that those working in related fields also find benefits. The Quebec City resident has a background in electrical engineering and has worked for IBM since 1985. He's currently a business development manager who focuses on solutions for the healthcare and life sciences industries.

"I hoped this program would help me see from the perspective of the person who uses the technology I am selling," he says. "I've been really pleased with the results. Healthcare is a very complex business. As an IBM representative, I understood part of what customers would do with our programs, but not all. I feel that now I under-

stand their challenges, and I'm equipped to be a better consultant."

He was pleased to be able to apply what he learned right away. "One thing I learned is that in any HI project, success is due 20 percent to the technology, and 80 percent to the planning and people involved. I'm work-

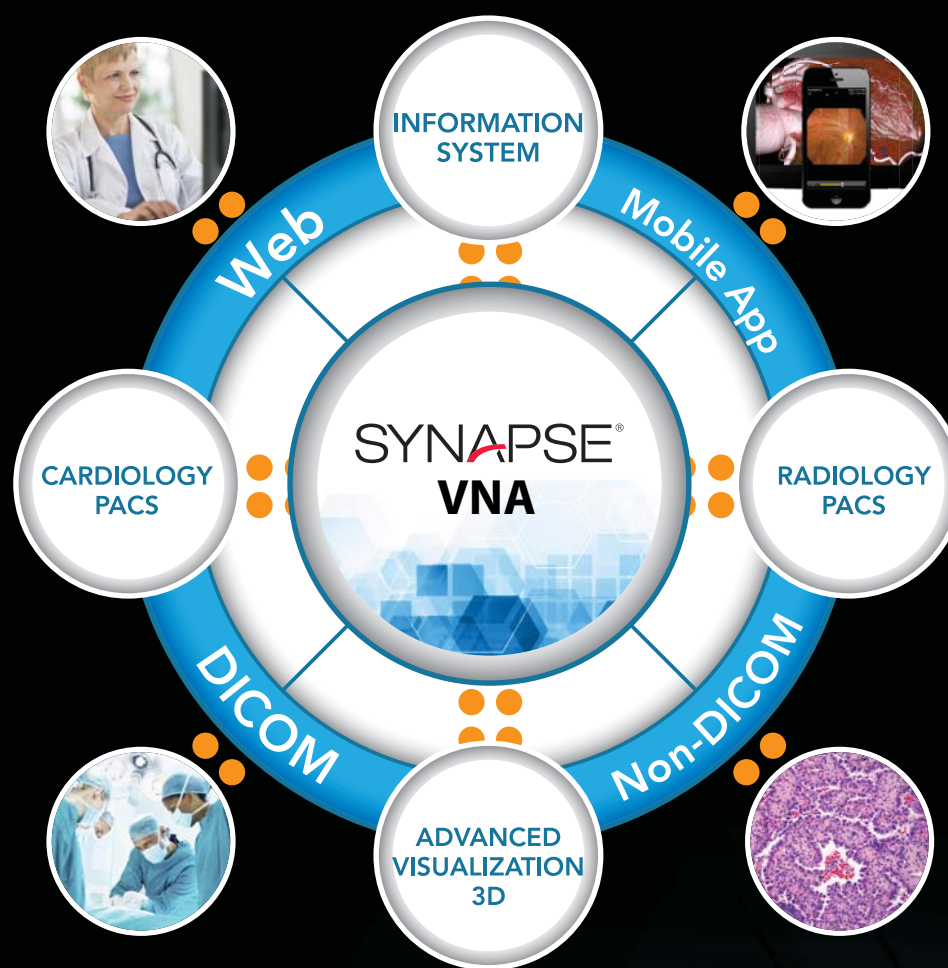
ing with a customer right now to make sure he has the right people in place, as well as the appropriate technological solutions."

Foster says, "There's really been a need for people who understand the business of healthcare and also how to leverage the technology and data to improve healthcare

services. It's great to see that McMaster has built this curriculum to meet that need."

For more information regarding McMaster's Health Informatics and Health Information Management diploma programs, please visit McMasterCCE.ca/health.

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Prominent physician urges her colleagues to use technology wisely

BY ANDY SHAW

TORONTO – Dr. Danielle Martin is a family physician and innovative vice-president at Women's College Hospital, whose firm grasp and defence of Medicare, Canada's beloved universal

healthcare system, famously won her the day at an inquisition-like U.S. Senate committee hearing in Washington last year.

Dr. Martin recently made a convincing case back home in Toronto that to fix our still admirable but admittedly flawed Medicare system, it's high time our health-

care leaders stopped grasping at straws.

We need, she says, to reduce wait times and improve outcomes with technological innovation certainly but also with bold, necessarily risky, non-techie approaches – like making all prescriptions in Canada free.

Dr Martin, charming and approachable

despite such strongly held views, got a chance to air them at the second in a series of Distinguished Speaker Series hosted by Telus Health, this one over lunch at the downtown Toronto Region Board of Trade offices.

There, another executive with a good grasp of Canadian healthcare and its troubles, Janet Da Silva, the Board of Trade's president and CEO, set the scene for the over 100 luncheon guests who paid to hear Dr. Martin's talk and her subsequent discussion with Paul Lepage, Telus Health's president.

"Our healthcare system doesn't come cheap, and our costs are rising," said the well-informed Ms. Da Silva, a former Western University dean of the Ivey Asia business school in China. "According to the OECD (Organization for Economic Co-operation and Development, in Paris), Canada has one of the most expensive universal healthcare systems in the world. And in 2011, a TD Bank economics report estimated that by 2030 our healthcare costs could well rise to be 80 percent of provincial spending!"

Da Silva further pointed out that a recent report from the Ontario Health Innovation Council (ohic.ca) made clear that if we are to create more sustainable healthcare, we rather desperately need to innovate new ways of doing things and consequently abandon the old.

Such as costly, unneeded, dangerous tests.

Dr. Martin, early in her after-lunch talk, told the story of a world-ranked athlete she knew who followed a private clinic's recommendation that he undergo a stress test and a follow-up angiogram "just in case" something was truly wrong: "The angiogram confirmed he was not suffering from heart disease, but not before he suffered a stroke on the table. This athlete will never play his beloved sport again because he is paralyzed on one side of his body, as a direct result of a completely unnecessary and inappropriate medical test."

Dr. Martin went on to say that many Canadians are harmed every year by improper, wasteful or harmful tests and prescriptions, naming mammography for young women, PSA testing for men not at risk, colonoscopy after five years instead of 10, among the leading culprits.

Also, such errant testing, she pointed out, lengthen an already over-long queue of people who truly need the tests.

In order to get better hold of such dysfunction in our healthcare system, Dr. Martin says the Canadian medical community together with its patients need to undergo a fundamental cultural change. And encouragingly, there's already a movement to bring that about underway in Canada.

"It's called the Choosing Wisely campaign which is a physician-led attempt to get doctors and patients talking more together about things they both need to question," said Dr. Martin. "When that occurs, two good things happen: the patients usually end up healthier; and resources are freed up for others who truly need them."

Beyond earnest discussion, Dr. Martin believes that all innovations aimed at giving Canada a stronger handle on its healthcare, be they cultural or technical, should leverage what she terms the "Medicare Advantage". "We have one

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health insurance plan for all, making widespread innovation relatively easy to implement. So we can make changes at low administrative costs.

"Our costs are impressively low by comparison," Dr. Martin told her audience over after-lunch coffee. "Administration accounts for 31 percent of healthcare expenditure in the United States, for example, but in our public insurance plans in Canada, administration costs are just 1.3 percent."

So it hasn't cost all that much to make some sweeping changes by applying the Medicare Advantage in coming to grips with a long-standing bugaboo in Canadian healthcare – wait times for surgery. Dr. Martin finds the innovations Ontario has made in reducing those times encouraging for both her as a physician and for her patients.

Ten years ago when she first started practicing, even if Dr. Martin referred a knee-replacement patient to an orthopaedic surgeon she knew well, the patient might still just go on wait list and have nothing done

while the surgeon, say, went off to vacation for the month of August.

"Ontario has since introduced Centralized Intake and Assessment centres across the province," said Dr. Martin, "so now if I refer a patient with late stage osteoarthritis of the



Dr. Danielle Martin

knee, that patient is seen within a week or two, first by an advanced practice nurse and then a physiotherapist."

In the course of those encounters, reports Dr. Martin, the two caregivers educate the patients about their disease; demonstrate exercises to improve pre-operative strength, give weight-loss advice, and use an evidence-based checklist to determine whether surgery is actually required. If it is, then the patient can book an appointment with a surgeon of their choosing, or wait for the next available one.

"The Intake Centres are good examples of the evidence-based cultural shift in the healthcare system I have been saying we need to make," said Dr. Martin. "It's a shift that moves us away from thinking of the surgeon as the personal owner of referral bases and wait lists – to one that puts access for patients first."

For Dr. Martin, the first among all patients needing a change are those paying for their own prescriptions.

"Canada is the only developed country with universal health insurance that doesn't include prescription drugs," Dr. Martin pointed out. "The result is many Canadians do not take the medication they need, simply because they can't afford to."

The well-known upshot is that neglected medications often lead to more serious and thus far more costly patient care for both public and private health insurance schemes to bear.

"The need to expand our public insurance plans to include coverage of medically necessary prescription medicine is absolutely clear," said Dr. Martin, adding that it would save tax-payer dollars as well as stimulate the economy.

A study Dr. Martin co-authored and was published in the Canadian Medical

Association Journal showed that implementing universal drug coverage would save private sector health insurers with drug coverage plans for their employees a whopping \$8.2 billion annually. "Think how much more competitive our industries could be without that burden," she said at the Telus luncheon.

This notion, said Dr. Martin, of a universal drug Pharmacare, is, as she termed

it, a good news story about opportunity: "It turns out that innovations we need in our system don't require that we turn our backs on our healthcare values, nor do they require a lot more money."

But they could do with much more help from technology.

Just how much help, became clearer after Dr. Martin's formal address in an informal on-stage chat with Telus Health Presi-

dent Lepage. Here's a synopsis of much of that conversation:

Lepage: As a practising physician Dr. Martin, I am wondering what you are gaining from technology generally and from the electronic medical record in particular?

Dr. Martin: Well Paul, it's a matter of stages. The first stage that technology has

CONTINUED ON PAGE 10



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Twin CT project accelerates translation of imaging R&D into practice

BY ANDY SHAW

Dr. Narinder Paul, like Noah, has faith that two are more productive than one. Especially if they are a pair of Toshiba's Aquilion ONE Vision Edition volume CT scanners, working side by side.

Dr. Paul, a British-educated radiologist and internationally recognized expert in image optimization and dosage reduction, is the head of cardiothoracic imaging at Toronto General Hospital (TGH), a cornerstone of the larger University Health Network (UHN) and the multi-hospital Joint Department of Medical Imaging.

As such, in April Dr. Paul was front-and-centre at TGH's Peter Munk Cardiac Centre for the launch of a joint, multi-year JDMI and Toshiba of Canada project featuring two identical Vision Edition scanners, operated from one control room.

This first-ever arrangement gives the Peter Munk Cardiac Centre the unique ability to expedite transferring what one CT is storing as research-proven protocols for imaging procedures to the other CT for use by clinicians caring for actual patients.

So why the need for two CT scanners?

"Typically, you have separate scanners for doing research and clinical work," says Dr. Paul. "And so often those scanners are different machines. Maybe one is older than the other, or they're from different manufacturers. Likely they are also in different parts of the hospital, each with their own control room, and for sure each with different ways of handling protocols."

"So if you identify a procedure or protocol for research subjects that might be applied to actual clinical patients, there's a lot of effort involved in translating those protocols from the research scanner to the clinical scanner. It might take days or even weeks to work the differences out and transfer the new protocols over."

"But now, with our identical twin scanners, if the new imaging practice protocol in the research scanner does not need to be peer reviewed, then we can make the transfer from it to the clinical scanner and put it to work on patients in the hands of our technicians and clinicians – almost instantly."

As Dr. Paul further points out, even if a new protocol coming out of research needs to be properly reported in medical journals and thus peer reviewed, a process itself that can take months to complete; once it does get the nod, the new protocol can be put into action on the front lines of health-care with the same swiftness.

Either way, the new integrated two-CT set-up enables quicker bench to bedside treatment.

With more and better imaging practices coming out of research being applied sooner, clinicians will be able to see the detailed images of the bone, blood vessel, and tissue conditions they seek to understand and treat. From that better knowledge, care givers should be able to map out better, more effective treatment plans.

What may also come of all this, is yet better scanning machines, especially from Toshiba.

"We have partnerships like this one in Toronto, and we work closely with the technical people and caregivers who actually use the scanners because it shortens our cycle of innovation," says Jens Dettmann, Toshiba of Canada General Manager and Vice-President, Medical Systems Division. "The partnerships give us a faster feedback loop to our engineers back in Japan."

Toshiba's research and development work with UHN stretches back a good number of years; one previous project included multidisciplinary teams working on the fusion of imaging technologies. The Peter Munk Centre clinicians involved in that project have in turn influenced the design of Toshiba scanners in significant ways with their feedback, reports Dr. Paul.



Imaging and surgical leaders from the University Health Network and Toshiba Canada at the twin CT launch.

But do the results of working with two \$3 million dollar scanners have meaning for other parts of the country?

"Very much so," says Dr. Paul. "What we are developing here is a model that others can emulate, regardless of the machines they are using. By pairing two compatible machines, you can bring research and consequent treatment together sooner."

What they likely won't be able to emulate quite is how low they can go, in terms of smaller radiation dosages patients are exposed to during a CT scan. First there's the Vision Editions' gantry speed of just barely over a quarter of a second to make one rotation, and yet still capture a highly detailed image in that one eye-blink turn.

"So with that gantry speed and the very high sensitivity of the scanners, what we can do now with our research scanner is to keep dialing down the dosage just to the point where it is at its lowest possible to get the kind of detail clinicians need for a particular examination," says Dr. Paul. "Then we can

put that lower setting into a new protocol and instantly transfer it over to the clinical scanner for use with patients that same day."

Not without willing hands to help, however. "I can't emphasize enough how important the nurses, the radiological technologists, and others who use these machines every day are to the innovation and partnership process as a whole," says Dr. Paul. "Without their knowledge and constant feedback on the protocols we may develop, the partnership and its benefits to all its partners simply wouldn't work."

Besides Dr. Paul's efforts to make this world-first bench to bedside partnership work, are other UHN project veterans, including Dr. Barry Rubin, the Peter Munk Cardiac Centre's Medical Director, and Dr. Larry White, the Radiologist-in-Chief for the UHN's Joint Department of Medical Imaging. The team embraces over 600 staff, 75 radiologists and 80 resident fellows, the largest speciality grouping of any kind in Canada.

Danielle Martin

CONTINUED FROM PAGE 9

taken us to is getting our record keeping off paper and into the computer.

The second stage or level we need to get to is getting our systems to talk to each other, and we're not there yet. For example, I am in a family medicine clinic at Women's College on one electronic medical record, but the rest of the hospital just across the street is on a different EMR. The one we have is more appropriate to what we do in the clinic and the one in the hospital is more appropriate to their needs. So, if I want to see what happened to my patient in the gastroenterology clinic across the street, I need to laboriously exit my EMR and then log into theirs – and that is absurd.

Once we get systems talking to each other, the third level up is to use IT to drive improvement in population health – but I don't think any healthcare system in the world has figured out how to do that yet.

Lepage: Speaking of IT, the balance of

power seems to be shifting to the cell phone-toting patient. How does that affect the physician, would you say?

Dr. Martin: That's a tricky issue. But what I find helpful is to look at it as part of the shift from doing healthcare things for the patient to doing things with the patient. Remember that patients are their own care provider 99.999 percent of the time. But if you give them stuff they don't use, can't understand, or doesn't fit into their world, you're not going to be much help to them. However, we are seeing a shift from traditional care in two forms: in one the patient sees the provider then goes home to use technology and manage themselves independently; in the other, both patient and provider stay in some form of two-way electronic communication. So there's a lot of research going on right now, to see which works best.

Lepage: That raises questions about access to the records and about who owns them, as well as the transparency and openness of the whole caregiver-patient record-producing process.

Dr. Martin: I am all for openness and

transparency, but I do think it is sort of sad that we feel this need to declare to people that they actually own the information about their own health. Also, patients need access to more than just their own health data. We need transparency for them at the physician level too, about the quality of their physician's individual work, about their physicians' incomes –

Aided by technology, there is a shift from doing things for the patient to doing things with the patient.

who is paying them, and how much their physicians are taking from industry in the work they do on behalf of businesses.

Lepage: So we can't just think about healthcare if we are going to solve its problems, can we?

Dr. Martin: That's what I think is so exciting about healthcare today, especially when you start trying to solve the many problems connected with high-end

users, like those who have chronic diseases. Many of them are socially and economically challenged, so they are not only sick, but usually have multiple challenges extending well beyond the medical sphere. That means, unless you are solving problems with their housing say, or unless you are thinking about their mental health, or wrestling with their language issues, you are not going to move the yardsticks on population health very much.

Indeed in our healthcare universe, where you have so many moving parts like we have in chronic disease and so many other variables that are particular to one individual, it's enough to make your head burst. It's so hard to know what to even try, exactly.

But what we've learned at Women's Hospital, in what we call our Virtual Clinic, is to think of "rapid cycle" development. That means we try something, evaluate it, often fail, but learn from it, and try again, kill that one if necessary and try something different, kill it again if needed, and just keep moving on to the next one until something works.

Data analytics essential for improving OR efficiency, reducing wait times

BY NURALLAH RAHIM

TORONTO – Seeking greater insight into the time and financial costs of its surgeries and procedures, The Scarborough Hospital (TSH) recently went through a vendor investigation and RFP process. It chose a perioperative information system for scheduling and documenting all phases of care.

Even though TSH operated with an electronic health record (EHR), providers still documented surgical cases on paper, a laborious process with a heightened risk for inaccuracies.

The new solution integrates with our Meditech EHR system, so data entry is automated. This helps TSH's nursing staff work more efficiently and safely. Another mandatory feature for us was the system's data-analytics capabilities needed to deliver actionable intelligence to improve OR utilization, turnover times and other efficiencies.

Since implementation, our hospital has seen improved surgical and endoscopy suite utilization and nurse staffing assignments thanks to the new insight we now have into higher-performing physicians and providers. Prior to the implementation of the new perioperative information system, Surgical Information Systems (SIS), generating a report that presented procedure times and costs by physician, pre-admission productivity by nurse, or patient recovery times by nurse was a time-consuming process. In part, this was because data was not consolidated in one system across the enterprise.

With disparate systems, communication was also less efficient, often requiring the patient to answer the same medical history and status questions several times during the pre-admission, surgery and recovery periods. This repetitive data entry would negatively impact the patient's experience, increase administrative work for providers and introduce the risk for data errors.

Following the requirements of our LHIN, TSH investigated eight perioperative information systems and created a request for proposal (RFP) for selected vendors. Among other qualifications, the RFP listed the required clinical and financial capabilities for eligible systems.

For example, one of the major requirements was integration with our organization's other information systems. Eligible technology also needed to automatically capture certain data and generate enterprise-wide and granular reports that would help us understand cost and utilization trends.

Although implementation took place only a year ago, the addition of the perioperative information system at TSH has already improved the efficiency of our surgical services. For example, prior to the SIS implementation, utilization in the endoscopy suites was at 66 percent, turnover times were between 10 and 12 minutes and

providers had completed their schedules by 1:30 p.m.

After analyzing the data to identify how providers could better schedule their procedures and improve their productivity, the hospital saw the following results: Utilization rate grew to 85 percent; turnover

times dropped to five minutes between patients; and billable time was extended to as late as 3:30 p.m.

The analytics have also helped with staffing efficiencies. For example, we were able to create a report showing which nurses complete more surgery assessments

in a day to ensure that they are continually assigned those duties and re-assign other clinicians with lower productivity metrics.

Nurallah Rahim, RN, BScN, MHA, is Director of Surgical Services at the Scarborough Hospital in Toronto.



Nurallah Rahim



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While the U.S. moves ahead on reimbursing telehealth, Canada dithers

Earlier this year, the Medicare began reimbursing physicians for non-face-to-face services.

BY DR. VIKRUM MALHOTRA

The Canadian healthcare system is one of many systems going through a transition from traditional hospital-based care to home-based patient-centric care and eventually to the “doctorless” patient. We have heard in previous years about the concept of bringing the care to the home, but much of this is still in the introductory phase and tele-homecare is still not reimbursed in Canada.

We have also heard of the promises of the transition to home-based care, but now our communities want to know what stage we are in and where we are headed.

Here is the update. We were bound as physicians and patients by expensive technologies, lack of cloud-based health networks, and poor legislative support to reimburse these services.

Due to the costs incurred, hospitals and clinics were created formally in the 16th and 17th century to centralize resources and deliver care. We saw this become formalized across the world as a form of delivering care. We are beginning to see the transition back to the patients’ homes for care delivery as technology improves, costs reduce, and positive healthcare outcomes are proven.

As our Canadian population ages, we are forced to put this in the forefront as costs of care will increase along with our wait times and overburdening our healthcare resources. There has been a large focus on solutions and healthcare economics. Currently, there is a large debate with the Ontario Medical Association and the Ontario government who are cutting costs by limiting this care.

The voice of the OMA has been strong in opposition and has created an agenda around the concept of “Care not Cuts” over the last year. The political landscape has also changed with telemedicine premiums enabling sustainable clinician tele-visits via the

Ontario Telemedicine Network. The government is holding the reins on its widespread use after seeing the disruptors create an over-utilization problem of healthcare resources.

Now, think about that for a second. We used these services so frequently that our costs of utilization expenses skyrocketed and the British Columbia government, with a fixed amount of resources, expressed public concern regarding its use by companies like Medeo, a Vancouver-based teleconferencing provider.

In the United States, Medicare introduced reimbursement codes 99490 and 99091 to reimburse re-

When you compare the Canadian digital health landscape to the American one, it’s almost as if Canada is in an entirely different universe.

note patient monitoring to facilitate collection and interpretation of health data as they are transitioning to Obamacare where fixed sums of money are used to reimburse care. The insurance companies have backed this form of care delivery because it is cost effective and shown positive health outcomes in different pathologies.

Beginning January 1, 2015, Medicare began reimbursing physicians for non-face-to-face care coordination services furnished to Medicare beneficiaries with multiple chronic conditions. For payment, chronic care management services must be furnished, with at least 20 minutes

Dr. Vikrum Malhotra is a US-trained cardiologist at AdvantageCare Physicians. He is also an entrepreneur and investor.



of clinical staff time directed by a physician or other qualified health care professional, per calendar month, with the following required elements:

- Multiple (two or more) chronic conditions expected to last at least 12 months, or until the death of the patient
- Chronic conditions place the patient at significant risk of death, acute exacerbation/decompensation, or functional decline
- Comprehensive care plan established, implemented, revised, or monitored.

This allows for early detection, fewer readmissions, and less costly readmissions. The United States has implemented Medicare codes 99490 and 99091 as a method of creating more sustainable personalized healthcare platforms as Obamacare is being transitioned through 2016.

In summary, the transition to personal medicine has changed as implantables/wearables have become smaller, cheaper, cloud-based and more integrated into our day to day living. We are starting to see the beginning of the second generation of remote patient

monitoring where “dumb” data collected by biosensors is being turned into “smart” data for interpretation and clinical decision support for doctors. Ontario has one of the largest telehealth networks in the world and has become the focus of attention for our delivery model success through our novel approach to care networking.

We are now at a point where we should support this shift in the paradigm to tele-homecare and telemedicine visits. Personalized medicine will represent

the advancement of our healthcare in the next 20 years and bring large-scale access to healthcare while improving costs.

REBOOTING eHEALTH

Theorems in eHealth? Is there a canonical basis for what we do?

BY DOMINIC COVVEY

Those with math backgrounds will know that ‘canonical’ means the simplest or standard form of a rule or equation. It also means the authorized, recognized and accepted or undisputed form of something. ‘Canonical basis’ is used herein to mean ‘recognized, accepted and simple’.

In April 2009, Chuck Friedman, renowned Health Informatics teacher and researcher, published ‘A Fundamental Theorem’ of Biomedical Informatics in the Journal of the American Medical Informatics Association. Math wonks know that the word ‘theorem’ represents a statement validated by a proof.

Chuck’s “Fundamental Theorem”

is not at that level of sophistication. It is, rather, an assertion in which we all believe and whose validity is based on real-world experience. Chuck expressed his Fundamental Theorem in the form of an inequality (to paraphrase): a human together with an information system resource is greater (or better) than a human on its own.

Some studies and even clinical trials indicate that this might be a valid statement, although many don’t and the magnitude of ‘greater than’ or ‘better than’ is still elusive.

Nonetheless, this is a tenet of our field. Chuck also points out that there are corollaries to the theorem including that “informatics is more about people than technology” and that the information system “re-

source must offer something that the person does not already know”.

Most eHealth professionals’ might react that such a basic statement is underwhelming and say, “so what?” Of course, the math types



Dominic Covvey

will simply ridicule a statement like this as being fundamentally unprovable and trivial. But, there may be great value in examining our field by asserting and even debating basic ideas and then building on them to create a structure of knowl-

edge that we can all accept and use. Let’s take a shot at that.

Let’s consider building up a set of assertions (‘theorems’ is a bit too pompous) about our field with which we can all agree. These assertions may help us to better understand and better explain what we do and what we are trying to accomplish.

Over the next few articles, we will put forward key assertions that we can organize into a useful body of knowledge. Moreover, we challenge readers to offer theirs. These assertions can be very basic, but must be demonstrated to have validity and to be commonly accepted by our confreres. Let’s start!

Assertion 0 – HUMAN LIMITATIONS: There is a need to supplement

CONTINUED ON PAGE 14

Use of smartphones in healthcare will soon face regulatory hurdles

BY MAHMOOD QASMI

The proliferation of smartphones has opened up multiple avenues for home healthcare management for consumers. In the last three years, the newer generation of smartphones and tablets have provided a platform for physical activity trackers and dietary intake monitors, but more importantly, they have allowed rudimentary data acquisition for physiological indicators.

For instance, the S Health app from Samsung makes use of Light Emitting Diodes (LED) and infrared (IR) sensors packaged with Galaxy S5/S6 smartphones to indirectly estimate the user's heart rate and blood oxygen saturation level.

Similarly, the Apple Health app uses the iPhone's camera as an optical sensor for estimation of heart rate. Interestingly, readings from such apps produce results comparable with conventional empirical methods used in medical practice.



Mahmood Qasmi

While sophisticated medical-grade instruments provide far more accurate and detailed analyses, consumer-grade smartphones could in fact use specialized instrumentation

"add-ons" to give users direct access to similar functionality in the next few years.

Basic blood pressure monitoring add-ons such as the Wireless Sphygmomanometer from Withings Inc. and stand-alone apps such as Instant Blood Pressure from Auralife Labs Inc. have already found their way into the marketplace. Soon, smartphones and tablets could be capable of using such extensions for monitoring and reporting Personal Health Information (PHI).

However, transfer and access of PHI between patients and medical practitioners can have a whole different set of opportunities and risks. While PHI security standards do not apply to fitness related apps, they do come into play when allowing medical practitioners and patients to communicate with each other on health matters.

The challenge is further compounded by significant fragmentation within healthcare information technology standards due to varying compliance requirements from country to country. For instance, it is rather difficult to have a unified protocol to concurrently comply with the Canadian Personal Health Information Protection Act (PHIPA) and the US Health Insurance Portability and Accountability Act (HIPAA).

PHIPA focuses on objectives and emphasizes the reasonability of methods to protect PHI against loss or unauthorized disclosure and subsequent copying, modification, or disposal. On the contrary, HIPAA tends to directly describe safeguards for health information including access controls, workstation/device security measures and authentication parameters.

As such, cross-compliance even within a North American context is far from trivial. Further still, the complexity can increase several fold when concurrently satisfying the European Data Protection Act

(DPA.) It can only be imagined what operational and technological challenges could be faced by OEMs and developers when aiming for global healthcare compliance.

They do however present new niche opportunities for OEMs, third party developers and Service Providers (SPs) to adapt

their technology and infrastructure for remotely managing and sharing PHI between clinical practitioners and patients.

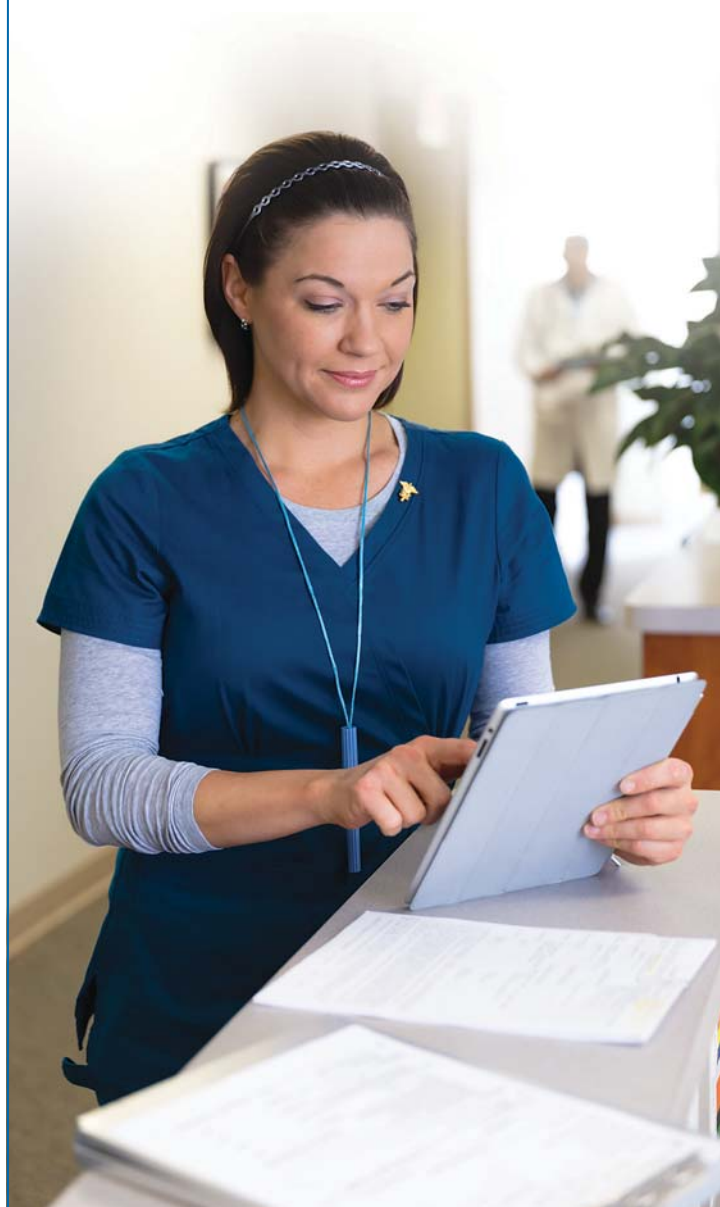
Service providers will need to warrant that adequate communication and service security is in place to comply with applicable healthcare regulations.

Mahmood Qasmi, BEng, MASc, MBA, PMP, is a Manager with the SR&ED Advisory Group at BDO Canada. He has more than ten years of progressive experience in engineering, product development and consulting with particular focus on Research and Development in the Telecommunications industry.

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Wearable healthcare devices: the next frontier for Canadian startups

BY ZAYNA KHAYAT

Wearable technology is moving quickly from a cutting-edge quirk to an everyday item, and this has huge implications for how we understand our own health – and how we can misunderstand it and how to know the difference.

A smart watch that can access your heartbeat, health records and Internet medical websites all at once can be a valuable tool or a path toward misinformation and an incorrect self-diagnosis. Medical info-tech can empower both healthy people and patients or it can confuse and lead to quack remedies.

This is a challenge, but it's also an opportunity to modernize our healthcare system, and a potentially massive opportunity for the tech firms that can make this happen. In addition to looking cool, wearable devices can let people become CEOs of their own healthcare.

According to BCC Research, global revenues for wearable healthcare devices have already reached more than \$1.1 billion a year. The investor community is noticing. In Ontario, the number of ventures in the "advanced health sector" grew by 21 per cent over the last two years, according to research by Innovation Data Partnership Ontario. Little surprise, over 400 industry executives and investors descended to Toronto this month to attend Health-Kick2015, Canada's largest showcase of early-stage health startups.

Governments, eager to rein in costs, are noticing too. For example, the Ontario government, which put the brakes on

provincial healthcare spending in its April budget, at the same time announced it's creating a new \$20 million fund to help boost homegrown health technology.

The province also announced it's appointing a new Chief Health Innovation Strategist to encourage health-related IT development and use in Ontario. The Toronto Region Board of Trade is also setting up a new consortium called TO-Health! to promote the region as a centre for tech-related health innovation.

Technology can bring cost efficiencies as well as improve effectiveness of the health system. It lets individuals focus on their own health and medical needs without the time-consuming and costly step of having to book a doctor's appointment or visit a clinic or hospital for non-emergencies.

A Toronto-based company called League, for example, developed by one of the co-founders of e-book company Kobo, will let people access and share their own health records securely with the teams of healthcare practitioners they designate – a shortcut around the more cumbersome alternative of requisitioning records through the province wide e-health system.

A Waterloo, Ont. health startup, Medella Health, pitched its high-tech contact lenses

at a Dragon's Den-style health-related investors' conference at Toronto's MaRS Discovery District in May. Medella's lenses measure glucose levels in the eye. This could be a boon for early treatment of diabetes, replacing the pinprick test that requires drawing blood.



Zayna Khayat

Right now one in four Canadian has diabetes or its precursors – a number predicted to rise to one in three by 2020 and cost Canada's economy \$16 billion a year in conventional treatment.

An app that deals with chronic pain from a company called ManagingLife lets people better communicate their pain with doctors. The app allows doctors to go back in time and look for changes in a patient's pain levels and response to medication. Not only can this help in the short term, but the information can be used to create a plan that looks at longer-term health goals.

Yet another startup, Toronto-based SeamlessMD has developed a platform that lets surgeons monitor patients remotely af-

ter surgery. Patients can also use the app to prepare for surgery and care for themselves after by following post-care instructions and sending updates to doctors and nurses.

Toronto East General Hospital tested the platform in a trial involving thoracic surgery patients, and found patients reported less anxiety over surgery instructions and fewer cancellations.

Fewer unnecessary post-op calls and readmissions frees up resources for others who need treatment and care; remote monitoring also helps 6.3 million Canadians who live in rural areas and can't easily travel back and forth from the hospital or clinic.

Ontario's government took a lot of heat over many years for huge cost overruns and delays in moving to electronic health records. But maybe moving from filing cabinets to e-health is simply a clumsy yet necessary first step in a revolution.

Portable, wearable health tech – which some observers still consider to be fashion accessories – may actually be the gateways to the way we take care of ourselves in the future.

Zayna Khayat is the Lead of the health practice of MaRS Discovery District and director of MaRS EXCITE.

Covvey: Is there a canonical basis for what we do?

CONTINUED FROM PAGE 12

human (individual and group) thought and work processes to deliver better health care. We have much evidence that humans need help, given our history of

inadequate or failed diagnoses and therapeutic interventions.

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

has a formal, if not scientific, basis. It is not just doing things. It is doing things that have been demonstrated to be appropriate, correct, usable and productive of desired effects.

Assertion 2: – UNDERSTANDING PROBLEMS FIRST: The fundamental contribution of Health Informatics (and its practice by eHealth professionals) is the understanding of problems related to human health and the health system. This means that what we are really about is observation, listening, studying, understanding or, more broadly, thinking. For us to be successful, the very first thing we must do is to get our minds around problems, challenges, deficiencies, etc. that make health care and the health system less than optimal. In other words, our focus must first be on understanding.

Assertion 3 – SOLUTIONS BASED ON UNDERSTOOD PROBLEMS: The understanding of problems is a continuing and progressively deepening process that practitioners attempt to address by various evolving solutions, often based on technology. Here we recognize that the complexity of health and the health system means that we will gradually approach comprehensive and persistent solutions as our understanding evolves. Initial uses of technology may be spotty and their effectiveness relatively weak, but we continue the process of understanding and evolving solutions through time.

We will continue this in the next article. Meanwhile, please start thinking about and sending your contributions. For now, many thanks to Dr. Tom Rosenal for reading and commenting on the manuscript for this article.

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

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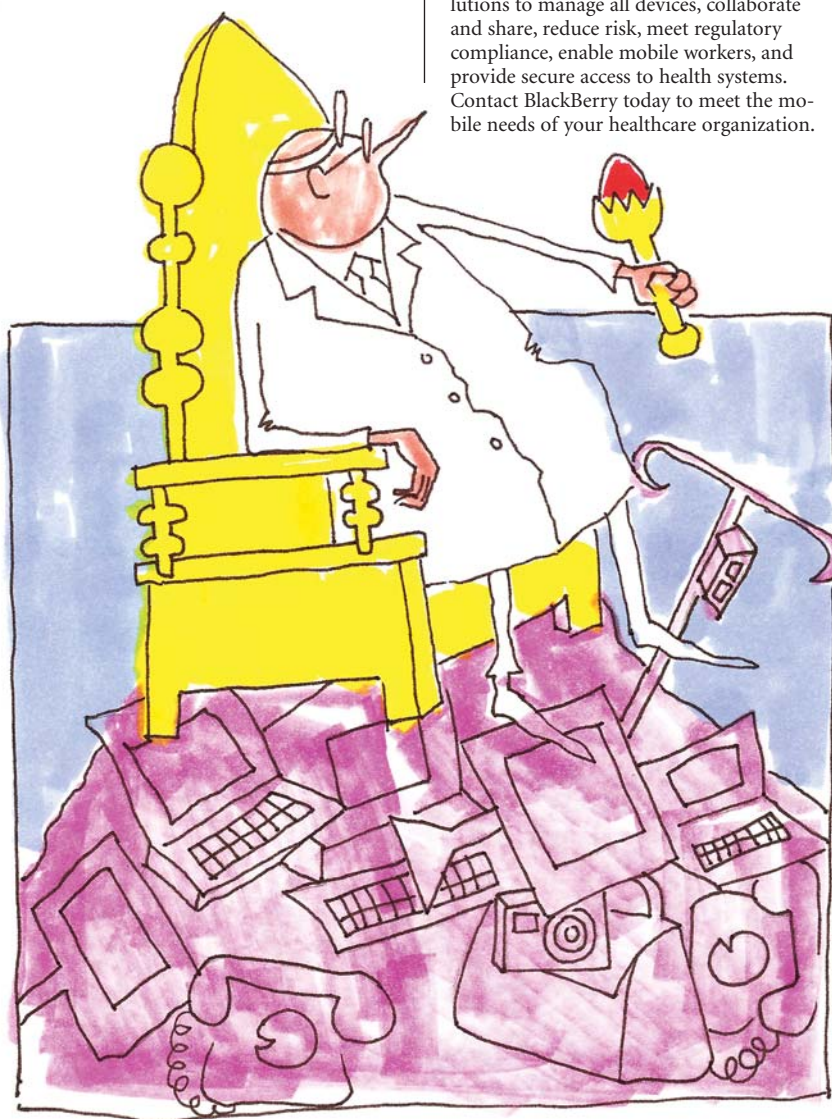
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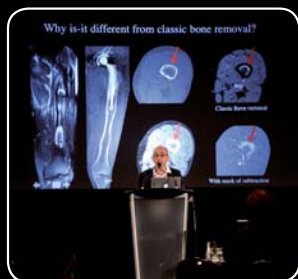
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A special thank you to all of our conference speakers. Their dedication to the field and knowledge they shared was insightful and will help us all achieve our goals to provide the best possible care for our patients. The details of the scientific sessions will be available soon on the conference web site (www.toshiba-medical.ca).



Prof. Alain Blum
C.H.U. Central Hospital
Lecture Topic: 4D MSK Imaging - Movement Analysis and SEMAR



Mme. Katia Kirpa
Montreal Neurological Institute
Lecture Topic: Protocols and Techniques using 320 Multislice Scanner in Cerebrovascular Disease



Dr. Almudena Perez
Montreal Neurological Institute
Lecture Topic: Applications of Multidetector CT in other Cerebro-vascular Diseases



Mr. Nagi Sharoubim
Radiation Protection and Quality Control
Lecture Topic: The Physics of CT from the Dose Perspective



Dr. Russell Bull
Royal Bournemouth Hospital
Lecture Topic: AIDR 3D Enhanced with the PUREVISION Detector



Dr. Catherine Legault
Montreal Neurological Institute
Lecture Topic: Clinical approach to Stroke: Ischemic and Hemorrhagic Stroke



Dr. Daniel Podberesky
Nemours Children's Health System
Lecture Topic: Pediatric Imaging



Dr. Donatella Tampieri
Montreal Neurological Institute
Lecture Topic: Multidetector CTA in the Management of Hemorrhagic Stroke



Dr. Marcus Chen
National Heart, Lung and Blood Institution
Lecture Topic: Cardiac Imaging with Coronary Subtraction



Dr. Dimitris Mitsouras
Harvard Medical School Brigham & Women's Hospital
Lecture Topic: The Emergence of CT Angiogram to Lesion Hemodynamic Significance



Dr. Patrik Rogalla
University Health Network
Lecture Topic: Dual-Energy Imaging



Dr. Maria Cortes
Montreal Neurological Institute
Lecture Topic: Multidetector CT in the Management Acute Ischemic Stroke



Dr. Narinder Paul
University Health Network
Lecture Topics: Cardiac CT – The New Frontier, CT Lung Perfusion – Techniques and Applications



Dr. Frank Rybicki
The Ottawa Hospital
Lecture Topic: Face Transplant Imaging with Wide Area Detector CT