

# CANADIAN Healthcare Technology

CANADA'S MAGAZINE FOR MANAGERS AND USERS OF INFORMATION SYSTEMS IN HEALTHCARE | VOL. 21, NO. 2 | MARCH 2016

## INSIDE:

**FOCUS REPORT:**  
**SOCIAL MEDIA**  
PAGE 8

### Wound care in Quebec

A team in the Eastern Townships has implemented two-way video technology on tablet computers that lets nurses communicate with experts while capturing images of patient wounds.

Page 8

### Raising awareness of DI

The new president of the Canadian Association of Radiologists has among his tasks the challenge of making the public, policy makers



and other physicians more aware of the importance of radiology in the delivery of healthcare.

Page 9

### Cloud-based peer review

A Canadian company, Real Time Medical, is creating a cloud solution for peer review. The system reduces the costs for hospitals, and can be used not only for radiology, but for other 'ologies', as well. It is available across the country.

Page 16

### Operation Smile

Not only are physicians from Operation Smile showing that a quick surgery can change the lives of youngsters with cleft lips and



palates, but they are also upgrading the infrastructure in many developing nations. Canadian doctors and execs are playing a big role.

Page 18



PHOTO: COURTESY CAMH

## New app brings psychiatric expertise to care-givers

The Centre for Addiction and Mental Health has created a unique web platform, called Portico, and an app that offers evidence-based psychiatric knowledge to primary care providers. Uniquely, the systems also create communities of practice that link caregivers. Pictured at the launch are: Dr. David Goldbloom, Mary Deacon, Amy Restoule, Dr. Catherine Zahn, Ann Douglas, Dr. Peter Selby. **SEE STORY ON PAGE 6.**

## Canada's first VNA installed in Peterborough

BY JERRY ZEIDENBERG

**P**ETERBOROUGH, ONT. – What may be the first comprehensive Vendor Neutral Archive in Canada is currently being installed at Peterborough Regional Health Centre, just east of Toronto. The \$2.5 million implementation not only replaces an eight-year-old radiology PACS, but it will provide storage and advanced reporting tools for cardiology studies, as well as DICOM and non-DICOM images from all other 'ologies' in the hospital, such as pathology and dermatology.

Large repositories for diagnostic images have been established in Ontario and other provinces, but they tend to house only images in the DICOM standard format, from

radiology departments. The system at Peterborough Regional Health goes far beyond this, and it will connect to the Meditech electronic patient record system that's used in the medical centre.

"Accessibility to images is going to be vastly improved for all clinicians," said Lorel Morrison,

**The system will provide shared storage for all types of images, an immense help to clinicians.**

son, director of diagnostic imaging at PRHC. "The tools the system offers, and the speed it works at, dwarfs what we currently have."

Morrison noted that the system will also offer remote viewing for clinicians, who will

be able to tap into the system from wherever they may be. "On-call physicians may be home, or at the cottage on a boat, and they can still view patient images," she said. "They can access the images on their phones or tablets, and they'll even be able to use the system's suite of tools. That's something we didn't have before for remote viewing."

The solution includes Fujifilm's Synapse Mobility Enterprise Viewer, which has been approved by Health Canada for diagnostic use. The system uses zero download technology for remote viewing, meaning that images don't remain on the remote device – a boon for security. As well, no extra software needs to be downloaded with web browsers, which greatly reduces pressures on staff to

CONTINUED ON PAGE 2

# Peterborough installing first comprehensive Vendor Neutral Archive

CONTINUED FROM PAGE 1

manage the myriad smartphones and tablets that are used by clinicians.

With Fujifilm's Synapse Cardiovascular, clinicians will also be able to call up ECGs, with tools to keep tabs on patients and to make decisions.

This remote-viewing feature means that on-call physicians may be able to provide instructions sooner, enabling treatment to start much more quickly.

Synapse Mobility also has a collaboration tool, enabling clinicians to simultaneously view images with their peers at other hospitals, to discuss cases and treatment options. This is a feature that many of PRHC's physicians asked for when the project was in the initial stages.

"Our physicians are able to look at images on their screens while discussing them with, for example, specialists in downtown Toronto," said Morrison. "We can send a secure link by email, and the images will open on their computer screens."

This kind of collaboration is in great demand, and the new system will make it much easier to accomplish.

The new Fujifilm solution is being provided through its Canadian partner, Christie InnoMed. Peterborough selected Christie InnoMed from nine vendors who responded to the original Request for Proposal.

Last year, Fujifilm purchased U.S.-based TeraMedica, a VNA developer with a large installed base in the United States and abroad. The TeraMedica technology is at the core of the Fujifilm solution.

When the hospital was in the decision-making stage, it assembled a team of 40 clinicians from across the facility to evaluate options and make suggestions about the features that were most useful and desirable.

There are quite a few components to the Christie InnoMed solution. Included in Fujifilm's Synapse suite are Synapse VNA, Synapse PACS, Synapse Cardiovascular with OPEN ECG, Synapse 3D for advanced visualization, Synapse Mobility Enterprise Viewer offering a patient centric access to all types of images on a single workstation, Cadens Colon virtual colonoscopy, and Crescendo Systems front-end dictation and voice-recognition for fast transcription.

These components are all running on a virtual VMWare solution.

The major parts of the system are scheduled to be installed by June. "It's a very fast implementation," said Morrison.

She noted that the Synapse VNA will

**Remote clinicians will be able to share diagnostic images on their screens while discussing diagnoses and treatments.**

help organize the clusters of images that are quickly growing throughout the hospital.

There are currently many pockets of images that are collected but not archived in any systematic way.

For example, there are many ambulatory clinics in the hospital that like to take jpg images using digital cameras. "If a patient came back, some time later, and wanted to see his wound care images, chances are they just wouldn't be there," said Morrison.

However, using the new system, the images can be stored in Synapse VNA. They

will be linked to the patient record using a header with demographic information.

This process can be used with all sorts of images that are proliferating, in surgery, endoscopy, and others. Morrison mentioned the example of pathology, which in addition to slides, is using a lot of digital photography, as well.

"In pathology, we take a lot of pictures to look at lesions. The new system will make it all available electronically."

She observed that ultrasound usage, too, is quickly growing, with point-of-care ultrasound becoming popular with physicians, especially in the ER. "In the past, these ultrasound images have rarely been stored. But in the future, the new system will allow them to be stored with the right patient identifiers."

With the Synapse Mobility Enterprise Viewer's patient centric access, the system will give clinicians – and patients – a much more accurate view of medical histories.

Automated tools will call up associated images, so that physicians can view the information need all at once. "If the patient is coming in for a cath procedure, the system will call up all the previous X-rays and CTs," said Morrison.

There will also be tight integration with the Meditech electronic health record. A single button in the EHR will launch the imaging system, so that clinicians can access the images they need without logging into a separate system.

Morrison said as well as all the software systems and tools that are being implemented, there is also a major hardware upgrade going on as part of the project.

Not only will clinicians benefit from the new software capabilities, which will enable them to obtain more information and make better decisions than ever before, but the new hardware will run it all at very fast speeds. "The speed of it all is very impressive," said Morrison.

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## Coming in April: Feature on mobility

IN THE APRIL EDITION of Canadian Healthcare Technology, we look at the fast-growth of mobile and wireless solutions for healthcare. Many of these solutions have been made possible by the increased power of smartphones and tablet computers.

In particular, we focus on remote monitoring of patients through the use of mobile platforms. Smartphones are even able to provide video of patients, enabling remote diagnoses.

## CANADIAN Healthcare Technology

CANADA'S MAGAZINE FOR MANAGERS AND USERS OF INFORMATION TECHNOLOGY IN HEALTHCARE  
Volume 21, Number 2 March 2016

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# Centre for diagnostic imaging education and training opens in Toronto

BY JERRY ZEIDENBERG

**T**ORONTO – A new education and training centre for diagnostic imaging and intervention, launched in December by Toronto's downtown hospitals, will help share the imaging expertise of some of Canada's most skilled DI professionals with medical imaging teams from across the country and around the world.

Called the Joint Department of Medical Imaging's Centre for Interprofessional Education in Imaging and Intervention (JDMI-CIPEII), the new facility is located at the Toronto General Hospital site and is a project of the Joint Department of Medical Imaging (JDMI). For its part, the JDMI manages DI at the University Health Network's three sites, Sinai Health System and Women's College Hospital.

JDMI-CIPEII provides a site where healthcare providers across professions can learn collaboratively in small or large groups. They can also discuss and create curricula to teach advanced imaging techniques, such as 3D cardiac imaging or virtual colonoscopy and advanced image-guided interventional techniques. The centre aims to spread expertise among various disciplines and professionals, including diagnostic and interventional radiologists, technologists, nurses and others.

"We should not be working in silos, we should be building partnerships," said Dr. Narinder Paul, Site Chief at Toronto General Hospital.

JDMI-CIPEII will coordinate education among the JDMI's various training facilities, some of which are operated with partners such as the University of Toronto. It will also create a competency assessment framework for the students who come to

learn about new procedures, to ensure they have absorbed their lessons.

"How do you know they get it," asked Dr. Paul, who is also the education leader for the JDMI. "You need to have expectations, a learning plan, and an assessment."

Dr. Paul noted that since 2009, the JDMI, through its University of Toronto affiliated Advanced Imaging and Education Centre (AIEC), has hosted nearly 1,000 clinicians from over 30 countries for educational purposes, many of whom stay for a four-week period of clinical observation.

As an advanced training centre with expertise in MR, CT, ultrasound, Interventional Radiology and PET/CT, as well as leading-edge cardiac imaging, the JDMI is one of the best places in the world for diagnostic imaging education.

Dr. Paul observed that few places in Canada have such a broad mix of technologies and skilled staff. "We have the critical mass here; we have the teams and the time."

Moreover, few other places have the volume of procedures going on that are required for continual education – a key factor, since the program also embeds the trainees in the procedure rooms to gain first-hand experience.

Community hospitals, Dr. Paul said, sometimes have advanced imaging systems, but the pressure of the clinical workload limits the opportunities for development of advanced imaging techniques and there is little time left over for educating their peers.

But the JDMI can do it, and community technologists, nurses, physicians and others from across Ontario, Canada and the world can come to learn new skills.

Not only do the trainees learn important technical skills, but they are also



(L to R): Dr. Barry Rubin, Catherine Wang, Dr. Peter Pisters, Mandy Lowe, Dr. Larry White, Dr. Narinder Paul.

taught the JDMI style of working collaboratively in interprofessional teams – where hierarchies are flattened and all members of the team are valued and respected for their unique and shared contributions to safe, high quality patient care, whether they are radiologists, surgeons, nurses, technologists or other hospital staff.

By having cross-disciplinary expertise in the same room, "We think the patients benefit," said Dr. Barry Rubin, Medical Director of the Peter Munk Cardiac Centre and Professor of Surgery at the University of Toronto. He noted that with radiologists and surgeons working together, diagnosis and therapy can be done all at once, dramatically speeding up treatment for the patient and producing better out-

comes because of the skills that are immediately available.

This style of working is transmitted to the trainees, and has a big impact: "When they go back to Tokyo or Buenos Aires, they do it the UHN way," he said.

Clinicians are also collaborating closely with industry partners to devise new technologies. Dr. Rubin announced two new partnerships that are expected to produce improved working methods and products.

First, the UHN is launching a new project with Toshiba Medical Systems to reduce radiation during cardiac catheterizations. The new technologies will dramatically minimize the X-ray dose given to patients during procedures, while

CONTINUED ON PAGE 19

## St. Michael's begins installation of a 'multi-media' Vendor Neutral Archive

BY JERRY ZEIDENBERG

**T**ORONTO – St. Michael's Hospital is now implementing a Vendor Neutral Archive, starting with pathology and clinical skin images. The hospital, a large, academic facility in downtown Toronto, will then add various other 'ologies' to form a complete repository of shared medical pictures, videos and waveforms.

"It's all about diagnostic accuracy," said Dr. Victor Tron, chief of laboratory medicine at St. Michael's and president of the Canadian Association of Pathologists.

"On the pathology side, it's been apparent that we need additional information that's not always available," he said, explaining that in his area of expertise, dermatological pathology, jpg images of skin rashes, lesions and diseases are of considerable benefit when assessing tissue samples on slides.

Those images, taken by treating physicians, are easily lost or misplaced, as they're taken on digital cameras and smartphones. In some cases, dermatologists are hesitant to share the images, as

they're usually transmitted via email, and many doctors are worried about unsecure networks.

"Because the VNA is secure," said Dr. Tron, "it will encourage them to share the images."

As the VNA gets up and running, all of the images in it will be automatically tagged with information that identifies the images and connects them to the right patient and body part. In this way, clinicians will be able to quickly call up all of the images they need for a particular patient and the problem at hand.

At the moment, most 'unstructured' images – those outside the radiology department – are stored on the computers of individual physicians.

"Even the pathologists have been storing their own images," said Christine Kao, global marketing and growth operations director for Carestream's healthcare IT solutions, which is the vendor supplying the VNA solution. "Physicians have been storing jpgs on computers, and sometimes they're simply kept on the cards of the cameras."

That will change with the VNA, as images can be kept in a central reposi-

tory, where they're automatically tagged and indexed for all to share.

Carestream has supplied St. Michael's with its Clinical Collaboration Platform. It complements and connects with the radiology department's Picture Archiving and Communications System (PACS), a solution that was also provided by Carestream. "It's one big archive, a platform for the entire enterprise," said Kao.

**Sharing images will promote diagnostic accuracy, which leads to better outcomes for patients, said Dr. Tron.**

All clinicians will be able to access the imaging archive through the Soarian electronic health record system. "The goal is one-button access through Soarian," said Kao. "That will open the images associated with the patient."

Dr. Tron said the system will also be useful for research and teaching purposes, as the images can be anonymized. "We'll be able to share rare and not so

rare images that you don't normally have access to, for teaching our students."

As well, the VNA is a way of encouraging the various specialties to work more closely together, as they'll be able to easily call up images for joint discussions and consultations.

This kind of collaboration and sharing of images, said Dr. Tron, leads to the final goal of greater accuracy, which helps both the patient and hospital. "The more accurate you are, the fewer tests you have to perform," he said.

The VNA will eventually allow access to patients, too, as a way of including patients as partners in their own health. This also has benefits, said Dr. Tron. By having more information, patients feel more involved and are motivated to adhere to care plans and get better. As well, they're often able to double-check information that's in their records.

"The patient can become part of the quality assurance process," he said. "They can catch things that have dropped through the cracks," such as missing test results. "I'm very much for engaging the patients and making them part of the process."

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# Portico site and app connect primary care to psychiatric expertise

BY JERRY ZEIDENBERG

**T**ORONTO – The Centre for Addiction and Mental Health (CAMH) has launched an interactive website, called Portico ([www.porticonetwork.ca](http://www.porticonetwork.ca)), which provides a platform for primary care physicians and allied healthcare professionals to better diagnose and treat patients and clients with psychiatric issues and substance abuse problems.

At the same time, CAMH released an app, called Psychiatry in Primary Care, which provides easy-to-use tools for primary care providers at the point-of-care. It also links back to the more comprehensive web platform.

“Primary care is the backbone of our healthcare system,” said Dr. Peter Selby, director of medical education at CAMH, who explained that primary care physicians are often the first place patients go for help with their problems. “It’s best if we can prepare primary care practitioners for the people who walk in with mental issues.”

Dr. Selby noted that Portico and the new app offer screening tools and access to advice from mental health professionals – backed by evidence: “No offence to Dr. Oz, but you want to make sure the information you give out is curated. Portico is curated.”

Importantly, Portico also offers primary care professionals the ability to interact with communities of care, and to join these communities, as a way of discussing psychiatric issues and ways of dealing with addictions, including alcoholism and opioid dependencies. “It’s not just a static website,” said Dr. Selby. “It’s a meeting place for knowledge to be spread.”

Already, there are 30 communities of practice up and running, with 2,000 care

providers active. “And it’s just at the beginning, it’s going to grow,” said Dr. Selby.

The launch of Portico and the app were made possible by resources from CAMH, as well as funding from Bell Canada. Recently, Bell made a \$10 million donation to CAMH, and a portion of the funding was used to produce the online system.

Bell has been actively involved in mental health issues. “So that people can get the care they need, and so they can reach their full potential,” said Mary Deacon, chair of Bell Let’s Talk, at the launch announcement, which was held at CAMH in January.

Dr. David Goldbloom demonstrated the use of the app with Nancy McNaughton, a senior simulation specialist at CAMH. With Dr. Goldbloom playing the role of a family doctor using the app on his tablet computer, they showed how a primary care provider could quickly screen a person with substance abuse issues, determining the degree of severity and whether the help of a specialist is needed.

The app, he said, answers the need for “a concise and rapid guide for the diagnosis and treatment” of psychiatric problems.

It makes use of more than 135 screening questions, which can be added to or customized by the user. As well, it connects to a variety of tools and resources on the Portico site. The app is based on Dr. Goldbloom’s book, *Psychiatry in Primary Care*, which was published in 2011. “The app version is evidence-based, customizable and updatable,” said Dr. Goldbloom.

A copy of the screening questions and answers can be emailed to the patient; moreover, it doesn’t remain on the tablet or point-of-care computer, but rather resides on a secure server. In this way the patient’s privacy is protected.



Nancy McNaughton, Simulation Specialist at CAMH (L) and Dr. David Goldbloom, Psychiatrist and Senior Medical Advisor at CAMH, demonstrate how clinicians might use the app at the official launch.

The Portico website has extensive resources about treatment options and best practices for topics such as suicide risk, depression, psychosis and personality disorders. It also offers a place for primary care doctors and social workers to ask questions and interact with their peers.

Amy Restoule, a social worker with the Sudbury East Community Health Centre, spoke about her experience with the app and web site. “On any given day, I’ll see people with depression, substance abuse problems, or anxiety, often coupled with physical problems. I have to know when to refer them to specialists.”

For many of them, expert help requires a one-hour car trip to Sudbury. “If possible, I don’t want to add to their stress with travel and wait times,” said Restoule. Using

the online systems, she has been able to access tools helping her to diagnose and treat her clients, and to better determine if they need the care of a specialist.

“We can connect with other professionals, including experts in Toronto,” said Restoule. She noted the app and website, by connecting her to others, “reduces her sense of isolation.”

Dr. David Wiljer, senior director, transformational education and academic advancement, observed that “there is a void out there when it comes to mental health apps, especially those that are connected to the care delivery system.” Portico and the Psychiatry in Primary Care app may be unique, he said, in providing care-givers with access to evidence-based knowledge and to whole communities of practice.

## Remote patient monitoring keeps patients out of hospitals

BY MARTIN TRÉPANIÉ

**M**arie Belanger\* has chronic obstructive pulmonary disease and diabetes. In 2015, Marie visited the hospital six times and spent 70 days as a patient. With her health conditions, Marie also has a complex medication regimen. On the other hand, Marie still lives independently. In fact, when not hospitalized, she has a relatively active life and enjoys spending time with her kids and grandkids in her own home.

But that almost wasn’t the case. Due to her fragile health, it was proposed that Marie move to an assisted living facility. However, she was adamant about living on her own and was, instead, offered the chance to join a Remote Patient Monitoring (RPM) program.

The RPM program, offered by the Laurentides region, helps complex chronic disease patients stay at home and out of hospital. According to Ed Brown,

CEO of Ontario Telemedicine Network, “... there is a 17% reduction of long-term care admission when RPM is present.”

In Marie’s case, this is now true. She hasn’t been to the emergency department (ED) or hospitalized since joining the RPM program six months ago. In fact, Marie now actively contributes to staying in optimal health, recognizing the signs of decompression and taking action to prevent an escalation of symptoms that would typically result in a trip to the emergency department. She has also adopted better lifestyle habits to prevent further degradation of her health.

Marie’s case illustrates a significant shift towards patient/family caregiver-centric care. Remote patient monitoring is increasingly being used to link home-care directly to primary care providers, specialists and other essential services to reduce hospitalizations in the case of chronic care patients.

In fact, Canada Health Infoway reports there are currently 19 RPM programs in seven provinces and territories, with a projected growth of 15-20 percent each year. Given that the aging population is putting a strain on Canada’s

healthcare system, it is no surprise that RPM solutions – which keep patients out of costly hospital beds – are getting a lot of traction.

When Marie was enrolled in the program, her case manager had to intervene a few times to avoid adverse situations and hospitalizations. In response, her monitoring plan was adapted accordingly and by empowering Marie to follow her prescribed medication treatment and take

**There are currently 19 RPM programs in seven provinces, with projected growth of 15-20 percent each year.**

greater control of her health, she began to understand her health conditions better.

Even Marie’s children got involved with the family caregiver’s portal that is available through the RPM solution. They log in regularly to check how their mom is doing, review her vital signs, assess any trends and also access educational material related to their mom’s conditions.

The Conference Board of Canada found that when patients have access to RPM solutions they report improved patient satisfaction and quality of life. This could be due to the fact that they no longer need to wait for medical emergencies to happen in order to get a provider’s attention.

Another advantage is that these solutions have been proven to increase patient adherence to treatment plans. In fact, an RPM pilot launched by the Québec Ministry of Health and Social Services has found that almost all patients involved in the program complied with their care plans.

Through alerts and remote check-ins, patients are notified when to take their medication and which symptoms to keep in check, what measurements to take, and how to promote a healthy lifestyle that keeps them out of hospital. RPM programs have shown that when patients are given the tools to take control of their own care, they do so willingly.

Martin Trépanier is Quebec Director of Operations, Orion Health

\*The name and certain details of the patient’s case have been changed to protect patient confidentiality.

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# Wound-care solution makes use of advances in telehealth software

BY JONATHAN LAPOINTE

A new, updated deployment of technology for Wound Care Teleassistance (WCT) service is now under way at the Centre de Coordination de la Télésanté (CCT) of the Centre intégré universitaire de santé et de services sociaux de l'Estrie-CHUS (CIUSSS de l'Estrie-CHUS), located in the Eastern Townships, in Quebec.

The aim of the WCT program is to improve access and care for patients needing complex wound care. Built on standardized methods and grounded in a clinical network of specially trained nurses, the WCT service model is unique in Canada. In 2014, about a hundred nurses, covering around 65 health facilities, were using it.

By 2014, 5 years after the initial deployment, it became obvious that the technology in place needed to be upgraded. In fact, most of the hardware used to provide the service was not supported anymore, which posed a threat to the continuity of the WCT service.

The CCT took this situation as an opportunity to reassess the needs of the nurses in regard to WCT and also re-evaluate the care organization to make sure that the service was still relevant and operating according to the actual needs. The results of these consultations was formalized and put up in a weighted requirement grid following the importance of each of the points suggested by the nurses.

The main concerns in the redesign were to find a software solution oriented towards the needs of the clinical teams and then to find an independent hardware platform to support this solution.



Jonathan Lapointe, Alex Gagné, Jennifer Morin and Sonia Quirion are leading the wound-care project.

The rationale behind this choice was to avoid a vendor lock-in if ever the hardware or the software provider was to close, or otherwise cease to offer his services, and to be more future-proof. This way we made sure that we offered a reliable solution to our end users.

Six software solutions were reviewed and tested according to each of the features identified in the need analysis. Each was also rated according to their perceived ease of use and the future possibilities.

One of the main upcoming enhancements which had to be considered was the possibility to do WCT clinics where there is no accessible wireless connection, be it at the patient's home, nursing homes or other health facilities. The chosen solution was REACTS from IIT, an innovative Quebec-based company. REACTS is a cloud-based software solution tailored directly to the

needs of clinical staff needing to do virtual clinics and other telehealth activities.

On the hardware side, we opted for a tablet computer that was chosen mainly because of its ability to use an external camera that can be placed near the patient.

Also, the possibility to use a SIM card was another requirement, as one of our goal is to use the tablet in the health facilities without WiFi or at a patient's home. The use of an LTE portable hotspot was considered, but was deemed more complex to manage and would have meant having one more device to manage, take around and recharge. The Dell Venue Pro 11 tablet was found to meet all our requirements. It is the tablet that was bought as the new technology for the service.

Since its launch, the new technology was used by many nurses and most of them are satisfied with the results. Among the posi-

tive comments that we received are the larger image, the flexibility of the tablet, the ergonomics of the software deployed. The old system only had one video stream from the patient to the expert nurse; now, the patient can simultaneously see the expert.

This was seen as a major upgrade for the virtual WCT clinics and it also offered a better setup for expert nurses when they do teaching sessions on wound care techniques with local nurses.

However, no system is perfect. One of the drawbacks of the new one is the image quality. The Logitech C615 camera deployed is capable of HD resolutions, but it lacks the optical zoom and the glass optics of the previous camera, which provided a superior image quality.

According to the nurses, the new camera still delivers images of sufficient quality to safely do WCT clinics. Also, the use of two video streams, as opposed to one in the previous system, takes more bandwidth which can be an issue in more remote sites, especially during peak hours.

Overall, most consider the transition to the new system a success as it provides a flexible solution that can be installed on different hardware platforms, and makes it possible to extend our reach toward patients that are located in places where there is no connectivity – such as patient rooms in nursing homes, and ultimately, at the patient's own house.

*Jonathan Lapointe is telehealth technology advisor at the CCT du CIUSSS de l'Estrie – CHUS.*

## Canada's primary care quality lags other nations

OTTAWA – A survey of primary care in 10 industrialized countries shows Canada at the low end of the pack when it comes to many measurements of quality.

In particular, the Commonwealth Fund's survey found only 53% of Canadian doctors reporting that patients who request a same-day or next-day appointment can get one. That puts Canada in ninth place in this category – with Switzerland at the top (85%) and Sweden at the bottom (42%).

Moreover, Canadian primary care doctors are considerably less likely than doctors in other countries to routinely review surveys on patient satisfaction and patient experiences (17% versus 47%) or to compare their performance with that of other primary care practices (17% versus 37%).

These and more insights come from How Canada Compares: Results From The Commonwealth Fund 2015 International Health Policy Survey of Primary Care Physicians. The study was released in January by the Canadian Institute for Health Information (CIHI) in partnership with the Canadian Institutes of Health Research, and with co-funding from Canada Health Infoway.

The Commonwealth Fund survey polled primary care doctors in 10 countries on topics such as access to care, coordination of patient care, organization of practice, use of information technology and performance measurement.

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# Radiology's importance to healthcare not generally recognized: CAR's Miller

**D**r. William Miller, president of the Canadian Association of Radiologists (CAR), has experienced diagnostic imaging as GP and as a radiologist. Trained as a family doctor on this side of the border, Dr. Miller practiced as a GP in the United States. That's where he transitioned from primary care to radiology. Now seasoned as a chief radiologist in Ottawa, he brings fresh views and initiatives to the likes of reading errors, quality control, outdated equipment, patient centric care, and the threat ultrasound brings to the whole profession of radiology. He recently spoke with Canadian Healthcare Technology's Andy Shaw.

**CHT:** Dr. Miller, what's in your background that lead you to the presidency of CAR?

**Dr. Miller:** Well, I was raised in Winnipeg, attended medical school there, and after went into family practice. But being a golfer, I admit I wanted to move to a warmer climate, and so ended up in a small Missouri town where the golf season is a lot longer. But I eventually felt burned out there as a GP and finally listened to my radiologist brother in Toronto, and made a career change to radiology. I got into a residency program at the University of Missouri where I had a neuroradiology teacher who was fabulous and motivating (Fabio Rodriguez). The result was I came to Toronto on a neuroradiology specialist fellowship and ended up in 1999 at the Ottawa General Civic Hospital. Eventually, I became the deputy interim chief and chair of radiology both for the hospital and the University of Ottawa.

**CHT:** So when did you get involved with CAR and end up running for the presidency?

**Dr. Miller:** It was about eight years ago that I first got involved through CAR's annual Scientific Meeting, which we will be running again from April 11 to 17, 2016 in Montreal. In the process, I got to know CAR's leadership and they approached me about joining the Board of Directors to eventually take on the presidency. So I've been president since May 2015.

**CHT:** That means you'll be CAR's head honcho until 2017. During that two-year stretch, what will be your priorities?

**Dr. Miller:** It's a bit of a long list, but our first priority is advocacy. We want to become stronger at advocating on behalf of our national membership, and also in support of our provincial organizations. They are separate organizations and have different responsibilities than we do at the national level. But collectively, we want to help all radiologists become more visible to the public, governments and the healthcare system as important members of the healthcare team.

Our second priority is appropriateness. We recognize that reducing the ordering of too many exams, especially inappropriate ones, is a very important issue. We believe we can help our physicians to order more appropriately. That would not only reduce waste but would also control population

radiation exposure, shorten wait-list times and, we hope, save money.

Encouragingly, a number of clinical decision-support systems have emerged around the world for reducing inappropriate exams. They do so by applying appropriate criteria as physicians put requests into the regular workflow, and get instant feedback as to whether the order is appropriate. If it is not, the system indicates another direction the physician might go. Also, physicians can tap into the system's built-in criteria and find out why they got the signal of inappropriateness. CAR's goal now is to provide a system like that for Canada. It will be bilingual and available coast to coast.

**CHT:** But what about quality control and reducing reading errors by radiologists?

**Dr. Miller:** That's an issue that really concerns all radiologists, so we guide radiology departments on how to develop their own peer-review process. This essentially generates random "double reading" of imaging files and reports to ensure quality and accuracy. So it is a very valuable learning tool. Personally, I work with a peer review system and have found that it has helped me improve.

Some provinces have mandated the use of peer review as a quality assurance and quality improvement tool, which is the other piece of this appropriateness work we're doing. Our quality control guidelines have been around for years, but I admit that they often sit languishing in reference books or as PDFs in computers because

**Dr. Miller was raised in Winnipeg, practiced as a GP in Missouri, then returned to Canada as a radiologist.**

they are not in the face of physicians when they are ordering. So one option for us is to partner with the American College of Radiologists, as the Europeans have already done, and work collaboratively with them.

**CHT:** What about getting your message out to all Canadian radiologists? How will you handle that?

**Dr. Miller:** Engaging our membership is crucial to the CAR's success and we have now made it a primary focus. We're at a 60 to 70 percent level of all Canadian radiologists belonging to CAR, but we intend to do much better than that.

One of the things we are planning right now is a residents and fellows section for radiologist trainees. So from day one of their careers they will be involved and come to understand the value of being CAR members.

**CHT:** One issue those new radiologists will face is outdated imaging equipment, as today's radiologists already do. Are you taking any steps to help clear these hurdles out of the way?

**Dr. Miller:** Historically, out-of-date equipment has been a big problem in Canada. However, you remember back in 2004 there was a federal health accord and with that



**Dr. William Miller says that CAR aims to make radiologists more visible to policy makers and to the public.**

came investment in new equipment on the order of a billion dollars. That was a tremendous boost to Canada's radiology infrastructure. But it has never been repeated, so here we are some 12 years down the road, faced with aging equipment that needs to be replaced again, or at the very least updated.

Two years ago, we created the CAR Life-cycle Guidance for Medical Imaging Equipment in Canada, providing life cycle standards to help facilities identify what reasonable life cycles are for a wide range of equipment. Those standards do not exist anywhere else, so we've created a tool that can not only help Canadian institutions but also others around the world understand when the time is right to replace or update aging equipment.

As well, we now have a new federal government which I think will take more interest in this issue. This makes me more optimistic about money being available for upkeep of our diagnostic imaging infrastructure.

**CHT:** No doubt, Dr. Miller, you are aware of the movement towards more patient-centric care. Traditionally radiologists in their reading rooms rarely, if ever, see or get involved with patients. Are you and CAR out to change that?

**Dr. Miller:** We believe that radiologists should be more visible. As one of our recent past presidents, Dr. Ted Lyons, has said, "It is critical for the radiologist to be seen as an integral member of the healthcare team."

We want patients to know who we are; we want them to know that we are accessible, that they can come to see us if they want to and talk to us about their imaging studies. So we are encouraging radiologists to get out and meet their patients whenever possible.

That's already happening in certain disciplines. For example, in pediatric radiology and ultrasound, radiologists often review the exam in person with the patient and parents. In interventional radiology and interventional neuroradiology, where the radiologists are performing procedures, they become part of the clinical team in direct contact with the patient.

But for the majority of pure imagers, as

I mostly am now, patient contact remains a challenge. However, we are aligned with our American and European counterparts and looking at how they are dealing with the same challenge.

**CHT:** Is one of your challenges also how hand-sized, highly portable ultrasound is becoming the new stethoscope for ER and OR physicians, who take courses in it? Doesn't that make radiologists less necessary?

**Dr. Miller:** We call it 'Point-of-Care Ultrasound' and it is being used in many ways to assist with procedures. For example, in ICUs it's helping surgeons to put in lines by showing the vessels inside that they're aiming for; it's used in the Emergency Room for rapid evaluation of trauma patients. So while this is definitely a threat to traditional radiology, at the same time we recognize that it adds value to the healthcare system.

So, our concern is not to stop this completely. Indeed we are promoting Point-of-Care Ultrasound, but saying that it must be conducted only in certain situations and used appropriately by properly trained healthcare professionals, with safety and quality improvement processes in place. Along those lines, CAR published guidelines for Point-of-Care Ultrasound a few years back.

**CHT:** Any final thoughts you might want to pass along about radiology's role in healthcare today?

**Dr. Miller:** I believe that radiology is at the heart of healthcare. I think that we bring tremendous value to the healthcare system. But that's not necessarily appreciated or understood by the ministries and other payers of healthcare. They see radiology simply as a cost but, we think that medical imaging often saves money in the long run; for example, an exam can help identify a diagnosis rather than having a patient undergo surgery, which is very expensive. And the ability to quickly establish a correct diagnosis helps in the efficient delivery of healthcare resources. Interventional radiology techniques offer faster, less invasive treatments for many problems, and can often be performed as out-patient procedures.

# Social media networks can help boost self-care and improve outcomes

BY DR. ZAYNA KHAYAT

When Dave deBronkart – a.k.a. e-Patient Dave – learned he had a rare and terminal cancer, he turned to a group of fellow patients online, and found the medical treatment that saved

his life. Now he's fighting for change in the system. Here's how he puts it: "While most people haven't had their 'aha!' moment yet, a lot of us are getting fed up and fighting for change. Some are even taking matters into their own hands, building new ecosystems."

The benefits of peer-mediated disease

management are clear, but a major barrier to widespread adoption of peer networks has been the lack of scalability. Until now. Through social media and digital networks, people are sourcing information from multiple sources – including their own peers facing similar health challenges.

This trend is in full swing: one in five Internet users have gone online to find people with related healthcare concerns, according to a recent Pew Research Centre study, and Facebook and Yelp groups are also mushrooming.

Facebook recently sponsored a dementia hackathon in Ontario where the winner – TakeMeHome – developed a mobile navigation application to enable those living with dementia to seamlessly communicate with their circle of informal caregivers.

There is also growth in the number of social tools and platforms for health self-management. Toronto's Self Care Catalysts allows patients to manage their treatment plans and share their stories. Patients can track their moods, setbacks, achievements and general conditions, while their friends and family are invited to participate by celebrating milestones and offering encouragement during difficult times.

Along the same vein, Toronto's ReThrive provides an app-based support system for stroke recovery, enabling patients to map their recovery time and connect with other survivors.

These tools and networks aren't just developing around patient recovery and management – some are moving further upstream to prevent the actual onset of illness. Toronto health startup League is designed to allow people to achieve and maintain a healthy lifestyle.

Users set a health goal, such as losing weight or sleeping better, and the app connects them with relevant practitioners and peer supports in their local community.

Most patients use social media to connect and share, but others like e-Patient Dave are using it to communicate directly with their own doctors because the "big iron medical system has no place to store all the information I'd like to share."

E-Patient Dave is vocal, but he's far from being the most e-activated patient. Take Toronto-based health activist Dana Lewis. Dana has Type 1 diabetes, and like thousands of other patients, has grown tired of waiting for the healthcare industry to improve her life.

She is active on Twitter, sharing hashtags such as #DIYPS (Do-it-Yourself Pancreas System project), which highlight how patients like herself hack into their own digital glucose monitors and insulin pumps to gather better information about their own condition.

While nearly every health organization is moving toward patient empowerment, putting this goal into practice has lagged in Canada. The reasons for slow progress are manifold. Key among them is that the users who ultimately fund our health system are largely living two lives: they're demanding access to 21st-century tools and yet continue to accept a 19th-century passive role as patients.

At the same time, clinicians and health delivery organizations are either unaware or explicitly discourage the use of any online tools, citing the lack of credibility of non-medical expertise obtained from "Dr. Google."

*Dr. Zayna Khayat is Senior Advisor, Health System Innovation at MaRS and Director, MaRS EXCITE.*



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# Physicians and patients find benefits to using social media in healthcare

Despite many legal and ethical issues, these platforms have begun to make a dramatic impact.

BY DR. SUNNY MALHOTRA

In our technology-driven society, many patients make their health choices based upon the direction they receive from peers, colleagues and role models via social media. As a result, social media has altered the way in which patients approach their health and their expectations in clinical care.

Physicians, too, have begun to use social media to their advantage as a professional networking tool, as a form of education for physicians, patients and students, and as a marketing tool. Despite many legal and ethical issues that pose a concern in the healthcare industry, social media platforms have begun to make a dramatic impact.

For instance, Figure1 is a popular platform that allows physicians to upload photos, while maintaining patient confidentiality, of rare diseases allowing other HCPs to view and discuss the case. Figure1 allows for both networking between physicians and serves as an educational tool for students and physicians.

In addition, using common social networking platforms like Twitter and Facebook, Healthcare providers (HCPs) are able to advertise their practices and start-up companies to patients, investors and other HCPs.

Social media also provides a useful tool for patients and physicians to make referrals and get second opinions about a diagnosis.

Students use social media platforms to engage with other students, professors and physicians in different schools and areas. Student Doctor Network has a popular discussion forum for medical students in Canada and the United States. Students post

queries and work with each other and physicians to gain a wider understanding of course material, admissions tests, residency, etc.

Healthcare Social Media Analytics can bring incredible value by segmenting, analyzing and curating online healthcare discussions to answer your unique questions and needs. Using social media to gain information is beneficial, as it allows students

**There are massive benefits to using social media as a networking and education tool, but precautions must be taken to uphold patient confidence.**

and HCPs to work alongside each other and gain a wider understanding in comparison to conventional methods.

Despite the massive benefits of using social media as a networking and educational tool, there are many precautions that must be taken to uphold patient confidence.

The healthcare industry is built upon a strong patient-doctor relationship that is focused on maintaining confidentiality, auton-

**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.**



omy and beneficence. Many companies and social platforms related to healthcare have already implemented privacy requirements to ensure patient confidentiality is maintained.

For instance, Figure1's software has an automatic face detector that will block faces. Furthermore, there is a team of moderators and medical officers who screen all photos for identifying features before they are posted to ensure patient privacy. All social media in healthcare must abide by Canada's privacy legislation.

In Ontario, the Personal Health Information Protection Act of 2002 protects patient details and holds physicians accountable for any indiscretions. The legislation is important for upholding doctor-patient confidentiality while allowing social media to be used in healthcare.

Social media is a relatively new advancement in healthcare that has proven to be an effective tool in connecting HCPs, students and patients to each other.

As a result, start-up companies have begun to use social media to their advantage by leveraging popular platforms or, in some cases, they have made new platforms. Despite ethical and legal issues when using social media in the healthcare industry, strict guidelines have been implemented to ensure patient privacy. With technology constantly advancing, social media is guaranteed to continue revolutionizing how patients and the medical professions approach healthcare.

## REBOOTING eHEALTH

### Some implications of a deeper appreciation of workflow

BY DOMINIC COVVEY

The last time around, we recognized that healthcare workflow is dynamic, meaning that it must constantly adapt to the real world situation. Within workflow there are two types of processes: those that change very little and those that must constantly be situationally responsive.

We called the relatively static workflow components "Prescribed" or "Micro-Workflows". We labelled the other components "Situation-Dependent Workflows".

The Situation-Dependent Workflows are typically responsive to many tens of factors characteristic of the operational environment (such as patient condition, resource availability, time of day and so forth). The static workflows are relatively easily described by classic tools such as flowcharts or process maps. The Situation-Dependent Workflows

defy or resist pre-definition or result in definitions with so many variations that they are unmanageable.

We also noted that the improvement of workflow is the primary reason we seek information (or online transaction processing) systems support for healthcare processes. Consequently, we must define desired workflows and select systems based on their ability to support human-machine interaction in the carrying out of tasks.

Finally, we noted that current systems are architecturally impaired when it comes to supporting Situation-Dependent Workflows, being more suited to assisting in static tasks.

What are some of the major practical conclusions we can draw from this recognition of the true nature of workflow?

**Workflow documentation:** Proper preparation for system procurement demands the documentation of the desired workflow, hopefully one op-

timally suited to our objectives. Given the fact that Situation-Dependent Workflows are the dominant workflows particularly related to care processes, we have a substantial challenge.



Dominic Covvey

What is needed is a system architecture that supports workflow adaptation based on a variety of situations. Another way of saying this is that the system can be responsive to that context and can adapt continuously to that context. Right now, this a bridge too far.

There are many examples of contexts, some of which have already been mentioned. The patient state is a context, as is the resource situation (available people, working

equipment, allocated budget are examples).

We can think of the workflow being immersed in these contexts and dependent on them, i.e., the context informs the workflow. Defining the context that the workflow interacts with is a crucial part of defining the total workflow process. This requires that we define the contextual elements that condition each task.

**Workflow dimensions:** In the past, we typically spent most of our time drawing flowcharts and/or process maps. However, it has become clear that, although this is still essential, the documentation of context must be incorporated into the documentation. In our research on workflow, we grouped various contextual elements into what we called 'dimensions' and considered each task of the workflow as being immersed in these multiple dimensions.

Unfortunately, our process docu-

CONTINUED ON PAGE 19

# Computer-based musculoskeletal triage can reduce pressure on ERs

BY DR. CHARLES YOUNG

We all know that health systems around the world are increasingly overloaded by the numbers of patients and carers who access them – or try to. In Ontario, for example, more than 90 percent of people have a primary care provider who they can see regularly. However, less than 50 percent of those Ontarians are able to see their primary care provider when they need to most – the same day, or even the next day, when they are sick.

Another example of the growing pressure on primary care comes from the United Kingdom. Towards the end of last year representatives of 7,000



Dr. Charles Young

general practitioners made a submission to the Government which stated that "...saturation point has been hit even by the most competently working practices in London..."

Also in England this winter the public were told to buy their own supplies of pain killers and cough medicines, and to avoid going to Accident & Emergency (A&E) departments, if possible. The fear was that emergency departments simply would not be able to cope with the numbers of patients seeking help.

The president of the UK's Royal College of Emergency Medicine advised patients to use the NHS's 111 telephone triage service as an alternative.

At present, a spectrum of clinical decision support (CDS), tools are available to clinicians and also, although much less commonly, to patients and carers. This CDS spectrum ranges from surprisingly unsophisticated, and often unhelpful, 'digital text books' through to much more useful purpose built tools such as BMJ Best Practice or Dynamed.

Within this spectrum, tools which assist with clinical triage (the process of deciding which patients should be treated first based on their injuries or illnesses), are key to helping reduce the growing demand on overloaded primary care and emergency services.

Triage tools achieve this outcome by appropriately redirecting patients who would otherwise have accessed an emergency care service, or urgently consulted their general practitioner, to a less acute service or even to self-care. This type of triage is often achieved by the patient or their carer calling a telephone triage service, like the NHS's 111 service or Australia's Healthdirect service, where a clinical telephonist supported by a digital triage tool will help direct the patient to an appropriate level of care.

Newer, more sophisticated triage solutions go one step further by providing patients or carers with direct triage advice using online tools, reducing the demand and costs of telephone triage services.

Recent research has shown that the most common reason for patients attending A&E departments unnecessarily was due to musculoskeletal problems. Last

year, Professor Karen Middleton, CEO of the UK's Chartered Society of Physiotherapists also identified that, "Up to 30 percent of patients seeking a GP consultation each year do so with a musculoskeletal complaint, such as back or neck pain. This equates to more than 100 million ap-

pointments that could be freed up in England alone if patients were given the choice of a physiotherapist as their first point of contact."

In this context, we know that physiotherapists are good at musculoskeletal triage. A systematic review published last

year found that out of 146 studies identified by the review 14 were eligible for inclusion and that, "all studies reported favourable outcomes for ESPs (Extended Scope Physiotherapists) in MSK triage clinics, with ESPs demonstrating a good

CONTINUED ON PAGE 19



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# Surgeons and radiologists combine forces to improve outcomes in 'hybrid' ORs

Hybrid rooms give surgeons more flexibility in changing from closed to open procedures.

BY DIANNE DANIEL

Not that long ago, there was a physical divide between the operating room (OR) and the radiology suite. The more surgeons rely on sophisticated imaging data to perform minimally invasive and complex surgeries, the more those walls are coming down, giving rise to the hybrid OR.

A hybrid OR is a sterile environment that combines the diagnostic functions of a catheterization lab and radiology suite with the traditional surgical functions of an operating room, along with real-time, intraoperative image guidance to support minimally invasive procedures. It's a place where you find multiple modalities and multiple disciplines collaborating in one super room, where surgical and diagnostic imaging (DI) teams work side-by-side instead of across the hall.

Though no two hybrid ORs are designed and equipped in the same manner for the same purpose, they all provide safer, more accurate treatment, and in some cases even allow diagnosis and treatment to occur in one place. Which is why they are on the rise, including here in Canada.

Occams Business Research, a global provider of consulting and information services, expects the global market for hybrid ORs to grow at a compound annual growth rate of 16.66 percent from 2015 to 2021. Increasing demand for minimally invasive surgeries is driving growth, as the healthcare industry gradually transforms from conventional operating methods to more intraoperative approaches.

One example is the interventional trauma operating room (ITOR) in the McCaig Tower at Calgary's Foothills Medical Centre, the first of its kind in North America. Launched in 2013, the \$6-million hybrid trauma suite is eliminating the need to make life-or-death decisions about whether to take patients for imaging prior to surgery. Instead, surgical and diagnostic teams work together simultaneously, meaning radiologists can scan for internal bleeding while surgeons operate.

"It's basically a room on call for trauma cases," said Greg Thompson, Territory Manager for Winnipeg-based Meditek (meditek.ca), the company involved in the design and planning of the Foothills hybrid OR. "Depending on the trauma, you can pull in whatever surgical teams you need," he said.

In the fall of 2014, Foothills opened a second Meditek-designed hybrid OR to focus solely on the heart. Called the interventional cardiac operating room (ICOR), it supports both traditional and endovascular methods and is one of only a few clinics worldwide to lead clinical trials of the world's smallest pacemaker. Measuring three centimetres long and no wider than a pencil, the pacemaker is inserted into the groin area and guided up into the lower right chamber of the heart using an X-ray. The fully integrated room includes wall cameras, surgical lights, flat-screen arms, booms and other hardware, in addition to advanced imaging equipment.

As Thompson explained, the biggest challenge in implementing a hybrid OR is the design. "Every room is different. There is no template," he said, not-

ing that decisions are primarily driven by physician personality and what each hospital is trying to achieve. The Meditek design team solicits input from multiple stakeholders, including DI teams, OR staff, management and surgical teams.

"Typically what happens is the room ends up being a beautiful compromise," said Thompson. "None of those players gets exactly what they want because it's just not possible."

At the core of most hybrid OR designs is the fixed C-arm, which can be floor- or ceiling-mounted. Selection and placement of all other equipment, from endoscopes, ultrasounds and monitors to surgical lights, booms and cameras, hinges on the DI vendor chosen.

Meditek provides a vendor-neutral strategy, supported by its relationship with Skytron LLC, an

At one time, the only option for treating a thoracic aortic aneurysm was open surgery, which resulted in a long incision in the patient, from chest to belly. In some cases, the procedure would last all day and it was therefore not recommended for elderly or frail patients.

The rise of the hybrid OR is changing that, he said. These days, the procedure is performed in one of the cardiac centre's two hybrid rooms and is becoming so simple, it's nearing the point of transitioning to day surgery.

"With the advances that have been made with medical device companies, we're able to do an operation like that through a small cut at the top of the leg," explained Dr. Forbes. "There were a lot of

patients prior to this alternative who were not treated because the only treatment was too large an operation for them and they would succumb to that aneurysm."

Dr. Forbes is currently part of a committee looking at creating a standard framework for vascular services in Ontario through the Cardiac Care Network of Ontario. The network helps to plan, coordinate, implement and evaluate cardiovascular care in the province and is looking to make a strong recommendation that any hospital performing advanced aortic repairs do it in a hybrid OR, he said.

"Sometimes we hear more about the firsts, or the weird and the wonderful and the very complex," said Dr. Forbes. "That's great. That's what we talk about. But the everyday more common procedures impact a greater number of people and if those can be made safe as well, that's a bigger impact."

Both Foothills Medical Centre and the Peter Munk Cardiac Centre are taking the approach of adding DI services to traditional operating room environments when creating hybrid ORs. Toronto's new Humber River Hospital took the opposite approach, becoming the first facility in North America to establish three hybrid ORs in interventional radiology suites. This means surgeons are now treating vascular cases in the same rooms traditionally used by interventional radiologists.

"The difference is it's not taking up OR time," said Dina Longo, Director of Medical Imaging at Humber River Hospital. "This is the way the future is going because imaging is hand-in-hand with the surgeon's workflow."

If a surgeon at Humber River Hospital is inserting a stent to treat an abdominal aortic aneurysm, and he or she realizes the procedure is not working, they don't close up and book an OR. They open the patient and perform surgery right there in the hybrid room. As Longo explains, the rooms are sterile, surgery-ready environments, with all of the features of a conventional OR housed in an interventional radiology suite.

Each of Humber River Hospital's hybrid suites is



OEM and distributor of medical equipment. Foothill's two hybrid ORs incorporate equipment from Philips, whereas a more recent Meditek implementation at the Peter Loughheed Centre in Calgary uses equipment from Siemens.

"The biggest challenge is getting the design right the first time," said Thompson. "Without a doubt it's a developing process and a learning process."

At the Peter Munk Cardiac Centre in Toronto, two hybrid ORs are changing the way surgeons approach complex vascular procedures. One incorporates a CT scanner and fluoroscopy machine from Toshiba; the other uses DI equipment from Siemens. Both are enabling surgeons to perform complex therapies that were previously not possible, said Dr. Thomas Forbes, Chair in the Division of Vascular Surgery at the University of Toronto and a practicing vascular surgeon at the Peter Munk Cardiac Centre.

"The rooms allow more accurate and precise placement of stents, stent graphs and valves," said Dr. Forbes. "It's a new environment that takes into account the strengths of both the operating environment and imaging."

the size of a typical OR, providing the space required to house state-of-the-art robotic imaging equipment from GE Healthcare. The hospital had the luxury of a new build and therefore designed the rooms to specification.

Prior to moving to the new Humber River Hospital facility in October 2015, vascular surgeons were accustomed to using portable c-arms. Longo said they were amazed when they saw the difference in image quality for the first time.

"They're in their glory in this space," she said. "... They're diagnosing, assessing and doing procedures all at the same time."

The next step is to transition the pacemaker program to the new hybrid suites as well. As Longo explains, the implants are currently performed in the regular OR where they may be bumped if emergency cases arise.

"Our pacemaker program is in the operating room right now, but there's no reason it needs to be there. It's probably a better flow within interventional radiology," she said. "Let's say you don't have a vascular case and I have another interventional radiology case that needs to go in because we're full. We can push and pull because the procedures are done in the same environment."

Regardless of the approach, all agree that hybrid ORs require a great deal of upfront planning in order to be successful. Not only are they expensive to design and build, they are also difficult to tweak after the fact.

In addition to clearly identifying the clinical intent, and performing a thorough utilization analysis, planners need to carefully map out who will be in the room and what equipment they will be using. Proactive planning helps to remove potential collision points and will ensure workflows are optimized.

Calgary's Foothills Medical Centre took an innovative approach to working out its logistical and workflow issues prior to implementing its interventional trauma OR. Enlisting the help of construction services company EllisDon, it built a mock room using wooden components to model the equipment as close to specification as possible. Hospital staff were able to walk through the room, obtaining a general idea about how it was going to function before it even got off the ground, explained Meditek's Thompson.

"I'd highly recommend that if anybody is trying to design and develop a room that they go through that process," he said. "You can map out your spacing and fully understand what you can accommodate in that room."

As more cases are being performed in hybrid ORs across Canada, attention is also being paid to radiation safety. Rooms are outfitted with clear radiation shields to limit exposure to patients and care providers, and surgeons routinely wear lead-lined caps, gloves and aprons, as well as thyroid collars. They also learn to adapt their workflow.

"It's not one thing; it's being constantly cognizant of the exposure in the room," said Dr. Forbes, noting that surgeons are trained to step away from the equipment during certain runs when they know the scatter of radiation will reach a certain distance.

"Without a shadow of a doubt, radiation exposure is a major factor in the whole design of a hybrid room. It has to be," added Thompson, noting that dose awareness has heightened in the last few years. "Part of our design/development process is to look at where we're going to be able to hang radiation shields so that we can protect the staff within the room."

Both Forbes and Thompson expect to

see 3D imaging impact workflow in the hybrid OR moving forward. The Peter Munk Cardiac Centre, for example, is collaborating with partners to develop 3D holograms that use patient-specific imaging to simulate a human heart. The idea is that surgeons can practice on the holograms, learning intricacies and difficulties they may not have foreseen.

"It's a very exciting field," said Dr.

Forbes. "Initially, imaging replaced the visibility of our eyes. Now it's providing better vision than our eyes could ever provide."

Moving forward, funding will remain the biggest challenge. But Thompson expects pricing to come down eventually. "In 10 years' time these rooms will be more of a norm as opposed to a speciality item," he said.



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# Technologies are re-engineering the healthcare system, neurosurgeon says

BY JERRY ZEIDENBERG

A \$250,000 telehealth pilot project in rural Saskatchewan has saved the provincial government \$310,000 in its first six months of operation. The success of the program will likely spawn the growth of similar projects across Saskatchewan.

“We are going to populate the province with remote presence devices,” said Dr. Ivar Mendez, head of the department of surgery at the University of Saskatchewan and the Saskatoon Health Region. He is also spearheading many of the telehealth projects in the province.

At a conference in Toronto on Design for Technology Innovation, Dr. Mendez spoke about how telehealth and other technologies are re-shaping the healthcare system, reducing costs while simultaneously delivering better care to remote patients. The conference was organized by the Canadian Centre for Healthcare Facilities, and was held at the new Humber River Hospital, dubbed the first digital hospital in North America.

In Pelican Narrows, a rural area of Saskatchewan, the local health centre is benefitting from the acquisition of a remote presence device called Rosie the Robot. Looking much like a sci-fi robot from a 1950s film, Rosie is on wheels and can be driven by the remote clinician.

She has been outfitted with a camera, stethoscope, ultrasound, dermatoscope (to see a magnified view of the skin), ophthalmoscope (to look into the eye) and otoscope (to look into the ear).

Her head contains a computer monitor that displays the face of a remote physi-

cian, who controls the robot from afar and interacts with the local patient and team. Specialists at Royal University Hospital, in Saskatoon, have been controlling Rosie to examine patients in Pelican Narrows.

Dr. Mendez noted that when the project was just getting off the ground, the team asked what kind of medical help Pelican Narrows needed most. The answer was paediatrics. People there were faced with sick children; not knowing what to do for them, they were often evacuated to bigger centres at a cost of \$10,000 per trip.

Sadly, in some cases, during the two hour wait for an aircraft, a child would die.

However, by interacting with specialists in Saskatoon, “We have been able to avoid 74 percent of the transports in just six months,” said Dr. Mendez. “There have been incredible cost efficiencies, and timely interventions.”

The remote presence robots, officially called RP-7 and produced by InTouch Health of Santa Barbara, Calif., are also used in Saskatchewan’s urban hospitals. There, they are deployed by physicians, when out of hospital, to check on patients.

An amusing slide showed three of the robots seemingly in conversation; Dr. Mendez explained that it was 6 am, and three surgeons, while still at home, were using the robots to discuss their cases.

Dr. Mendez explains that by using the robots, “I can do rounds from my hotel room,” when out of town. “I can see my patients, their wounds, and talk to the families.”

The robots can be “driven” by remote control, and they can even open elevators.

Dr. Mendez also discussed the rise of implantables in his own area of medicine, brain surgery. Electronic devices are being used to stimulate regions of the brain, of-



Robots bring distant medical experts to the bedside.

ten as small as a pea, to treat and even cure many diseases, including Parkinson’s.

As a centre of excellence, patients come to Saskatoon from all over the province, and from across the country, to have deep-brain devices implanted. Of course, follow ups and adjustments are needed, but it’s difficult for patients to travel for these appointments.

Instead, Dr. Mendez and his team are using something called “Doctor-in-a-Box”, a lunch-box sized device that serves as a portable videoconferencing terminal. The unit can be taken into a patient’s home by a nurse, where a conference can be set up involving the patient, doctor and nurse.

Dr. Mendez demonstrated using a video showing him adjusting the implantable device of a Parkinson’s patient in Ottawa, via the Doctor-in-a-Box, while he was in

Saskatoon. Before the adjustment, the patient’s hands were trembling, in typical Parkinson’s fashion. However, Dr. Mendez could instruct the nurse how to wirelessly reset the implantable; immediately, the patient’s tremours stopped.

This was all done in a matter of minutes, while doctor and patient were thousands of kilometres away.

Dr. Mendez explained that telemedicine of this sort can be used to re-engineer the healthcare system, which suffers from overloaded hospitals and clinics, and patients that need care closer to home. “This is why I came to Saskatchewan,” he said, explaining that he wanted to help create new systems that can better serve remote patients. Previously, he worked for many years as a top surgeon in Halifax.

In addition to the growth in implantables, Dr. Mendez also highlighted stem cell therapy as a fast-expanding technology. He observed that rapid progress is being made in brain repair through stem cell injections, which require special techniques.

He displayed a video of a man with Parkinson’s who was afflicted by tremours and couldn’t hold a cup or walk. “We transplanted 4 million cells to each side of the brain,” said Dr. Mendez. Soon after, the man’s tremours stopped, and he could walk normally, with a regular gait.

However, the hospitals of the future will need to be modified to deliver these kinds of therapies. “We will need facilities for bioreactors,” he noted, which are small silos capable of generating millions of healthy cells from stem cells. The will need to be located close to operating rooms, meaning in the future, hospitals will have radically different designs when it comes to their surgical centres.

## Cloud-based peer review solves problems for smaller hospitals

BY DIANNE DANIEL

As Canadian provinces continue to evolve their large-scale radiology peer review programs, now considered an important tool in the overall quality management toolkit, Toronto-based Real Time Medical is launching a Software-as-a-Service (SaaS) offering it believes will usher in a whole new era in peer review.

The DiaShare CloudQA subscription service goes live in Canada during the second quarter of 2016. For a monthly subscription fee based on volume, users gain access to the company’s DiaShare peer review platform, giving them the ability to apply concepts of context-aware workflow management to solve their peer review challenges in the cloud.

“We estimate a cloud-based quality assurance approach is four to five times less expensive than traditional deployments,” said Real Time Medical CEO and Co-Founder Ian Maynard. “Not only does it reduce the capital required, but it also reduces selection risk. If you don’t like it, you simply end your subscription.”

By using a SaaS model, Real Time

Medical is removing the need for healthcare facilities to invest in individual peer review systems and support, thereby reducing the capital expenditure required to move forward with implementations. It also dramatically speeds up time to deployment, a key challenge facing provinces as they work to implement large-scale peer review networks.

Whereas some provincial radiology peer review projects are currently at five years’ deployment time and counting, Maynard estimates the CloudQA approach could enable a province-wide deployment in a province the size of Ontario within 18 to 24 months.

“What we realized is that if you have a cloud-based offering that’s repeatable for all hospitals, and that’s subscription-based ... you can get peer review mandates addressed in record time,” he said.

Additionally, as many as 50 percent of radiology exams reported in Ontario are performed at independent health facilities (IHF). Not only do these smaller facilities lack the funds required to implement historical approaches to peer review, they don’t have sufficient staffing to provide anonymity and statistical objectivity, es-

pecially in radiology sub-specialties.

With CloudQA, a province-wide network of peers can be established through which anonymized peer review can be performed. In instances where a sufficient number of peers in a given sub-specialty are not available, Real Time Medical is also providing a second option to its SaaS, called CloudQA + Assisted Peer Review.

In addition to all of the DiaShare functionality, users also receive access to

**The cloud-based solution dramatically reduces the capital expenditures required to implement peer-review.**

no diagnostic peer review services provided by more than 60 radiologists who make up Real Time Radiology, the company’s radiology collaboration service.

“The advantage is the ability to provide independent healthcare facilities with an affordable means of responding to peer review mandates,” said Maynard. “Traditional peer review systems have a threshold cost. Even those that

claim to provide the software for free have to charge in other ways, such as for professional services to set up and support the solution.”

CloudQA provides secure, encrypted and authenticated web access. Cases randomly selected for sampling are temporarily stored in a highly secure, private cloud, hosted in a Toronto data centre. Information is only stored there for as long as it takes for review and feedback to be provided to the original reporting radiologist.

The SaaS version provides all of the features of DiaShare Quality, including prospective (pre-report distribution) and retrospective peer review. It also supports “multi-ology” capabilities, applying principles of peer review across the full scope of diagnostic imaging disciplines.

“That means provinces like Ontario can meet their peer review mandate, not only for radiology, but also for pathology, cardiology, dermatology, and others,” said Maynard. “The system’s peer review capabilities, with its multi-ology applicability, creates an opportunity for organizations to tailor peer review for different disciplines.”



# PeriopSim selected for surgical simulation education and training study

SURREY, B.C. – Conquer Mobile, a company specializing in medical simulation training, announced that its iPad-based training system, PeriopSim, has been selected as the simulation tool for the '100 Nurses' research study taking place in Halifax, N.S.

The aim of the research study is to measure the effectiveness of simulation training to increase perioperative nurses' ability and confidence in identifying surgical instruments.

It will also identify the aspects of simulation that nurses find most useful for learning, and will assess the time saved in simulated surgery when nurses are able to anticipate the correct instrument for the surgeon.

There is increasing pressure for perioperative nurses to be competent in a wide variety of surgical specialties. Currently, nurses learn surgical skills in on-the-job training, scrubbing in for surgeries under the guidance of an experienced perioperative nurse.

Clinical training is limited and yet the demands placed on nurses and the complexity of surgeries are escalating. Simulation addresses the problem of limited clinical placements by providing a safe way to practice clinical skills in a wide variety of clinical situations.

Although simulation is being increasingly adopted for both undergraduate and post-graduate nursing education, there is limited research to show how simulation should be used in nursing education and exactly how it may enhance performance, clinical understanding or critical thinking.

The study is being led by Dr. David Clarke, Head of Neurosurgery at Dalhousie University and the Nova Scotia Health Authority. It will be based at the Neurosurgical Simulation Training Laboratory of the QEII Health Sciences Centre; testing will involve operating room nurses at the Halifax Infirmary and the Victoria General Hospital in Halifax. The study has been funded by a grant from the Brain Repair Centre at Dalhousie University.

The research is part of a national drive to develop expertise in surgical simulation and builds upon previous work in 2009, when the world's first Virtual Reality brain surgery was performed in Halifax by Dr. David Clarke and Dr. Ryan D'Arcy using Neurotouch, a neurosurgery simulator developed by the National Research Council of Canada.

"Perioperative nurses are critical members of the surgical team in ensuring that instruments are ready and available efficiently at every stage of a surgical procedure," said Dr. Clarke. "Simulation training offers the opportunity to provide surgical nurse training cost-effectively and efficiently outside of the operating room. This focused study will measure the effectiveness of simulation instrument training as an educational tool."

"We are excited to be part of this landmark study," commented Angela Robert, CEO of Conquer Mobile. "Surgical nurses have to learn a daunting array of instruments and complex procedures across many specialties" she said. "If staff can learn and prepare safely outside of the OR, the surgical team becomes more efficient and can deliver the best patient results."

PeriopSim has been developed in close collaboration with medical experts, including surgeons, nurses and nurse educators to ensure accuracy and realistic learning outcomes. The product has recently been tested in academic research with neurosurgical residents learning how to perform

Burr Hole brain surgery at the annual Canadian Neurosurgery Rookie Camp.

For its part, Conquer Mobile is a specialist in mobile solutions with a focus on medical simulation training. PeriopSim is a simulation training tool for the iPad that helps clinicians to prepare for procedures

safely, outside of clinical time. PeriopSim is available as a free preview version on the App Store. It is designed to be purchased by educators as an institutional purchase. For more product details, visit the PeriopSim web site. The free preview version can be downloaded from the App Store.

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# Operation Smile is clearing paths to safe surgeries around the world

BY DIANNE CRAIG

Connection to care is so central to the vision of Operation Smile that it has just launched a global strategy to improve access to safe, effective surgical care around the world. The organization is investing more than \$250 million over the next five years to ramp up transfer of medical expertise to improve surgical capacity in 40 countries, eradicate the backlog of hard-to-access cleft patients and provide life-changing surgeries to countless children and young adults.

“It’s really about so much more than surgeries,” says Dr. Ruben Ayala, Senior Vice President of Medical Affairs, Operation Smile, United States, explaining that it includes access to the right information, to anesthetic, to the right equipment, to the right supplies, to the right infrastructure – to all aspects of care.

In just 45 minutes, Operation Smile’s doctors can transform the life of a child with cleft lip or palate surgery, provided free of charge.

“While there are many great humanitarian causes, most of which focus on healthcare and poverty, few can give this type of life changing impact for so little. For an average of \$240 and 45 minutes, a life is changed forever,” says Al Hildebrandt, former CEO of QHR Technologies, of Kelowna, B.C., and now an ambassador of Operation Smile who assists with its exposure to corporate, medical and technology leaders.

Last year, Operation Smile conducted 161 medical missions across 112 sites in 29

countries, including new sites in Morocco, Myanmar, Nicaragua and Ghana. In early 2016, Operation Smile medical volunteers will perform 3,000 surgeries during 39 medical missions in 19 countries. This year they will also conduct several multi-site programs, and will add new care centres in Ecuador, Nicaragua, and Paraguay, in addition to the 25 now in operation.

With more than 33 years of experience delivering surgical care in resource-limited environments around the world, Operation Smile is an expert in scaling up access to surgery in low- and middle-income countries. It is uniquely positioned to lead the effort to overcome geographic, economic and social barriers to access to safe surgeries and care.

To achieve this, they will work very closely with governments, hospitals and ministries of health in low- and middle-income countries to educate and train local medical personnel, while forming partnerships that build capacity, improve surgical standards and transform healthcare systems.

A big focus is on deploying new strategies to help people overcome the geographic, economic and social barriers to care, to research the causes of cleft conditions, and donate essential supplies and medical equipment to surgical sites around the world.

When they began working with the Ministry of Health in Vietnam, they asked, “What do you wish for your people?” recalls Dr. Ayala. “Equity. I don’t want the people of the villages to be left behind,” was the reply.

Access to care is a strong focus of Operation Smile because many of those afflicted are in remote areas. “It is difficult to reach



Dr. Ruben Ayala helps ensure that developing nations have the right infrastructure to perform operations.

them sometimes, difficult for them to find transportation to the mission site and also challenging in terms of follow-up,” says Dr. Ron Zuker, Professor of Surgery, University of Toronto, and Staff Surgeon, Division, Plastic and Reconstructive Surgery, at the Hospital for Sick Children.

Dr. Zuker, who recalls Operation Smile’s Journey of Hope in 1999, when a large plane flew around the world, stopping in different countries, notes the organization is not just interested in ensuring surgeries are conducted correctly. It is also assessing the outcomes and understanding how they have helped the patients’ lives.

“It’s a multi-disciplinary problem,” says Dr. Zuker – adding that a major problem the children have is with speech. Teeth are also often rotten, they can have difficulties hearing, and the effect it has on their appearance can be devastating to them. That’s why the missions need to include speech pathologists, and other medical and non-medical professionals.

Cleft issues appear to be more common in developing countries – particularly some Asian countries, he notes. Approximately one third of children treated have a cleft lip, one third have a cleft palate, and the other third have both a cleft lip and palate.

All conditions are treatable, adds Dr. Zuker, who has performed surgeries for Operation Smile in Kenya, the Philippines, Colombia, China and India. While the majority of patients are young children, there are exceptions, including a 40-year-old man in Kenya who wanted the surgery so he could get married, he recalls.

At the site of a mission in Hanoi, the mothers bring their toddlers and children to a waiting room. As they wait to be called, the children are often playful, despite the facial-disfiguring cleft lip or cleft palates from which they suffer. In a short time, after the requisite blood tests and other medical vital signs checks to ensure they are qualified for surgery, their cleft issues will be resolved, freeing them from a lifetime of challenging physical and socialization issues.

“Later, the nurse walks about 100 feet to the post-op room, where there are 10 beds, and hands the child over to Mom. It’s a touching moment to observe,” says Hildebrandt, who, in January, with his wife Irene, was able to witness firsthand how

Operation Smile provides this surgical care to affected children. “Just to see how happy the parents are ... they are immediately thankful, so appreciative of what the doctors have done for their children.”

While Operation Smile sends surgeons, nurses, speech pathologists, and other medical and non-medical professionals to correct cleft issues around the world, in this case, in Vietnam, this is a ‘local mission,’ where the surgeries are performed by Vietnamese doctors.

“You want to set the stage so there is some kind of local ownership. Doctors want to help,” says Dr. Ayala. Some Vietnamese doctors involved with Operation Smile now also volunteer to go on missions to other countries, and help train other doctors.

In Vietnam, as with a large percentage of Operation Smile’s international mis-

**For an average of \$240 and 45 minutes, a life is changed forever by repairing a cleft lip or palate.**

sions, the primary focus is on treating backlog cases. Vietnam has 1,000 to 2,000 babies born each year with cleft lips. While each year about 1,500 cases are treated, the country knows there are 10,000 children who get left behind, explains Hildebrandt, adding that it’s virtually impossible to keep up with the backlog.

“It’s simple for us to bring in doctors ... and do training,” says Dr. Ayala. Ten of the upcoming missions will focus on providing training to local medical personnel to improve surgical capacity and overall healthcare services in those countries.

Asked where they’ve found more challenges, Dr. Ayala said that in some cases, they find there just isn’t the level of, or sufficient quantities of equipment needed: “A lot of planning goes into it to make it safe. We sometimes have to bring in or purchase the equipment to do the surgery, including needle drivers, different types of suture material, forceps, scissors, gloves, gowns, gauze, as well as post-operative monitoring equipment, anaesthetic agents and antibiotics, and equipment such as tubing is brought in to ensure safer surgery.”



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# New centre for diagnostic imaging education and training opens in Toronto

CONTINUED FROM PAGE 4

maintaining the quality of the images. At the same time, ionizing radiation will also be reduced for staff and clinicians who remain in the room while procedures are conducted.

Second, a partnership with Boston Scientific is beginning this year, in which Boston Scientific will embed engineers in the operating rooms of the University Health Network. The engineers will closely monitor procedures to learn how to develop the surgical devices of the future, working in close collaboration with Medical Imaging Physicians, Cardiologists, Cardiac and Vascular Surgeons in the Peter Munk Cardiac Centre. At the same time, the UHN will learn lean methodologies from the Boston Scientific professionals.

Dr. Peter Pisters, President and CEO of the UHN, spoke at the launch event and noted that JDMI-CIPEII will be able to draw on the expertise of eight different educational groups within the hospital to provide trainees with leading-edge services. They include the already busy AIEC and the University of Toronto's Centre for Interprofessional Education, also located at UHN.

What's more, he mentioned the integration of the nearby Michener Institute into the University Health Network – something that was finalized soon after and took effect January 1st. "It's a significant development," said Dr. Pisters, "to integrate a diploma-granting institution with an academic healthcare institution."

He said the amalgamation will pave the way for the healthcare professional educa-

tion of the future. "The old way is to spit students out of educational factories," said Dr. Pisters. "The new way is to put them into teams to see how medicine is actually deployed."

Under this model, Michener students, who are training to become technologists,

**UHN president says the organization is breaking down the 'caste system' that has plagued the world of medicine.**

will work closely with the UHN's clinicians as part of their education.

Dr. Pisters spoke of the organization's active efforts to break down the traditional "caste system" that plagues the medical

world, where specialists, GPs, nurses, technologists and other professionals work in a rigid hierarchy. In many cases, members of this ladder have trouble communicating and collaborating with each other, which can have dire repercussions for patient care.

"We have the opportunity to close these gaps," said Dr. Pisters.

Mandy Lowe, Director of Education at the UHN and acting director of the University of Toronto's Centre for Interprofessional Education, compared high-functioning groups of clinicians to league-leading hockey teams. They need to train and learn to work well together to achieve excellent outcomes. "If care-givers don't collaborate," she said, "the implications can be very serious for patients."

Catherine Wang, Executive Director of the JDMI, emphasized the positive and caring culture of the UHN and the JDMI – critical factors when it comes to the quality of a patient's experience. She spoke about a personal incident, when she recently suffered a fall and was treated as a patient at the UHN.

She was stressed and in pain, and spent time in a CT scanner, "only vaguely remembering the whole experience." The CT scan only took a couple of minutes. It is easy to overlook how important those two minutes are in acquiring a high-quality image to diagnose the extent of my injury.

"It's important for our techs to provide leadership," said Wang, who noted they are practicing both "technology and art." They are applying sophisticated protocols which give the radiologists the most information possible, with the least radiation exposure to the patient, while avoiding adverse events, she said.

Dr. Lawrence White, Radiologist-in-Chief at the JDMI, emphasized the importance of high-quality care, innovation and research at the JDMI. "It's in the blood of the institution," he said. And it's done in a spirit of inclusiveness, he observed, so that physicians, technologists, administrators and nurses are all part of the equation.

That's having a positive effect at the downtown Toronto hospitals, and at others, too. Said Dr. White: "It's amazing to see the impact they have when they leave the JDMI and go on to work at other hospitals."

## Musculoskeletal triage can reduce pressure on ERs

CONTINUED FROM PAGE 13

level of diagnostic ability in comparison with a gold standard such as surgery."

In another UK example, this time from north Wales, two physiotherapists working in four general practices saw 1,525 patients who would normally have seen the GP. The physiotherapists found that only 23 (1.5 percent) of these patients actually needed to see a GP.

There are research data to support musculoskeletal telephone triage. In 2012, a large, pragmatic randomized controlled research trial investigating a Physiodirect service (direct telephone assessment by a physiotherapist), in over 2,000 primary care patients found that "Compared with usual care based on waiting lists for face-to-face appointments, a care pathway based on PhysioDirect is equally clinically effective, provides faster access to advice and treatment, and seems to be safe."

Primary and emergency care services around the world are overloaded and musculoskeletal problems account for much of this burden. Identifying patients with musculoskeletal illness and safely directing them to the right level of care, often not

the emergency department or even their GP, is an important global health priority.

Not only does this musculoskeletal triage provide fast and effective care for the patients themselves, it also frees up precious primary and emergency care services to help other patients who desperately need them. In a logical, and research-based sequence this musculoskeletal triage has evolved from face to face consultations to telephone based services.

The next stage of this evolution will be

**Primary and emergency care services around the world are overloaded and MSK problems account for much of the burden.**

for patients to self-triage and self-refer using sophisticated purpose built online triage tools. These tools will empower patients to make informed decisions about what their next level of care should be, for example direct access to a physiotherapist, or maybe a non-urgent appointment with their GP.

The few patients who do need urgent treatment will be identified early. The ma-

ajority with less acute problems will also be provided with health related advice, and those in whom self-care is appropriate will be directed to online resources to facilitate that management. Digital, patient-focused musculoskeletal self-triage and self-referral is a key part of the clinical decision support spectrum and one that will have a big impact on the delivery of high quality healthcare in the immediate future.

As professor Middleton says, "...the critical point with self-referral is the vast improvement it offers for patient care. Self-referral helps prevent acute problems from becoming chronic and reduces long term pain and disability."

*Dr Charles Young is CMO at Capita Healthcare Decisions. He trained in medicine in London and continues to practice as an emergency physician for one day each week at St Thomas' hospital, London. For the last 16 years, he has spent the majority of his time in a range of editorial, evidence-based medicine, clinical decision support and healthcare IT strategic leadership roles. Capita's decision support software and clinical content is used by some of the world's leading healthcare providers.*

## Dominic Covvey

CONTINUED FROM PAGE 12

mentation toolkits typically lack any means of expressing these dimensions correlated with a workflow (although some new products may assist). The compromise some have used is to develop spreadsheets that are correlated with each task or group of tasks in a workflow, where these spreadsheets detail the specific contextual elements.

Probably the easiest one of these to appreciate is the financial dimension, which contains the budget available for a set of tasks.

At the very least, this explicit statement of contextual elements provides an understanding of what affects the workflow.

**Information flow:** A second derivation from a deeper understanding of workflow is that there is an interaction

of information with the workflow. In particular, each workflow task either obtains data or produces it or both. It has been common for organizations to produce data flow diagrams, but far less common to associate them with the process flow.

Creating this association is crucial. In our work, we visualized information as existing in a pipeline that runs through the workflow tasks. Each task can take data from this pipeline and/or put data into the pipeline. The pipeline itself carries information from task to task throughout the process.

This recognition that data flow is integrated with process flow, means that, in addition to the documentation of contextual dimensions, we must also document the data needed by a task and produced by a task. Again, a simple way of doing this is by associating a spreadsheet with each task or, in some other way, combining data flow information

with the process flow information.

**The future of workflow-informed systems:** If we project the best future world, it will be one in which all of this information can be used to directly inform a system as to what to do to support healthcare processes. Ideally, the description of workflow would be done in

**In an optimal future, one can imagine systems that adapt to local needs without creating a version per site.**

a formal (often called 'declarative') language that tells the system what to do as opposed to how to do it.

Some vendors have 'workflow engines' that are intended to allow workflows to be 'programmed' (without doing classic programming) into systems without changing the fundamental sys-

tem code. In that optimal future, one could imagine tools that allowed the entering of a flowchart or process map, the contextual dimensions and the data flow information at any time, allowing the system to adapt to local needs without creating an opprobrious 'version-per-site'.

We still have a way to go in this regard, as the workflow engine itself will have to possess capabilities that allow it to adapt at each moment, and yet be guided overall by the workflow that expresses what we want to see done.

Looking at all this, we have to recognize that workflow is far more complicated a matter than we typically recognize. Furthermore, the real adaptation of systems to the dynamic nature of healthcare still awaits the future.

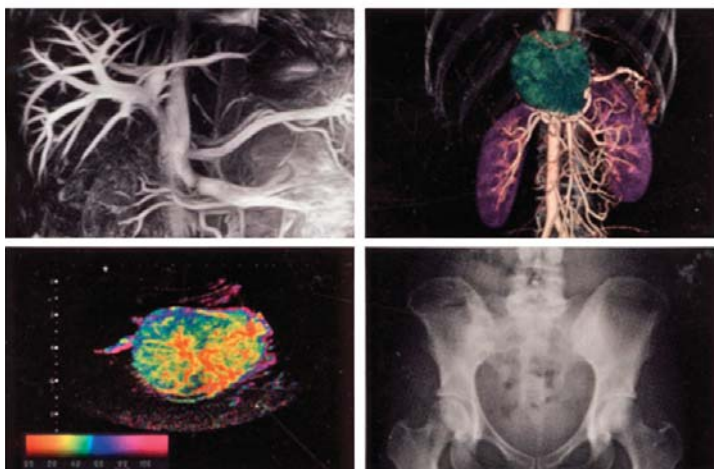
*Dominic Covvey is President, National Institutes of Health Informatics, and an Adjunct Professor at the University of Waterloo.*

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