

CANADIAN Healthcare Technology

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INSIDE:

FOCUS REPORT: PHYSICIAN I.T. PAGE 14

Exercising the brain

Researchers at Bruyere Continuing Care are testing exergaming systems – similar to Wii – to determine if they're useful for improving the physical and mental health of older adults with cognitive impairments.
Page 6

Alan Alda and ultrasound

Famed actor Alan Alda helped open a conference in Toronto about advances in the use of High Frequency Ultrasound. The technology is now being used to treat a host of diseases.
Page 8

Resurgent radiology

Radiologists have been exploring ways to return themselves to the centre of the medical universe – or perhaps the centre of the hospital. At the recent RSNA conference, radiological leaders discussed how this is happening.
Page 10



PHOTO: MACKENZIE HEALTH

Leaders of Mackenzie Health's advanced EMR implementation include: (l to r) Richard Tam, Executive VP; Altaf Stationwala, President and CEO; Dr. Victoria Chan, Deputy CMIO; Shanelle Referente, Manager, EMR Clinical Applications; Diane Salois-Swallow, Chief Information Officer; Sharon MacSween, Director, Clinical Informatics and ICAT; and Andrea Shum, Manager, ICAT Projects.

Mackenzie Health makes the leap to EMRAM 7

BY JERRY ZEIDENBERG

RICHMOND HILL, ONT. – In November, Mackenzie Health announced that it had become the first acute-care hospital in Canada to achieve Stage 7 on the HIMSS EMRAM scale. Stage 7 is the highest rung on a ladder that measures end-user adoption of electronic medical record (EMR) functions.

And while several Canadian hospitals have made it to Stage 6, it's a big jump to Stage 7. "To get to seven, it's a completely different story," asserted Richard Tam, Executive Vice President & Chief Administration Officer at Mackenzie Health.

To qualify for EMRAM Stage 6, a hospital must implement advanced systems like computerized provider order entry (CPOE) and closed-loop medication management.

But a hospital must only demonstrate limited use of these systems, and the process of qualification is done over the phone.

By contrast, EMRAM Stage 7 involves a full-day site visit and evaluation by officials from HIMSS. They thoroughly check to see that electronic records, CPOE and closed-

EMRAM Stage 7 is a big jump from Stage 6. The requirements are much more stringent.

loop medical management are used throughout the healthcare organization.

"It must be an enterprise-wide implementation," said Tam.

During the site visit, the HIMSS evaluation team visits various units and departments of the hospital and checks on how

computerized systems are deployed and used in day-to-day work. They will also randomly stop staff – including doctors, nurses and pharmacists – in the hallways and assess how they are using these advanced systems.

"It's similar to Accreditation Canada," said Tam. "They will talk to anyone they run into in the hospital."

He added that an EMRAM Stage 7 hospital must also submit three case studies, showing how advanced systems have improved clinical, business or financial outcomes within the hospital. And the results must be based on at least 12 months of data.

"They asked for three case studies, but we submitted five," noted Tam.

For example, the hospital showed the impact of its electronic systems on length of stay (LOS) for COPD (Chronic Obstructive

CONTINUED ON PAGE 2

Mackenzie Health first acute-care hospital in Canada to reach Stage 7

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Pulmonary Disease) patients. Tam said the hospital has reduced the LOS for these patients by 2.2 days, resulting in financial gains of about \$205,000 for the year.

In July 2017, Mackenzie Health went live with its implementation of the Epic Systems electronic medical record (EMR). Shortly after that, it achieved the EMRAM Stage 6 certification, and achieved EMRAM Stage 7 in just 16 months.

The Epic EMR has been implemented in every part of the hospital, including the Emergency Department (ED), surgical and operating rooms, medicine, long-term care and mental health.

Tam noted that while there are other Canadian hospitals using Epic, Mackenzie Health was the first hospital to have an integrated end-to-end Epic system in all areas of the hospital. Moreover, Mackenzie Health went live with the system all at once. “We chose the big bang rollout,” he said. “Everyone had access at the same time.”

This has had a dramatic effect on efficiency, as well as on patient safety and quality. It has also reduced delays in patient care.

“For example, when you have a patient in the ED or the fracture clinic. As soon as the consult is done, and the physician writes the note in Epic, everyone on that patient’s treatment team can see what was diagnosed and ordered,” said Tam. This allows treatment to begin immediately.

The single-view of patient encounters in all parts of the hospital has also contributed to teamwork, as all clinicians can instantly see relevant clinical information and easily collaborate.

Tam emphasized that the EMR project has always been clinically led, and many of the workflows have been developed and implemented with the direct involvement of doctors, nurses and allied professionals. Indeed, many meetings were held with clinical teams to design the system well before it was tested and implemented.

Mackenzie Health’s Epic EMR project has been led by Dr. Stephen Jackson, Dr. Aviv Gladman and Dr. Victoria Chan. As well, every area of the hospital has its own specialty physician-champion.

“IT has been a support service,” said Tam. “The clinicians have really taken a primary role to run the project.”

Buy-in to the project has been so high that Mackenzie Health has one of the highest number of “physician builders” of any Epic hospital in North America. “Physician-builder” is an Epic designation that requires doctors to be trained by Epic and to pass two levels of exams.

Given the complexity of the system, all staff and physicians must be trained in order to gain access.

“It’s like driving a car,” said Tam. “If you’re not trained on how to drive the car

set the bar quite high, for all professions,” said Tam.

On the medication management front, noted Tam, Mackenzie Health needed to demonstrate that the closed-loop barcode-enabled technology administration had 95 percent compliance to qualify for the EMRAM Stage 7 designation.

That means the system must be consistently used by clinicians to ensure that the right medications are administered to the right patient, everywhere within the hospital – from the ED, to the medical floors and ORs.

Furthermore, additional EMRAM Stage 7 requirements include the use of barcode technology utilization for human product administration such as blood products (across the entire hospital) and human milk in the Neo-natal Intensive Care Unit (NICU).

Tam says the medication management system has contributed considerably to improved patient safety. By having to scan the medication and the patient armband, “the likelihood of medication errors is drastically reduced,” said Tam. “The system will give the nurse a very strong alert [in the event of any error in medication administration process].”

Another area that has positively affected efficiency and patient care has been the use of electronic and voice-recognition software. In the past, physicians would dictate notes and outsource for transcription. Now, they are either typing their own notes or capturing them by voice, with voice-recognition software converting them directly into text on the screen.

The notes automatically become part of the patient’s record.

While Epic has been installed end-to-end, there are still legacy systems in operation at the hospital. Indeed, Tam said, at the Epic launch, up to 90 legacy systems were in use, and were integrated into the Epic EMR through the use of interfaces. Since then, the hospital has consolidated these systems to 26, and an effort continues to reduce this number.

Mackenzie Health, situated in the fast-growing 905 belt outside Toronto, is currently building a second hospital site, called Mackenzie Vaughan Hospital.

Mackenzie Vaughan Hospital is the first hospital to be built in the city of Vaughan, and the first new hospital to be built in the York Region in the last 30 years. It’s scheduled to open in late 2020, and through the use of advanced technologies, it will be one of Canada’s “smartest” hospitals.

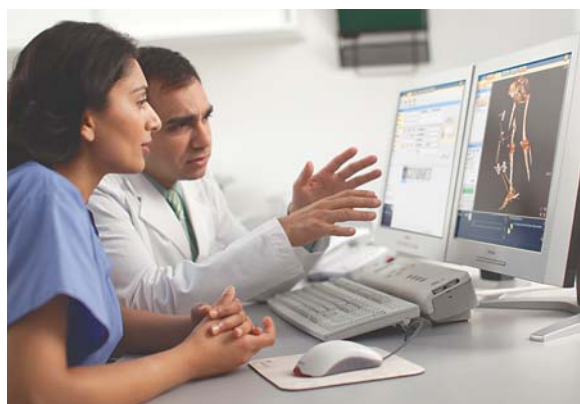
The plan is for continual improvements at both sites. “We’ve now got the platform to do this,” said Diane Salois-Swallow, Chief Information Officer at Mackenzie Health.

The EMR project has been physician-led, and every area of the hospital has its own specialty physician-champion.

and operate it safely, you don’t want to give someone the keys.”

Using the system may mean that if you are a physician, you are ordering medications, and if you are a nurse, you are charting and administering the medications to the patient. These are life-changing tasks. “So, when it comes to working here, we’ve

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Osler's Peel Memorial testing new processes for care in Brampton

BY JERRY ZEIDENBERG

TORONTO – To prepare for the future of Brampton, which has one of the fastest-growing municipal populations in Canada, healthcare planners built a new hospital with no beds.

The Peel Memorial Centre for Integrated Health and Wellness opened in February 2017 as an ambulatory “day hospital”, where the needs of patients could be handled on an outpatient basis. The aim is to care for chronic problems quickly and efficiently, and by doing so, to keep patients healthy and out of acute care centres – like the Osler's Brampton Civic Hospital – which is just a short distance away.

“We have capacity issues at Brampton Civic and at Osler's Etobicoke General Hospital site too,” said Ann Ford, Vice President of Facility Operations, Redevelopment and Information Technology at William Osler Health System – a three-site organization and one of the largest community hospital systems in Canada. “So, the strategy was to keep our community healthy enough to stay out of our acute care hospitals.”

Ford and her colleague, Jane deLacy, Associate Vice President of Clinical Operations, were speakers at the Canadian Centre for Health Facilities (CCHF) conference in November. The conference was held at Bridgepoint Active Healthcare, in Toronto, part of the Sinai Health System.

They outlined how the new Peel Memorial is really a hospital of the future, with a design that, in some ways, helps take care of patients better than ever before.

One of the most innovative design features is the emphasis on an integrated approach to chronic disease management.

Ford noted that in speaking with patients, they emphasized the fragmentation



William Osler Health System's Ann Ford, VP of facility operations, and Jane deLacy, AVP of clinical operations.

of care and the lack of a coordinated plan to address their care concerns. With the traditional form of care, they'd go to a hospital clinic for an appointment with a specialist, only to come back a week or two later for an appointment with another.

In the meantime, they might have to go elsewhere for labs and diagnostic imaging, too.

Moreover, one clinician wouldn't know what another had discussed or prescribed.

“Patients felt their visits were disjointed,” said Ford. “There were many visits, and no unified plan.”

In contrast, Peel Memorial now sets out to have patients visit several in-house clinics during one visit – such as diabetes, eye care, kinesiology, social work or diet, as well as the lab and pharmacy.

Afterwards, a nurse practitioner or physician reviews the results of the visits

and tests along with the care plans, and makes adjustments as necessary.

If the physician believes the patient needs to see someone about falls, incontinence or rehab, those clinics are there and ready to help, too.

And to encourage group decision-making and dialogue, there are relatively few individual clinical offices at the hospital. Instead, the emphasis is on group meeting rooms.

“We have a lot of team rooms, so that people talk to each other,” said Ford.

The results have been positive. “The feedback from patients has been phenomenal,” said Ford.

She noted that patients accomplish much more in a single visit, and have a team of care providers who are all on the same page. They're working together, talking to each other, so they all know what

each is thinking about the patient's problem and progress.

It's a much more effective way of providing care, said Ford. “And because they come to Peel once, they pay for their parking just once, instead of five times.”

She noted that this model, along with others, is being tested and refined at Peel Memorial. These models will then be rolled out Osler's other sites at Brampton Civic and Etobicoke General.

DeLacy observed that the new hospital is conducting a large number of day surgeries, and has advanced facilities for cataract procedures, knee arthroscopy, foot and ankle surgery, and shoulder operations.

By performing these procedures in an outpatient facility, it takes pressure off Brampton Civic and Etobicoke General.

At the same time, the co-location of other services, such as fluorescein and laser eye treatments, creates the opportunity for Osler to use the Peel Memorial site to develop expertise in certain areas. For example, “It's becoming a centre of excellence in eye procedures,” said deLacy.

Peel Memorial's Urgent Care Centre (UCC) has also been designed for efficiency. During the planning phase for Peel Memorial, eight years ago, it was forecasted the UCC would attract about 120 emergency visits a day. However, within a few months, the UCC visits quickly increased, and now averages more than 200 per day.

That might overwhelm most organizations, but the UCC team at Peel is taking it in stride. Design features are certainly helping, said deLacy. The UCC makes use of an efficient registration and triage system, and moves patients into private exam rooms quickly for an initial assessment. They're then escorted back into a sub-waiting room to wait for results and a plan of care. The private room is then available for the next patient/doctor visit.

London Health Sciences Centre implements single encounter workflow

London Health Sciences Centre (LHSC) and its Thames Valley regional partners in southwestern Ontario are the first Cerner based, multi-site regional health system live with an order based Single Encounter solution. The new workflow improves patient safety and outcomes by ensuring physician orders and other clinical notes follow patients when they move across different hospital settings, including from Emergency or Urgent Care to Inpatient Admission.

As LHSC Clinical Information Specialist Shari Wolfe explained, the flow of patient information changed when the healthcare facility transitioned from a paper chart to an electronic medical record. In the paper world, orders were written on a single chart that travelled with patients. In the digital world, the chart still follows patients, but encounter numbers are used to signal when they visit different areas or locations of the hospital. This adds a level of complexity

to the electronic system, requiring a great deal of coordination and oversight by clerks and nurses in the background to minimize risk and ensure continuity of orders, she said.

“Nurses (on the floor) couldn't easily see what medications had been given on the Emergency encounter. It wasn't in their normal workflow; it required extra work and there was always the risk of error,” explained Wolfe, noting that the electronic system is intrinsically designed for downstream recordkeeping and reporting, hence the need for separate encounter numbers.

Dr. Tom Janzen, Chief Medical Information Officer at LHSC, said moving to an electronic system forced physicians to be encounter aware out of necessity. “You had to be encounter aware or you had a problem,” said Dr. Janzen. “If somebody was in Emergency and they were going to be admitted to hospital, the consulting service would come in, write their orders, and they didn't have awareness that they were writing orders

on an Emergency encounter, and that those wouldn't follow the patient to their Inpatient encounter,” he explained.

The decision to add single encounter functionality was made soon after LHSC went live with its Healthcare Undergoing Optimization project in 2015. Three

Single encounter workflow ensures that orders and notes follow patients as they move across different settings.

years and 25,000 Information Technology Services (ITS) hours later, the new system was up and running in September 2018. Throughout the project, the primary focus was what's best for patient care, and how to minimize risk and potential errors for clinical staff, said Integrated ITS Director Monica Olanski.

“All of our communication and messaging has really focused on what this means to patients as they cross within

the organization and outside of the organization,” said Olanski. “Patient care has been our number one priority.”

Today, an entire hospital visit is treated as one encounter, allowing easier identification and selection of the correct patient for order entry and ensuring clinical documentation flows from one part of the hospital to the next. At the same time, thousands of backend reports and interfaces to other systems, including capacity management, are receiving the specific encounter information required for seamless data flow and recordkeeping.

In its first two months of operation, single encounter eliminated more than 8,000 opportunities for error. In addition to mitigating the risk for medication error and improving clinician communication across the care continuum, single encounter functionality is enabling our hospitals to standardize practices and prepare for the next phase of its electronic clinical documentation rollout, which includes electronic clinical

CONTINUED ON PAGE 22



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'Exergaming' aims to help cognitively impaired seniors exercise at home

BY REBECCA IHILCHIK

Fitness video games – think Wii Fit or Dance Dance Revolution – are commonly associated with adolescents. These exercise programs, also called exergames, use virtual reality software to track body movements, allowing a user to interact with the activity presented on a TV screen.

Could exergaming be used to benefit older adults with cognitive impairment? One research group funded by the Baycrest-led Centre for Aging + Brain Health Innovation (CABHI) is on its way to finding out.

CABHI is a solution accelerator focused on driving innovation in the aging and brain health sector. It's backing the work of rehabilitation physician Dr. Hillel Finestone and physiotherapist Dr. Lisa Sheehy, along with a multidisciplinary team at Ottawa's Bruyère Continuing Care that's been pioneering the use of exergaming on stroke rehabilitation patients for a decade.

Recently the team turned their attention to another population: seniors with Mild Cognitive Impairment (MCI). Those with MCI experience minor problems with cognitive functions like memory or thinking, and are considered at risk of developing dementia. It's estimated that half a million Canadians over the age of 65 live with the condition.

"Seniors with MCI are suggested by their physicians to incorporate exercise as part of a healthy lifestyle," says Dr. Sheehy. "Physical exercise has potential to improve or stabilize MCI, and the combination of physical and cognitive exercise may be even better."

But there are often barriers preventing seniors from participating in regular exercise classes. Mobility issues, difficulty arranging transportation, fear of falling, pro-

hibitive cost, or bad weather could all prevent attendance.

Enter exergaming. It's unorthodox, but it might be the home-based solution many seniors are looking for.

Thanks to support from CABHI's Spark program, which supports early-stage innovations, Finestone and Sheehy's project leveraged \$50,000 in funding to develop and test an exergame training program tailored for seniors with MCI.

Their team recruited a group of 12 older adults with MCI ranging in physical and cognitive ability. Participants were asked to follow the virtual reality training program in their own homes for 30 minutes a day, five days a week over six consecutive weeks.

Activities focused on balance, arm and leg exercises, gentle aerobic conditioning, and cognition. The exergaming technology was connected to a TV, which most participants already owned, and set up in a room the participants chose.



Dr. Hillel Finestone

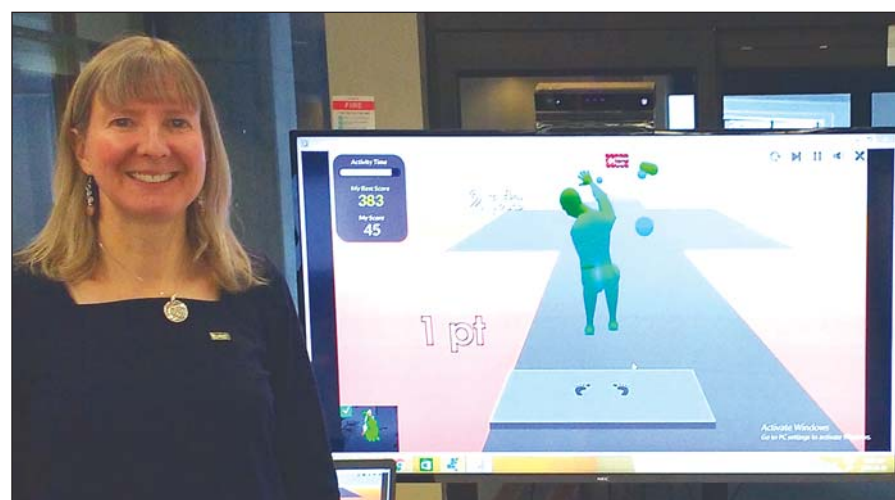
To the team's surprise, participant compliance was excellent. "The first several participants were averaging 30.5 minutes per session, at an average of 31 sessions over six weeks – more than what we asked," says Dr. Sheehy. "I think that's amazing. People were very engaged and motivated."

She reports that participants' perceived physical benefit correlated to their pre-existing abilities, meaning participants

who felt they benefitted most were the ones that hadn't been active beforehand.

One participant, Rick, says he felt the program helped him improve physically. "In fact, Dr. Sheehy increased the difficulty of the different exercises several times during the six weeks because they got easier for me," he says.

Rick also feels the improvement translated into daily physical actions like



Dr. Lisa Sheehy with the exergaming system. It's being tested with patients with mild cognitive impairment.

bending down to the floor and getting back up again.

Perhaps most importantly, the study answered some fundamental questions about usability. All participants were able to handle the technology – turn the computer on and off, move the mouse – as well as learn and progress through the training program.

"There's an automatic assumption many people have that seniors will have difficulty with computers and technology," Dr. Finestone says. "From our work, we can say no, that's not true. If the system is simple enough, technology is not an impediment to the performance of the training program."

The training program could be uniquely viable for a commercial audience of seniors that crosses socioeconomic lines. The program functions on common household amenities like an internet connection and a TV, and its virtual reality hardware was chosen specifically because it's inexpensive and already available on the market. Several study participants have expressed interest in purchasing the program.

That's the future Drs. Finestone and

Sheehy envision. They hope to see home-based exergaming technology reach a mainstream audience of seniors, as well as spread into settings like outpatient rehabilitation. At rehab sites, physiotherapists and occupational therapists could facilitate continued targeted therapy outside of appointments.

The pair plan to follow this study with another, longer one that focuses further on increasing cognitive benefit in addition to physical improvements. CABHI's support has opened the doors to future testing, says Dr. Finestone.

"This is an example of CABHI enabling a research group to really exercise their thoughts and their dreams," he says.

"What I've been so impressed by is CABHI's recognition that there is a science behind science, and that questions about implementation and feasibility are just as important as the science itself. It's not a given that seniors with a cognitive impairment are going to be able to uptake technology like this. But CABHI has enabled us to do the work to say yes, they can."

To learn more about CABHI, visit www.cabhi.com.

Voice-recognition dictation speeds up access to information

Keeping pace with the change in healthcare, particularly when it comes to technology, can be a challenge and disruptive, but for oncologists at the Saskatchewan Cancer Agency, the implementation of a new voice recognition system has transformed care for patients and providers.

The Cancer Agency, like many healthcare organizations, used a traditional system where a physician would dictate clinical notes and send it to internal transcriptionists who would create a record for each patient visit.

With the ARIA oncology information system transcription solution no longer supported by the vendor, the Cancer Agency took on the task of revamping its documentation practices by implementing Fluency Direct by M*Modal.

Unlike the traditional transcription style which uses an audio file and a transcriptionist, this software interprets the

physician's dictation and populates the note in real-time into the Cancer Agency's electronic medical record.

"Moving to voice recognition was a fundamental shift in how we did business and was going to take more than just installing new programs on computers," said Brenda Jameson, Chief Information Officer at the Cancer Agency. "This was change of a significant magnitude that would impact roles of staff, change processes and require a technical ability that had not been expected from our healthcare professionals in the past."

Key to the success was to take a phased approach to implementation rather than trying to implement the new technology with all 70 physicians in the Cancer Agency at the same time. Every three weeks, a group of seven physicians went live with voice recognition. The training and lead time was six weeks for each group of physicians, which allowed them to fully train their personal profile

before the go-live would take place.

By January 2018, all physicians were using voice recognition. The full conversion to the Fluency Direct by M*Modal took six months, but the time spent was well worth the effort, as the results were astounding.

Before voice recognition was implemented the clinical patient note turn-

After technology adoption, 97 percent of clinical notes were approved and available in charts within 24 hours.

around time from the point of a patient consult to the note being approved and made available electronically ranged from three to four weeks.

After technology adoption, 97 percent of clinical notes were approved and available in a patient's chart within 24 hours.

As of August 31, 2018, the average time to approve a note after a patient appointment was five hours and 36 minutes.

To make better use of the dictation software the patient intake process was also changed. Having a pre-collection process of a patient's health information before their first appointment, and before the patient arrived at the cancer centre allowed for a focused consultation during the appointment.

For the patient, this change in process means their needs are the priority of the appointment and it results in a better overall experience. For the physician, this change allowed for their note to be pre-populated with the patient's health information, which reduced the dictation effort needed.

From a technical perspective, the other advancement was the integration of the Cancer Agency electronic medical record software with the provincial electronic health record (EHR).



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Focused ultrasound gaining proponents as breakthroughs are made

BY DAVE WEBB

TORONTO – The blood-brain barrier – a selectively permeable capillary wall that bars circulating blood and extracellular fluid from entering the central nervous system – performs a critical function in preventing blood-borne pathogens from entering the central nervous system. But it also effectively resists the delivery of lifesaving drug therapies to the brain, requiring higher doses of dangerous chemotherapy drugs, for example, to treat conditions such as brain tumours.

Temporarily increasing the permeability of the blood-brain barrier to allow more efficient therapy delivery is one focus of research in the application of high-intensity focused ultrasound (HIFU).

This relatively new technology was the topic at a recent symposium in Toronto, presented by the Gairdner Foundation and Sunnybrook Research Foundation.

Focused Ultrasound: A New Frontier for Brain Therapy brought presenters from Canada, the U.S., Korea, France and Taiwan to Koerner Hall last November, along with keynote speakers Alan Alda, the iconic actor and science communicator, Brian Greene, a string theorist and author of *The Elegant Universe*, and Cori Bargmann, a neurobiologist and head of the Chan-Zuckerberg Foundation.

Kullervo Hynynen, director of physical sciences at Sunnybrook Research Institute (SRI), Canada Research Chair in Imaging Systems and Image-Guided Therapy and considered by many to be the “godfather” of the field, kicked off the clinical portion of the conference with a discussion of the blood-brain barrier issue. Many researchers previously thought the problem to be intractable.

“In all the papers, sometimes (using HIFU) worked, sometimes it did damage,” Hynynen says. “It wasn’t consistent.”

Hynynen found that microbubbles – pockets of air two to 10 micrometres in di-



The conference was opened by Dr. Brian Greene and Alan Alda, the famed actor and science communicator.

ameter – used for ultrasound imaging contrast, could be made to resonate and inflame the capillary walls temporarily, allowing the larger molecules of chemical therapies to pass through.

CT scans and computer modeling of resonance within the skull help focus and dial in the intensity of the ultrasound; the inflammation lasts only for the two minutes of sonification, and the increase in permeability is gone within six hours.

Surgery for brain tumours doesn’t always remove all the cancerous cells, so despite chemotherapeutic follow-up, recurrence is virtually inevitable, said Hao-Li Liu, a PhD electrical engineer and adjunct assistant researcher in the division of medical engineering research, National Health Research Institutes, Miaoli, Taiwan.

He said treating the blood-brain barrier improves the penetration of chemotherapy agents by two to three times, and as much as 60 times for larger molecule medications. He cited a 135 percent median survival rate increase in test animals.

SRI scientist and neurosurgeon Nir

Lipsman extolled the effectiveness of HIFU in a number of treatment areas – including neurodegenerative disorders, cancer, and mental health – but called it “truly transformational” for treating tremor. HIFU is used to create a lesion on an area of the brain which “wipes out” tremor, he said.

“No patient leaves the scanner with a tremor,” Lipsman said. And patients are home the next day.

Moreover, it’s minimally invasive and safe. “They (patients) don’t want their skulls opened, and perhaps rightfully so.”

Lipsman said HIFU has great potential for treatment of mental illnesses such as obsessive compulsive disorder and depression, along with progressive diseases like Parkinson’s, Alzheimer’s and amyotrophic lateral sclerosis (ALS), which he called “relentless in its downward course.”

For Alzheimer’s, Phase 1 of clinical trials targeted the prefrontal cortex, demonstrating the blood-brain barrier dilation was safe and reversible – “not a trivial question,” Lipsman said. All patients asked to be included in the second phase of the

trial which targeted amyloid deposits, the “plaque” that causes cognitive impairment, in other areas of the brain. Treatments at two-week intervals showed it could be used in all areas of the brain.

Jean-François Aubrey, MR-guided transcranial brain therapy expert and a director of research at France’s National Center for Scientific Research, said that at first “only a couple of teams believed” in ultrasound therapy for the brain.

“The first thing you’re taught in medical school is that ultrasound doesn’t go through bone,” he said. Breakthroughs led to increasingly complex and expensive systems to focus ultrasound beams within the skull. By 2010, focusing systems comprised as many as 512 elements. So there was skepticism when Aubrey’s team proposed going back to a single-element model. “It seems impossible,” Aubrey said.

Their solution was a patient-specific acoustic lens to recreate the wave pattern. It is cast from a polymer that slows sound and focuses it, much like a magnifying glass focuses light. The lens, with a 61-millimetre radius and 67-millimetre aperture, focuses a 914 KHz sound wave to a resolution on a single target with about 10 mm of play.

The previous evening at a public lecture, Alda and Greene had discussed the importance of communicating science. Alda, the former *M*A*S*H* star and longtime host of *Scientific American Frontiers*, who now owns a communications consultancy, said the most important element of communication is making sure an audience understands. In other words, he asked, “Are you getting it?”

The public “is on a blind date with science,” Alda said, and compared the journey of understanding to the phases of a relationship: attraction, infatuation, commitment.

Greene alluded to a cultural mindset that equates expertise with elitism, and disdains the latter. In an interview afterward, he explicitly called that suspicion a product of “inculcation that is for political gain.”

“It’s a real, devious plot,” he said.

Virtual care platform helps Alberta patients with sexual therapy

Alberta’s Insight Psychological is a counselling practice that has implemented a virtual care platform, including videoconferencing and instant messaging, to provide psychological services to Albertans. Sexual therapy is one of Insight’s specialties, with ASSECT certified therapists and sexologists in major cities, including Edmonton and Calgary.

Insight works with Toronto-based OnCall Health, a developer of a virtual platform for healthcare practitioners, to provide online counselling to a number of clients.

“OnCall Health has made it possible for our large team of therapists to provide valuable support to clients across Alberta who are located in rural areas or who may experience barriers to transportation, or fears and phobias that make in-person visits impossible,” said Dr. Cory

Hrushka, CEO of Insight Psychological.

“With the support of OnCall Health, our therapists can reach clients on their own terms and in an environment that is comfortable, as well as conducive to success in therapy.”

Dr. Hrushka is a senior psychologist, a PhD and an AASECT Certified Sex Therapist. His main specialty is sexuality, with a secondary focus on violence-related issues, trauma and couple counselling issues.

Dr. Hrushka currently runs Insight Psychological, where he supervises and supports the team of psychologists, as well as 10 provisional psychologists and Masters-level students. “We are proud to offer services in multiple locations, and OnCall Health has been instrumental in helping us go to the next level by eliminating all geographical barriers for our clients across Alberta.”

OnCall Health is a leading Canadian virtual care platform which allows healthcare practitioners to leverage secure video conferencing and instant messaging technology in their practices. This Toronto start-up sees a future where all healthcare practitioners,

Insight Psychological is providing online counselling to patients across Alberta, using a virtual care platform.

from psychotherapists to GPs, utilize a virtual care platform as a core part of their practices.

Launched in 2015, OnCall has expanded quickly, partnering with some of the largest providers of mental health and occupational health services across

Canada. Today, over 1,000 healthcare providers across Canada and the United States trust OnCall Health to make their services more accessible, offering secure video conferencing and messaging appointments to their patients.

OnCall’s benefits include the platform’s Canadian healthcare-compliant security measures (meeting standards for both PHIPA and PIPEDA compliance) as well as a design focused on accessibility.

Applications for OnCall’s services include mental health, home healthcare and primary care, with mental health practitioners making up the majority of their current customer base. OnCall Health said it is investing significantly in its technology as virtual visits in primary care are rapidly rising, with the number of telehealth appointments expected to increase tenfold in the next two years.

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How IT is helping radiologists to get closer to colleagues and patients

BY JERRY ZEIDENBERG

CHICAGO – While booking a trip online to Disneyland, and searching for hotels and new rides for his children, a pop-up asked Dr. Michael Recht if he could use some help. “Why not,” he thought, and found the virtual assistant to be just what he needed.

Afterwards, he realized, what if you could do this in radiology? To improve communication between referring physicians and radiologists, you could create a button on the referring doctors’ computer that would connect him or her to a radiologist for quick answers to questions.

Dr. Recht, chair of radiology at NYU Langone Health, in New York City, proceeded to have this done at his organization – with great success. He talked about this and other ways of using IT to enhance radiology, and medicine in general, during his keynote address at the RSNA conference in November.

“It’s especially popular with our ER physicians,” he said. When the ER docs hit the help button, they’re put into instant communication with a radiologist in the reading room. Dr. Recht explained that a rad each day is tasked with handling these queries. If the ordering doctor wants to know, for example, if something in an image is a lesion, they can circle it on screen and find out right away.

Some radiologists might balk at this solution, countering that radiologists are already busy and don’t need further interruptions. But Dr. Recht asserted, “It isn’t an interruption of your day – it is your day. It is a privilege to be called.”

Indeed, this new system creates closer ties between radiologists and other physicians at a time when many have lamented the isolation of imaging specialists, who are often hidden away in their dark reading rooms.

Dr. Recht noted that radiologists used



Dr. Vijay Rao, president of the RSNA (above), and Dr. Michael Recht (right) gave keynote addresses.

to be at the centre of a hospital’s medical activities – referring physicians and specialists would regularly congregate in the diagnostic imaging department to look at films and discuss cases with radiologists.

In recent years, however, with the rise of PACS, the role of radiologists has changed drastically. Images and reports can be easily transmitted to ordering doctors over electronic networks, leaving little reason for them to visit the reading room.

Some have gone so far as to suggest that PACS have destroyed the role of radiologists as the “doctors’ doctor”, since fewer clinicians are taking the time or trouble to consult them. But with the help button at NYU Langone, relationships among rads and other doctors are being revived.

The “virtual consulting” system is even being used during morning rounds, when teams of doctors and residents visit patients at their bedsides. They can instantly query a radiologist on the particular problems of each patient. Dr. Recht noted that



this application has become extremely popular in teaching – so much so that nurses, too, have joined the rounds to find out more about their patients.

Not only are today’s radiologists isolated from other physicians, they’re largely removed from the patient population, too. At the same time, they’re being told by their imaging leaders that to remain relevant, they’ve got to get closer to their patients in this “patient-centric” world.

However, as RSNA President Dr. Vijay Rao observed in her own address at the conference, the only radiologists who actually see patients regularly are breast imagers and interventional radiologists.

This could be countered by opening the door to patients. She said a day will come when radiologists will not only send their reports to ordering doctors, but to patients, too. And the reports will contain an invitation for the patient to contact the radiologist, if he or she has any questions. “It’s only in this way that the patient will see that the radiologist is a real doctor who can be contacted,” she said.

“We need to act like clinicians, and not just as image readers,” she added.

Another important IT tool being implemented at NYU Langone to improve radiology is analytics. Without data, quipped Dr. Recht, the HIPPO principle usually prevails – the Highest Paid Person’s Opinion will win out, which is often not the best opinion or idea.

At NYU Langone Health, a major effort has been made in the DI department to collect, present and analyze data. “We’ve created dashboards for all areas,” he said.

And the views can be easily customized, according to the preferences of the users. “Some people like tables, others prefer to look at graphs,” he said. Dr. Recht commented that an MRI machine installed at the hospital was only being used 25 percent of the time that was originally planned. Using collected data – including RTLS information that showed how long patients were spending in prep, on the table, in the machine, and in the change rooms – the department discovered that too many steps were occurring in the MRI room. This was slowing down throughput considerably.

The answer was to create prep rooms surrounding the MRI room. “We built two doors on the MRI room – one to go in, and the other to go out.”

Gazing into the crystal ball: Predictions for Canadian healthcare IT

BY DR CHRIS HOBSON

What can we expect to see happen in healthcare IT and the management of data this year? Based on the momentum we’re seeing, and the feedback we’re receiving in Canada and worldwide, here’s our outlook for 2019.

The growing importance of community care: Healthcare planners know that better healthcare in the community results in fewer hospital admissions. It also results in faster discharges from hospitals, with fewer patients staying in ALC beds. Slowly but surely, we’re seeing provincial governments increase their spending on nursing homes, home care and other forms of community care.

Consumer and patient-centric applications: Moving care to the community and becoming more patient centric means a focus on enabling technologies like Remote Patient Monitoring, e-Refer-

als, and Medication Reconciliation. These systems help to connect caregivers and patients, and lead to higher-quality care. RPM also empowers patients to play a more active role in the management of their personal health, resulting in better outcomes.

A patient bill of digital rights: In the decision *McInerney v. MacDonald*, 1993, the Supreme Court of Canada made it clear that the information in a patient’s medical record belongs to that patient. Patients have a right to see the content of their record at any time and for any reason, subject to certain exceptions (e.g. if there is likelihood of harm to the patient). Nevertheless, it hasn’t been easy for patients to gain access to their records. As a result, in 2019, we’re likely to see a more cohesive lobby for an official patient bill of digital rights, and the continued growth of patient portals.

Enhancing technology’s value: Health organizations have found it challenging

to realize the maximum value from their use of information technology. Some well-recognized causes include the complexity of healthcare and of technology, and inadequate attention to fundamentals such as clinician-driven implementations and change management.



Dr. Chris Hobson

There will be a more focused effort on solution adoption by physicians, nurse practitioners and other clinicians as they come to recognize tangible value from information technology. Organizations

will rely on vendors to ensure the technology is designed with interoperability in its DNA to enable ease of use.

Managing medical devices: After extensive media coverage into the problems with medical devices this year, Canada’s health minister has vowed to strengthen oversight of certain devices such as pacemakers, implants and insulin pumps.

The rise of artificial intelligence: AI will move from hype to reality, helping clinicians identify patients for clinical trials or moving urgent cases to the top of radiology reading lists. As well, AI will become important parts of safety and security systems, automating the safe use of medical devices, software and hardware.

Shared services: We anticipate smaller provinces and health authorities will struggle with the costs and human resources needed to implement new systems, such as smart hospital software

CONTINUED ON PAGE 22



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Service enables clinicians across Ontario to access images, reports

TORONTO – A better experience and fewer medical tests for patients is at the heart of a new initiative from eHealth Ontario. Diagnostic images and reports are now available to healthcare providers across the province, regardless of where they were originally obtained. The goal of the new solution, called Diagnostic Imaging Common Service (or DI Common Service), is to save time for patients and to reduce costs in the health system.

In the early 2000s, the idea to create a central, secure and accessible repository for diagnostic reports and images was explored between Ontario hospitals and the provincial government. Since diagnostic imaging (DI) data was largely digitized, it presented an early opportunity to form part of the overall electronic health record (EHR).

But, a diagnostic imaging repository (DI-r) had to be able to receive thousands of exam files every day, store them, retrieve them, and send them quickly and securely to those who needed them. Powerful computers with large storage capacities for this level of processing were required. At the time, it was determined that a single system would not be capable of handling that much data for the entire province.

As a result, Ontario was divided into four distinct regions and each one was supported by a regional diagnostic imaging network. The South West Ontario Diagnostic Imaging Network (SWODIN); the Northern and Eastern Ontario Diagnostic Imaging Network (NEODIN); the Greater Toronto Area West (GTA West) including the GTA and North Simcoe Muskoka area; and the Hospital Diagnostic Imaging Repository Services (HDIRS), covering the south-central area of Ontario, were formed.

It was a good start, and contributed to the early foundation of electronic health records in Ontario. Healthcare providers could call up the digital images and reports for their patients with the touch of a button as compared to the previous method of scanning, faxing and mailing these results between care teams – which often took days and sometimes weeks while patients waited to hear from their doctors.

“Digital health has been a major breakthrough in healthcare. Probably one of the

while visiting friends or family, were required to carry a CD with their images and reports from specialist to specialist.

Today, with eHealth Ontario’s DI Common Service, healthcare providers have quick, easy and secure access to patients’ diagnostic images and reports created anywhere in the province. The access and sharing can occur anytime, anywhere in the province.

As a result, the DI Common Service is eliminating the need for the physical transfer of test results, and the costly duplica-

the written report of the original X-ray.”

Most importantly for patients, this enables more informed, timely medical decision-making and reduces exposure to radiation by eliminating the need to undergo duplicate tests.

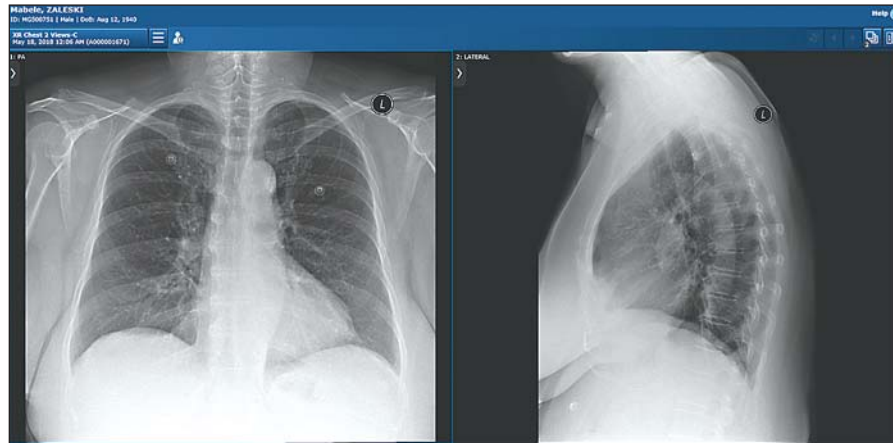
“This has been extremely valuable to me and my patients,” said Dr. Therese Hodgson, Primary Care Practitioner. “Access to the diagnostic images while doing a home visit enabled me to ensure the absence of pathological fracture on my palliative patient. This allowed for better and more timely management of my patient’s pain and prevented an emergency room visit.”

Today, there are more than 68 million images and reports captured in the DI Common Service. More than 70,000 healthcare providers across Ontario are able to access valuable patient data through the repository, providing a more complete picture of their patient’s health. And with over 72,000 records retrieved/viewed each month on average, the repository is demonstrating its value for patients.

“This saves us a lot of time and money by preventing us from having to take additional images and having to send the patient to do CT scans they don’t need,” said Dr. Koff. “[It helps] patients to stay at home, not having to go to facilities because they can communicate remotely with their physicians who have access to their critical data.”

The DI Common Service continues to be rolled out to additional healthcare providers and organizations throughout the province. Authorized users gain access through their provincial clinical viewer or through the eHealth Ontario portal.

“I’m very positive and optimistic about the development of electronic records and access to digital health information,” said Dr. Koff.



most important ones in the past 20-30 years,” said Dr. David Koff, Chief of Radiology, Hamilton Health Sciences. “We’ve seen 100 percent of the imaging facilities going digital in Ontario which is a major achievement.”

While this was a significant improvement, healthcare providers could only access their patients’ diagnostic images and reports if they were captured within their region. This meant that patients seeking specialist attention outside of their region or who obtained testing elsewhere in the province, say

tion of scans when a patient moves from one hospital to another.

“I recently saw a patient in my Emergency Department with a possible re-injury,” said Dr. David Rosenstein, Medical Director of Informatics (CMIO) at Michael Garron Hospital in Toronto. “I was able to directly compare their current X-ray with the original one [taken] at another hospital. I confirmed that they did not re-injure their fracture and saved them another trip to the orthopedic clinic. I would never have been able to do that with just

Intelerad’s new CEO, Paul Lepage, has ambitious goals for the company

BY JERRY ZEIDENBERG

Paul Lepage is well-known in Canada’s health IT sector – he was until recently the president of Telus Health, where he led the company’s drive to become the country’s biggest player in the electronic health records market for physicians.

Last year, he left Telus to become CEO of Montreal-based Intelerad, a developer of PACS and other solutions for the diagnostic imaging sector, in hospitals and clinics. He’s now got an even bigger goal – to make Intelerad the leading vendor of picture archiving and communications systems for large organizations in the U.S. and worldwide.

In Lepage’s view, that goal is quite attainable, as the company is consistently rated as having top-rated technology. It also has momentum in the marketplace. “When you look at the latest results from KLAS, we’re ranked as number one in terms of large-volume PACS vendors, and we’re also number one when it comes to winning large-scale clients in the United

States and Oceania,” said Lepage.

As well, the company scores highly when rated by its customers. “98 percent of them say they’d buy from us again,” he noted.

Still, the company is competing against heavyweights like Philips, Agfa and Sectra. So how does Intelerad plan to grow?

For one thing, in a sector where information and studies are rapidly expanding, Intelerad is focusing on making its own solution readily scalable. “We’re already handling millions of studies,” said Lepage. “We want to allow it to easily double, triple or quadruple the capacity for customers.”

As part of the plan, the company is also focusing on cloud solutions. In this way, customers can benefit from the enormous computing power of the cloud, including analytics and artificial intelligence.

On the technology front, Intelerad employs 100 people in R&D alone. Most are located in Montreal, where the company is about to consolidate three offices into one large location in the city. It also has a development office in Toronto, where about 10 researchers are working

on leading-edge AI solutions.

Moreover, Intelerad has of late been acquiring companies and forging alliances with complementary vendors.

Of note, in 2018 it acquired Clario Medical, a zero-footprint worklist company based in Seattle. Intelerad and



Paul Lepage

Clario had already been doing a lot of work together, and Clario functions in the cloud, which is a priority for Intelerad. Clario’s smart worklist system is a proven solution, and a popular one, said Lepage. “Of

100 large-scale opportunities in the United States, they’re already present in 20 of them.”

But the most important aspect is that Clario’s worklist solution helps improve productivity for radiologists and the overall experience for patients. And that, said Lepage, is of the utmost significance to hospitals and clinics.

“When you combine Clario with our viewer, you have a very strong solution,” said Lepage.

From Intelerad’s perspective, it’s the focus on the customer’s goals that are key. That is, it’s not just producing or acquiring technology for technology’s sake, but to make the clinic, hospital or regional radiology organization more effective.

Of course, that might be easier said than done. But the company appears to be succeeding. Not only did the KLAS study report that 98 percent of current customers say they’d buy again from Intelerad, 98 percent said they intend to do so.

What’s the plan for Canada? There’s a perception in the market that Intelerad is strong internationally, but doesn’t have a big footprint in its own backyard.

“We already have some great customers in Canada, such as the McGill University Health Centre, the Maisonneuve Rosemont Hospital (a 700-bed hospital in Montreal) and the Vancouver Island Health Authority,” said Lepage. But the company does intend to increase its presence in Canadian hospitals – by

CONTINUED ON PAGE 22

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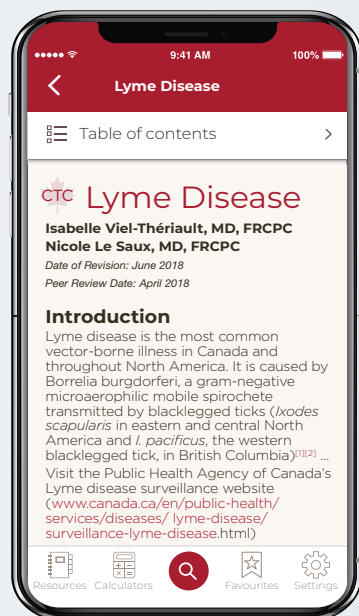


Figure 4 : Post-Exposure Prophylaxis Algorithm

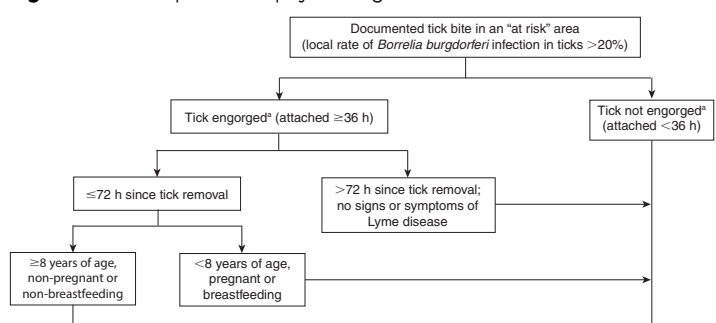


Table 2: Drugs Used to Treat Lyme disease

Drug Cost	Dosage	Adverse Effects	Comments
Drug Class: Penicillins			
amoxicillin generics	Adults: 500 mg TID PO Children: 50 mg/kg/day divided TID PO; maximum 500 mg/dose	GI upset (usually mild: nausea, vomiting, diarrhea), rash, hypersensitivity.	Drug of choice in pregnancy and breastfeeding for mild/localized disease. ^[23]
penicillin G generics	Adults: 18–24 million units/day divided Q4H IV Children: 200 000–400 000 unit/kg/day divided Q4H IV; maximum: 18–24 million units/day	Rash, hypersensitivity, interstitial nephritis, seizures (high doses).	

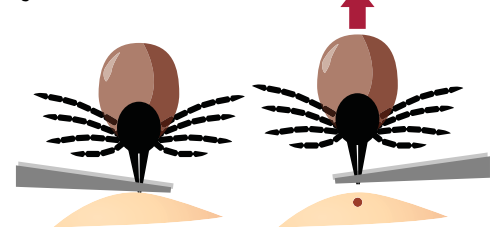
Amoxicillin

amoxicillin trihydrate
Antibiotic

CPhA Monograph
SUMMARY PRODUCT INFORMATION

Route of administration	Dosage Form	Strength
Oral	Capsule	250 mg, 500 mg
	Chewable tablet	125 mg, 250 mg
	Powder for oral suspension ^[a]	125 mg/5 mL, 250 mg/5 mL

Figure 3 : How to Remove a Tick With Tweezers



Therapeutic content from CPhA's Compendium of Therapeutic Choices (CTC) and the Compendium of Therapeutics for Minor Ailments (CTMA) is now accessible on your mobile device.

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There are many reasons why physicians should be using medical apps. Chief among them: "It's easier to use your phone than to reach for a book," commented Dr. Chandi Chandrasena, an Ottawa-based family doctor and an OntarioMD peer leader.

What's more, there's a ton of expertise built into apps. They can be used for everything from medication checking and journal-article lookups to visual anatomy and 'best practices' for various conditions.

As Dr. Chandrasena noted at last fall's OntarioMD Every Step conference, "If you're not using them, you're missing the boat."

Dr. Chandrasena led a session called "Medical Apps for Physicians and Patients", which was filled to overflowing. Right away she warned, however, that apps are of wildly varying quality, and it takes skill to separate the wheat from the chaff. It's important to view them with a critical eye.

"Look at an app like a journal article," she said. "Ask yourself who wrote it, or who developed it, and find out what other apps they have developed." This is akin to discerning whether an article has been written by a credible source.

Next, make sure to find out when the last update was. If the app hasn't been updated for 10 years, don't download it, she cautioned.

Another important feature is privacy – how private is the data you're entering?

Dr. Chandrasena then commented on a number of popular medical apps and discussed their pros and cons.

One of the most popular apps for doctors, she noted, is RxTx mobile, which is provided by the Canadian Medical Association's subsidiary Joule, at no charge to members. It's produced by the Canadian Pharmacists Association (CPhA), and it contains much of the data found in the huge, printed volume known as the Compendium of Pharmaceuticals and Specialties (CPS). "It's a smaller CPS at your fingertips," said Dr. Chandrasena.



RxTx is available through online, mobile and integrated EMR channels, and offers a compilation of more than 2,000 fully bilingual, Health Canada approved, Canadian product monographs and images for drugs, vaccines and natural health products.

The app has condition-based drug tables that are formatted for quick access to dose, adverse effects, drug interactions and relative costs. It runs on iOS and Android devices.

An important feature for Canadian physicians is the availability of Health Canada advisories. These advisories appear in both general search returns and the actual product monograph.

RxTx is now used by more than 17,000 Canadian clinicians. "They include, but are not limited to, physicians, pharmacists, nurses, residents and medical students, as well as dentists and dental hygienists," said Lyndon McPhail, director of product management for the Canadian Pharmacists Association.

"In January, we launched a major upgrade to

RxTx Mobile; which now includes the full content from our Compendium of Therapeutic Choices (CTC) and Compendium of Therapeutics for Minor Ailments (CTMA), said McPhail.

He explained this additional content provides "critical information on what a clinician needs to know about a given condition, through Canadian guidelines and evidence-based steps to treat the condition."

This therapeutic content, he said, has been one of the most requested features over the past few years.

While the CPS and drug tables in the RxTx app are complimentary to members of the CMA, use of the therapeutic content will be available at a member-discounted fee, McPhail said. Nevertheless, there will be several months of free usage, to show clinicians the benefits of the new content at the point of care.

Some other apps that Dr. Chandrasena mentioned:

- UpToDate, \$519 Cdn. A strength is that it mirrors the comprehensive website, but in an app form. On the other hand, it contains U.S. data.

- DynaMed Plus, \$395 US or complimentary to CMA members. It includes bullet format evidence-based recommendations, Micromedex drug content, and coverage of Canadian and international guidelines.

- Epocrates, free. It's popular, and contains information on thousands of prescriptions, generic and OTC drugs, including an interaction check for adverse reactions between up to 30 drugs at a time. However, it uses U.S. content.

- Visual anatomy, free. It's great to have a skeleton in your pocket. The app can be a little hard to use at times, said Dr. Chandrasena, and there are ad links. There's a better version, called Visual Body, but there is a cost to it.

- Telus EMR Mobile app. "If you have a Telus EMR, you should download this app," said Dr. Chandrasena. "You will have access to your scheduling, and the camera app is good."

Screening tool addressing poverty in patient populations

BY JERRY ZEIDENBERG

It's well-known that poverty is a major determinant of health, and that one's social and economic environments play a large role in whether a person becomes physically or mentally ill. However, little has been done in a practical way to identify and assist at-risk members of society at the primary care level.

Now, however, a project has been launched to turn things around. Initially, a two-month pilot project was conducted in 2018 that gave primary

care providers a computerized tool to identify patients who are at risk of living in poverty, and who could use the support of community resources.

The project was conducted at primary care clinics in four Ontario cities – London, Sudbury, Cambridge and Toronto – under the leadership of the Toronto-based Centre for Effective Practice (CEP), a not-for-profit organization which started at the University of Toronto's Department of Family and Community Medicine to create and disseminate evidence-based im-

provements in primary care.

"My office screened 700 patients for poverty, and 100 were identified,"

Diabetes, asthma, arthritis, cancer, and mental health have all been linked with a person's environment.

said Dr. Mario Elia, a London-based family physician and one of the pilot site leads.

Overall, 4,517 patients were

screened at the four sites, and 12 percent were found to be at risk of poverty.

Of these, 30 percent were provided with customized resources and referrals to community supports at the same visit.

Dr. Elia and Claire Stapon, a manager at the CEP, spoke about the poverty screening project at a session for physicians at OntarioMD's Every Step conference, held in Toronto in September.

Stapon said that 20 percent of

CONTINUED ON PAGE 23



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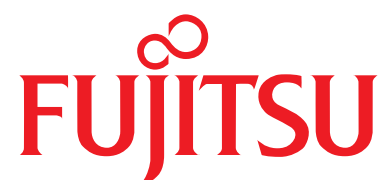


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Bionic contact lenses: An In-SIGHT into the future

By combining new, optical materials and microelectronics, smart contact lenses are being created.

BY DR. SUNNY MALHOTRA

When people think of bionic lenses they may envision some sci-fi device used in a movie that renders super-detailed images in augmented reality. Vision technologies this advanced are still a long way from becoming a reality, but early prototypes are showing promise.

Traditionally contact lenses have been used to correct the vision of patients by focusing light onto the retina, which is the photosensitive part of the eye contributing to clear image formation.

Bionic lenses function to address the issue of correcting vision, but also introduce basic aspects of augmented reality. An early bionic contact lens prototype was developed in the electrical engineering department at the University of Washington.

Standard contact lenses are made up of hard or soft polymers, but many electrical components must be integrated into these lenses to turn them into 'bionic lenses'. These contacts need access to a power unit, but it's not possible to integrate the unit within the lens, so an antenna is used to provide wireless power to the LED display.

The contact lens itself has a basic single-pixel display and was successfully able to display digital time that could be viewed by the wearer. The design team had to overcome many obstacles to develop a working and wearable contact lens.

Fitting so many components in a single contact is the first obstacle, as all of these components have to

fit into a space of 1cm^2 . It is also important that these components do not impinge the vision of a patient by blocking their line of sight.

The second limitation is due to the focusing power of the eye itself. In order to form clear images,

Further testing is needed to determine how long-term use of new contact materials would affect ocular tissue. But the impact could be dramatic.

the eye must use the cornea and lens to focus light onto the retina.

Typically the eye cannot bring extremely close objects into focus if they are within a centimeter or two of the eye, which is why close objects blur. This would mean that the display of the contact lens itself would not be clear to the wearer.

The design team addressed this issue by introducing micro-lenses around the dis-

play, which would, in turn, reduce the amount of effort the eye would need to exert in order to bring the image into focus.

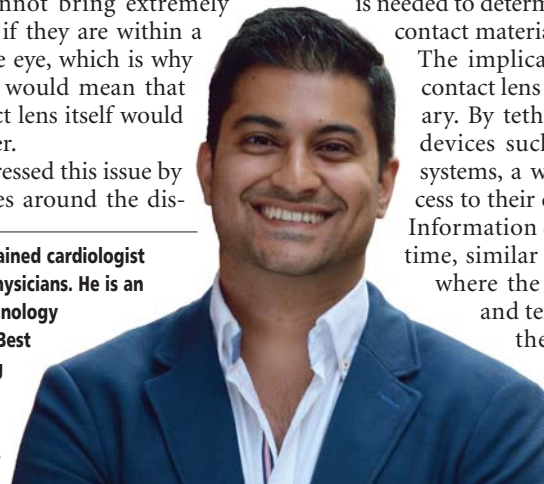
Finally, the team had to use materials that would be both biocompatible and able to retain electrical connections and thermal stability.

The team opted for a material known as polyethylene terephthalate (PET), since it retains good chemical stability and is still able to maintain transparency and oxygen permeability. Although further testing is required, use on animal models showed no allergic reactions.

Although the display is early in its development, in time it may become a reality, as electric components get smaller and more advanced. Further testing is needed to determine how long-term use of new contact materials would affect ocular tissue.

The implications of an advanced bionic contact lens would certainly be revolutionary. By tethering the lens to other smart devices such as smartphones and home systems, a wearer could have seamless access to their devices.

Information could also be displayed in real time, similar to modern heads-up display, where the user could access navigation and text notifications without using their smartphones or other smart devices. This would allow for a more integrated and seamless user experience across multiple digital platforms.



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

The difficulty of selling to public sector hospitals: myth or reality?

BY DENIS CHAMBERLAND

Myths exist because they serve a purpose. In what may be one of the most famous myths in history, on being told that her French subjects had no bread, French queen Marie-Antoinette supposedly snorted, "Let them eat cake". The French Revolution (1789) was on.

With this single sentence, the queen was destined to become a symbol of monarchical callousness, decadence and depravity. Soon thereafter, she would go on to lose her head (for real). But did Marie-Antoinette really utter those odious words?

Highly unlikely, say historians, who note that the offensive words had been floating around for some 30 years before 1789 in relation to another European diva, and that the French queen was herself an engaged philanthropist.

Yet, the myth of her callousness persists more than two hundred years after her death. This symbolic tale of a distant past endures because

the global political ecosystem has allowed it to flourish. It serves a purpose.

But what do myths have to do with healthcare procurement? If procurement is akin to plumbing, as some have claimed – it all goes unnoticed until it breaks down – why would myths permeate an area so humdrum and mundane? Why myths in healthcare procurement? And why would an organization as prominent and esteemed at the Council of Academic Hospitals of Ontario (CAHO) issue a publication intended to debunk 'myths' in procurement?

That is what happened last summer when CAHO released *The Art of the Possible: A Quick Reference Guide to Ontario BPS Procurement Myths*.

The Art of the Possible guide provides clarifications and explanations on 16 points connected to Ontario's BPS Procurement Directive. The guide clarifies some practical points (I plan to delve into some of them in upcoming columns), but CAHO states that procurement myths "are major barriers to innovation adop-

tion". Really? Innovation in healthcare procurement is impeded by myths?

The idea that myths exist in public procurement arguably started its career in the 1990s when RFPs began to gain momentum in Canada. The seminal 1981 Supreme Court of Canada decision in *R vs Ron Engineering and Construction (Eastern) Ltd* had nailed down the dogma that negotiations are forbidden in the context of a pure tender, where only price matters.

The reasoning was sound. If the tender document says there will be no negotiations, then there should be no negotiations. If value is measured entirely on best pricing, then pure tenders are as sensible as they are convenient.

But RFPs are a different animal.

They measure value more broadly and in more nuanced ways. RFPs call out for negotiations. Yet, in the absence of any analyses of the court decisions that followed Ron Engineering, the view developed that negotiations were out in Canada, just when they desperately needed to flourish to truly capture value.

What was, and is still needed is regulatory guidance, something in short supply in Canada (with the possible exception of Quebec). In procurement, regulatory guidance is essential if value is to be optimized.

The guidance must be detailed and comprehensive if it is to be useful. A good example of effective regulatory guidance is the Federal Acquisition Regulation (FAR), which governs federal procurement in the United States.

The FAR is a substantial and complex body of rules that procurement practitioners study on an ongoing basis. It expressly allows for competitive negotiations and legislatively empowers the procurement manager (the

CONTINUED ON PAGE 21



Denis Chamberland



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Breast density is becoming an important issue for accurate screening of cancer

Many experts believe that women with dense breasts should receive more than standard 2D screening.

BY DIANNE DANIEL

Are you dense? It sounds offensive, but it's a question Canadians need to be asking, say advocates of a growing awareness campaign about breast density and its relation to increased cancer risk.

"The denser you are, the more likely you are to get breast cancer and the more likely it is to be missed," said Dr. Paula Gordon, a Clinical Professor in the Department of Radiology at the University of British Columbia. She is also Medical Advisor to Dense Breasts Canada, a non-profit organization dedicated to educating people about the risks associated with dense breasts.

As early as the mid-1970s, medical experts showed a correlation between extremely dense breast tissue and increased cancer risk.

More recent studies indicate the risk of missing cancer is higher in people who have dense breasts when 2D digital mammography is used as a screening tool because of the masking that occurs.

Extremely dense breast tissue and cancerous tumours both show up white on a mammogram image, so that spotting abnormalities is like looking for a snowman in a snowstorm, said Dr. Gordon. Often, tumours in dense tissue aren't discovered until they are at an advanced stage and noticed as a lump, even in those who routinely go for mammograms.

Despite the push for awareness, the latest guidelines for breast cancer screening, released by The Canadian Task Force on Preventive Health Care in December 2018, do not include recommendations specific to breast density.

According to the guidelines, "classification of breast density status has poor reliability." The report goes on to caution that "supplemental screening may increase the number of women experiencing over-diagnosis with unnecessary treatment and negative effects from false-positive results."

It also states that the task force "did not specifically review evidence on supplemental screening for women with dense breast tissue."

Leading Canadian breast screening experts believe the recommendations could and should do better.

When reading mammograms, radiologists apply the Breast Imaging-Reporting and Data System (BI-RADS) to standardize their description and assessment of image findings. BI-RADS is also used to assign a density score.

Category A signifies breasts that are almost entirely fatty; B indicates scattered areas of fibrous and glandular tissue; C indicates breasts that are heterogeneously dense, indicating large areas of dense tissue which may hide tumours; and, D indicates extremely dense tissue which will lower the accuracy of mammography.

The argument is that women in the highest two categories should be put into a high risk group and offered supplemental screening, similar to the way other risk factors are considered.

"The task force says density is no big deal, we're not going to treat women with dense breasts any differently than average-risk women," said Gordon. "My goal is to get all of Canada using BI-RADS and for doctors and patients to be told."

British Columbia is the first province to mandate that women and their doctors receive information about breast density after mammogram screening. In

making the announcement, B.C. Health Minister Adrian Dix stated the decision was based on evidence.

In other provinces, women can ask their family doctors about their breast density measure and if they are in the extremely dense category D, meaning their breast tissue is more than 75 per cent dense, they may be recommended for annual screening and/or supplemental testing.

The lack of federal recommendations means breast density is treated differently according to where people live. In Alberta, for example, radiologists report density to primary-care providers who then decide the next course of action for women in the higher categories.

Supplemental screening is covered, but the technology available varies between clinics. In Ontario, patients in the extremely dense category are recommended for annual mammograms.

One reason for the push for increased awareness and education about breast density is the advent of

and resource planning can be applied uniformly across the healthcare system," said Densitas founder and CEO Mo Abdoell.

The densitasdensity software appliance installs on a network alongside the mammography machine and picture archiving and communication system (PACS).

Every mammogram acquired is routed through the software, which automatically generates a density report and sends it to the PACS or electronic medical record for inclusion in the radiologist's report. The technology is deployed across the province of Nova Scotia and is being considered by breast screening programs in other provinces.

According to Abdoell, the company is leaving the decision about what to do with the automated breast density score up to healthcare system policy makers.

"A lot of people are focused now on whether or not women are informed of their density. It's a complex issue and it has to be a healthcare system decision on how you inform women and what do you in-



new technology, including tools that bring consistency to how it is measured and advanced imaging techniques that do a better job than 2D mammography at detecting early stage cancers in dense breast tissue.

For example, densitasdensity from Halifax-based Densitas Inc. and VolparaDensity from New Zealand's Volpara Solutions Ltd., are providing software to automatically generate standardized breast density measurements, removing the subjectivity associated with visual assessments and giving radiologists a good indicator to confirm what they see with their eyes.

Volpara uses volumetric breast density, a method that divides the volume of fibroglandular (dense) tissue by the total volume of breast tissue and has been validated by magnetic resonance imaging. Densitas applies artificial intelligence (AI), using an algorithm to 'teach' its software to assess the same images a radiologist sees.

"We want to provide a measure of density that is standardized, reliable and reproducible so that we have equitable service delivery, and so that planning

form them," he said. "That's an important question that has to be dealt with at the system level. However, we know that by providing a standardized measure of density to the radiologist at the point of care, they can already make a really important decision when it comes to how they manage that patient."

Dr. Martin Yaffe, Co-director of the Imaging Research Program at the Ontario Institute for Cancer Research and a Volpara founder, has had a long-standing interest in breast density, helping to develop an early tool called Cumulus for measuring breast density in a research lab environment.

He believes there is a clear path towards action to reduce the likelihood of cancers being missed in women with dense breast tissue, beginning with quantitative, standard measure. He has been pushing the Ontario screening program to start reporting density.

Dr. Yaffe's lab is currently applying feature and texture analysis to analyze the composition and structure of a mammogram, applying AI to refine

CONTINUED ON PAGE 22



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Vendors show progress in applying AI to diagnostic imaging at RSNA

CHICAGO – Artificial intelligence was certainly in the air at the annual Radiological Society of North America (RSNA) conference in November, as vendors showed the progress they're making with Deep Learning and neural networks.

For its part, GE Healthcare announced new applications and smart devices built on Edison – a platform that helps accelerate the development and adoption of AI and empower providers to deliver faster, more precise care.

Edison is part of GE Healthcare's \$1 billion digital portfolio and will serve as a "digital thread" for its existing AI partnerships and products.

The company said that its clinical partners will use Edison to develop algorithms, and technology partners will work with GE Healthcare to bring the latest advancements in data processing to Edison applications and smart devices.

Later in December, GE filed papers for healthcare unit spinoff. According to Bloomberg news, the IPO will probably occur this spring, with an estimated value of \$65 billion to \$70 billion (US).

The healthcare AI market will reach \$6.6 billion in 2021, and 39 percent of healthcare provider executives say that they're investing in AI, machine learning and predictive analytics. At the RSNA conference, GE Healthcare showed several works in progress, including:

AIRx is an AI-based, automated workflow tool for MRI brain scanning designed to increase consistency and productivity. AIRx is designed to provide automated slice prescriptions to help reduce previously redundant, manual steps. AIRx is intended to produce images that have less variability between technologists and between scans, to help lower the chances for a patient to be recalled due to incorrect slice placement.

An increase in consistency is particularly important when doing longitudinal assessments for diseases like Alzheimer's and Multiple Sclerosis. AIRx features a pre-trained neural network model that leverages deep learning algorithms and anatomy recognition based on a database of over 36,000 images sourced from clinical studies and reference sites. (The solution is not yet approved by the FDA.)

Critical Care Suite on Optima XR240amx is designed to identify cases with the critical condition of pneumothorax at the point-of-care to enable prioritization of image review. Critical Care Suite will employ a suite of AI algorithms, such as pneumothorax detection, designed to identify this potentially life-threatening condition in chest X-Rays with high accuracy.

The AI algorithms are hosted on the mobile X-Ray system – a first of its kind AI-embedded imaging device – designed to share the output through an onscreen notification. When a pneumothorax condition is identified, the point-of-care notification alerts the clinical team, enabling prioritization of image review. The AI results are sent to PACS for review of the critical findings by a radiologist. The system is awaiting FDA approval.

For its part, Siemens Healthineers presented its AI-Pathway Companion for the



GE Healthcare demonstrated Critical Care Suite, which can automatically identify patients with pneumothorax at the point-of-care for image prioritization.

first time. It's said to be a clinical decision-support system based on artificial intelligence that helps doctors make diagnostic and therapeutic decisions.

The solution is currently under development, and is designed to provide the clinical status of each patient, based on data integration and artificial intelligence, and will make suggestions for next steps. The first clinical application will apply to prostate cancer.

Siemens Healthineers also showed off its first "intelligent software assistant" for radiology, the AI-Rad Companion Chest CT, which brings artificial intelligence to

Siemens' AI-Rad Companion can mark and measure potential abnormalities in the lungs, heart, aorta and coronary arteries.

computed tomography (CT). Using CT images of the chest, the software can differentiate between various structures in that region of the body, highlight them individually, and mark and measure potential abnormalities in the lungs, heart, aorta, and coronary arteries. AI-Rad Companion Chest CT automatically translates its findings into structured reports.

Featuring underlying algorithms that were trained by Siemens Healthineers scientists on extensive clinical datasets, AI-Rad Companion Chest CT is designed to help radiologists interpret images via automation for potentially reduced time spent on results documentation. It's currently undergoing the FDA approval process. The company said it plans additional intelligent assistants for the AI-Rad Companion platform.

Siemens Healthineers announced that it

is currently working on a AI-based features for its mammography reading and reporting solution, syngo.Breast Care. These features are designed to provide physicians with interactive decision support.

A large number of mammograms are performed each day to screen for breast cancer, which means radiologists must accurately interpret hundreds of images daily. Additionally, the increased use of 3D breast tomosynthesis adds to the number of images to be read. The new version of Siemens Healthineers' syngo.Breast Care is designed to give radiologists interactive clinical decision support.

AI-based algorithms are designed to help evaluate individual lesions and provide a system evaluation for 2D mammograms or 3D tomosynthesis. A peer-reviewed scientific study demonstrated increased sensitivity and specificity with the use of AI-based support.

Also, the planned software is designed to sort cases automatically and score those cases with a numerical value between 1 and 10. The case score is designed to take into account any existing lesions, microcalcifications, and other abnormalities. As such, critical cases can be moved immediately to the top to receive priority.

Siemens Healthineers collaborated with ScreenPoint Medical and plans to integrate interactive decision support in syngo.Breast Care. The company's mammography reading software, Transpara, is based on deep learning and has been trained with over 1 million images.

Meanwhile, Philips announced a research platform for radiology that's powered by AI. IntelliSpace Discovery 3.0 is said to be an open platform to enable the development and deployment of Artificial Intelligence assets in radiology to support radiologists in their clinical and transla-

tional research. The company noted that it's for research purposes, and not for use in clinical diagnoses.

According to Philips, IntelliSpace Discovery is already a proven research platform, used by more than 50 hospitals and academic institutions worldwide for the development of radiology applications for rendering, segmentation, and quantification.

IntelliSpace Discovery 3.0 now provides research applications and tools for radiologists to aggregate, normalize and anonymize data, which can be visualized and annotated to 'train' and validate deep learning algorithms.

They can then deploy these algorithms as plug-in apps into the research workflow to analyze new datasets and help facilitate clinical research in radiology, oncology, neurology and cardiology.

Canon Medical Systems – which recently absorbed Toshiba Medical – showed an impressive AI technology for CT. The company has developed deep convolutional neural network (DCNN) image reconstruction, which dramatically cuts the time needed for 3D reconstructions.

Called Advanced Intelligent Clear-IQ Engine (AiCE), the system is currently undergoing the FDA approval process. It's powered by NVIDIA processors, and uses deep learning to differentiate signal from noise so that it can suppress noise while enhancing signal.

According to Canon, it's able to reconstruct images three to five times faster than traditional Model Based Iterative Reconstruction (MBIR).

That's expected to be a welcome enhancement for radiology departments, as it will help with workflow and productivity. Of course, by speeding up the availability of high-quality images, it will also benefit patients.

Radiology's artificial intelligence revolution: The game is changing

BY DR. DAVID KOFF

According to Merriam-Webster, a revolution can be defined as “a fundamental change in the way of thinking about or visualizing something, a change of paradigm or a changeover in use or preference especially in technology”. In contrast, evolution is “a process of gradual and relatively peaceful social, political, and economic advance”. Revolution is a game-changer which alters dramatically the way people function, when evolution results mostly in improvements in the way we live and work.

One of the most intriguing revolutions of these past years has been the invention of the Global Positioning System (GPS). No more guessing when you are lost in the middle of nowhere on a rainy night, trying desperately to figure out where you are on a clumsy paper map.

The last major revolution we had in radiology was the advent of digital imaging almost 40 years ago. At that time, the invention of Computerized Tomography (CT), a major game changer in itself, quickly transformed the way physicians function in the Emergency Room, in Neurology and Oncology, among others.

In the old days of analog imaging, the radiograph was a printed document which had to be viewed by the radiologist and the physician in the reading room or at the point of care. Moreover, it existed in only one copy – a single piece of film.

The radiologist would go to work and report a stack of films displayed on a viewer. With the digital revolution, images could be distributed simultaneously in the department and in the enterprise, and eventually over regional networks or over the cloud.

The report has to be out as fast as possible,

ideally before the referring physician sees the images. Teleradiology has flourished, allowing radiology groups to serve multiple sites, or companies to serve remote hospitals. This has dramatically altered the way radiologists work.

And now comes a new disruptive technology, which will again affect the way radiology is performed. You've heard a lot about Artificial Intelligence, the hype, hope and scare it has generated. Again this year, it was all the buzz at the Radiology Society of North America meeting in Chicago. In just a matter of a year, we have seen many more mature applications emerge from multiple equipment vendors and software companies, large and small, who are now bringing to market FDA-approved solutions.

Numerous research teams worldwide are developing their solutions and are participating in popular international competitions. In fact, it is relatively easy to program Machine Learning and Deep Learning solutions, and it's becoming even easier with the availability of development platforms which can be accessed and used with short-term training.

Deep Learning solutions have improved their accuracy to the point that many organizations are adopting them.

According to a recent KLAS survey, 17 percent of U.S. hospital organizations are already using Artificial Intelligence, and 30 percent more are planning to adopt AI-based solutions in the near future.

The Artificial Intelligence market is estimated to represent \$2 billion by 2023, starting with breast and lung applications. The catalog of urgent or critical conditions benefiting from Artificial Intelligence is expanding fast, helping to diagnose breast lesions, lung nodules, pneumothorax, pulmonary embolism, aortic dissection or intracranial hemorrhage among others.

Now urgent exams can be prioritized even before the radiologist sees the images, and placed on top of the reading list for immediate reporting. As well, the software can prepopulate the report for radiologist review and approval. AI can be applied on the PACS/VNA, on the

cloud or in some cases directly at the modality.

So what does it mean for the radiologist? Does it mean the end of radiology as a profession? And maybe the end of many other medical specialties, which could be replaced by intelligent machines? Certainly not, as in reality, it won't be different from airlines where the pilots are still in control, when we know they could easily be replaced, or the way drones are flown remotely.

Self-driving cars are not replacing drivers yet, but artificial intelligence is adding multiple levels of security to support the driver. Similarly, AI will assist the radiologist and will alleviate the considerable load of tedious and repetitive tasks that the radiologist has to perform all day long. Ultimately, the radiologist will gain in accuracy and efficiency.

In conclusion, Artificial Intelligence appears to be a new and disruptive technology in radiology. It is certainly a game-changer, but it is more likely to augment and not replace the radiologist.

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



Dr. David Koff

Real work is needed to raise productivity in radiology

BY THOMAS HOUGH

Artificial Intelligence: These two words were everywhere and on everyone's lips at the November Radiological Society of North America conference in Chicago. We've never seen anything like this in Diagnostic Imaging before. Even the excitement over MRI, CT, PACS never reached this level of intensity.

Virtually every vendor was promoting their plans for AI and forecasting how the technology will revolutionize Diagnostic Imaging and healthcare as a whole. The words were evangelical: AI is going to save the world and make DI a much more valuable healthcare tool. The AI message was so strong, it makes one wonder what the truth really is.

Paul Chang, MD was interviewed by Brian Casey, Editor-in-Chief of Aunt Minnie.com on the RSNA floor. Dr. Chang revealed a well-balanced perspective regarding AI. I highly recommend you take time to hear his viewpoint. Be sure to stay to the end of the interview, as Dr Chang reveals what needs to be focused on in order for AI to be effective in the future. Link is https://www.auntminnie.com/index.aspx?sec=rca&sub=rsna_2018&pag=photo&photoID=3671&pno=4

In reality, notes Dr. Chang, we are in the early hype cycle of AI adoption and can only see its potential. There is much work to be done before AI becomes operationalized and delivers real value to healthcare clinicians and patients. The early adopters will be the first to spend big money on figuring out use cases and will evolve AI to the next level – a more useful state of affairs that results

in a better return-on-investment.

Putting AI aside for a moment, what really needs to be done in today's healthcare IT environment is to invest in better workflow.

More needs to be done on integration between IT systems in order for faster, more precise medicine and DI reports to be generated in less time.

As well, solutions of this sort need to be shared across a larger healthcare community. For example, we need the ability to share images and reports across South Western Ontario and to collect exams requiring consultations

from Northern Ontario through an enterprise-wide viewing network. This needs to be extended across Canada, to create a national, connected system. Providing patient information in formats and methods that all clinicians can access will make them more productive and provide better quality diagnoses, in less time.

Imagine the benefits if AI technologies could access the metadata from this pool of information!

Let's now look more closely at vendors. IBM Watson Health has two commercialized products you can purchase today. These products have been through the FDA and are both vendor-agnostic.

The company's Patient Synopsis is an AI solution that searches all meta-data

and images it has access to for relevant info on the patient's current case.

The Synopsis then presents all the data – such as blood work results, pathology, and other lab and surgical notes – using NLP technology to inform the radiologist prior to seeing the current exams. It appears to be a good example of the technology. Radiologists are not about to go out and search like you and I do for a new car on the internet. However, having all the data presented to them prior to the exam images being viewed is a productivity and quality enhancement for both radiologist and patient.

Today, as I write this, GE has announced their filing of an IPO for General Electric Medical Systems (GEMS), which should result in GEMS spinning off as an independent company. If you recall, last year at this time I predicted GE Medical Systems were segmented and ready to be bought. Well, it has come true in a rather smart way.

Rather than shopping the world for someone with billions to spare, and taking months or years to figure out how the two companies can merge, GE is selling the unit to all the people of the world who have money to buy one or more shares.

This also provides cash to the parent conglomerate, which is something they desperately need fast. Other large players are also seeking the best partnership or buyer for their goods and services, and I predict that other firms will be sold or spun off in the year to come. Who? Call or e-mail me and I will tell you my thoughts. tomhough@truenorthconsult.com or 416.433.8543



Thomas Hough

Difficulty of selling to public sector hospitals

CONTINUED FROM PAGE 16

'Contracting Officer' under the FAR) to negotiate when that is the best thing to do to optimize value. Even at the State and local government level, negotiations are often statutorily encouraged across the United States.

Could it be that the premise of procurement myths acting as a barrier to innovation adoption is... well, a myth?

Could it be that healthcare innovation in procurement is impeded by such things as a lack of understanding of the procurement laws that were non-existent just a few years ago?

A lack of regulatory guidance which provides the knowledge and confidence it takes to embrace fresh thinking? And a lack of risk-taking shrewdness that often results in significant new outcomes?

Denis Chamberland is a commercial lawyer with extensive procurement, technology and trade law experience in the healthcare sector in Canada and Europe. He has pioneered various procurement approaches designed to optimize value for hospitals. He can be reached at dac@chamberlandlawcorp.com.

Breast density

CONTINUED FROM PAGE 18

their algorithm so it can more accurately identify women with dense breast tissue who should be recommended for supplemental screening.

“If a woman knows she has dense breasts, even if her screening program didn’t offer additional screening ... at least until it is offered, she would have that information so she could take her health into her own hands,” said Dr. Yaffe. Once women know they have dense breasts, he said, they may be more likely to have a discussion with their family doctor about recommended next steps.

“Supplemental exams are additional money spent in the health system; the pay-off is you’re going to find more cancers,” he said. “And you’re going to find them at an earlier stage when more can be done and the treatment may not have to be as aggressive.”

Advances in imaging tools used for supplemental breast screening include automated breast ultrasound (ABUS), 3D digital tomosynthesis mammography and contrast enhanced mammography, all of

which make it easier to spot cancers in dense breast tissue.

Breast MRI is frequently used for supplemental screening for women considered high risk due to family history and other factors, but it is an expensive test and requires a contrast dye – typically gadolinium – which introduces additional health risks. In the absence of guidelines to recommend supplemental screening for breast dense tissue, however, there is no consistency in how the technologies are applied across Canada.

Dr. Jean Seely, Head of Breast Imaging at The Ottawa Hospital Breast Health Centre, believes there needs to be a better way of communicating breast density to patients and treating physicians, and more awareness that dense breasts will reduce the accuracy of a routine, biannual 2D mammogram.

“If you have 100 women with dense breasts and they all have breast cancer, the sensitivity is only going to be about 60 percent. We’re going to miss 40 percent of those cancers,” said Dr. Seely, referring to the sensitivity of 2D mammogram. “That, to me, is the biggest harm of screening mammography. There are a lot of people

discussing over-diagnosis and false alarms. Women aren’t so worried about that. They’re more worried about the cancer being missed,” she said.

The Ottawa Hospital is one of three Canadian clinical trial sites to participate in the first North American randomized, multi-centre study to assess the effectiveness of tomosynthesis called The Tomosynthesis Mammographic Imaging Screening Trial (TMIST). Also under way at Sunnybrook Health Sciences Centre and in Vancouver under the Screening Mammography Program of B.C., the study is

Dr Jean Seely: There is more awareness needed that dense breasts will reduce the accuracy of routine 2D mammograms.

comparing conventional mammography to the newer 3D method at more than 90 centres to determine whether screening with tomosynthesis will reduce the number of fatal cancers. The trial will enrol 165,000 women by the end of 2020.

“We know from other studies that tomosynthesis is going to help pick up more breast cancers than 2D mammogram, even for women with the most dense breasts,” said Dr. Seely, explaining that the 3D image provided by tomosynthesis makes it possible to see a mass that is obscured by breast tissue because it provides views of a breast in multiple layers.

The CIBC Breast Assessment Centre at the Juravinski Hospital and Cancer Centre in Hamilton, Ontario, opened in 2014 to provide a comprehensive, one-stop site for breast cancer screening, assessment and surgical consult. The centre’s Medical Director, Dr. Kavita Dhamanaskar, said she suspects tomosynthesis will be recommended for all patients in the C and D BI-RAD categories within the next decade.

At the Juravinski centre, one of the goals is to make the breast a sub-specialty of radiology, similar to the way abdominal or neurological specialties are managed, so that patients receive consistent, high-quality care in a fast and accurate manner. Dr. Dhamanaskar said she believes that breast density is an important factor to consider and that patients in the highest categories of density should be carefully managed.

The centre was scheduled to receive its first tomosynthesis machine in January, and is also considering handheld ultrasound

and ABUS for supplemental screening. The challenge, she said, is that supplemental ultrasound is time-consuming and tends to pick up more benign lumps that then require follow up per radiology guidelines.

“It’s extra resource utilization for something that’s not cancerous, so it creates a large amount of flow issues for centres. I’m pro-ultrasound, but I see the hesitation in dedicated breast centres to implement it as a screening tool,” she said, adding that she would recommend ABUS over using a handheld probe for screening by ultrasound because of its ability to scan the entire volume of a breast in a shorter time. “When a province is spending money on a screening tool, it has to be timely, quick, comfortable for the patient and cost effective.”

Each mammogram report produced by the Juravinski centre includes a mandatory reporting of breast density so that patients are informed of their BI-RAD score. “My bottom line is that women should know,” said Dr. Dhamanaskar.

In advance of the CTF recommendations, Dr. Gordon engaged with every provincial health minister and screening program. In a statement released by Dense Breasts Canada, she expressed her disappointment in the new guidelines and maintained that the CTF overstated the risk of over-diagnosis. “False alarms are the main reason not to screen women, but if your general practitioner explains it to you, that there’s a 10 percent chance you’ll get recalled (for supplemental screening or a needle biopsy) even though there’s a one percent chance you have cancer, I think most women understand that,” she said.

Predictions for Canadian healthcare IT

CONTINUED FROM PAGE 10

and hardware, and electronic systems to improve community care. They will likely move towards inter-provincial efforts. For example, the Atlantic provinces may make combined decisions about investments.

The shift from big data to actionable data: Providing the highest quality clinical care to patients with the support of IT can mean, in practice, that clinicians are having to spend ever more time looking for the specific data they need. The analogy of looking for the needle in a haystack is a good one here, and a solution that simply provides more hay is not of itself going to lead to better care. 2019 will therefore see a bigger focus on presenting meaningful data to clinicians, using analytics and predictive modelling to shift our thinking from ‘big data’ to ‘actionable data.’

Blockchain will become ‘PART’ of the solution: Blockchain will see an enhanced applicability in health technology, mainly because it meets the ‘PART’ criteria: Permanent, Auditable, Reliable and Transparent. This enables a key benefit from blockchain — the ability to ensure a reliable single source of truth. Blockchain allows for improved controls on data access by the right parties and is very attractive as a model for storing clinical data. However, there are some potential downsides, including how to re-engineer existing systems and the significant increase in the amount of raw computing power required.

Dr Chris Hobson is Chief Medical Officer at Orion Health.

Intelrad’s new CEO has ambitious goals

CONTINUED FROM PAGE 12

offering that mix of scalability, efficiency and customer service.

As Lepage notes, hospitals in Canada have problems that are similar to DI providers around the world. The growing volume of studies, demands for efficiency and improved patient care, and patient access to their results are all issues in Canada as they are elsewhere.

He mentioned that Intelrad has leading solutions for tying-in referring physicians to radiologists, and has a portal to connect patients to their results.

And it can only be a point of pride that a Canadian company has succeeded internationally, Lepage said.

And he emphasized that Intelrad likes to work in partnership with its clients – it grows through its customer’s successes, a real win/win. He said that listening to their concerns is a top priority. One of the places where Intelrad does this listening is at the annual RSNA meeting, in Chicago. Lepage attended his first of such meetings

last November, and found it a thrilling experience. The busy Intelrad booth, already a large one, is going to be expanded next year to accommodate more customers and more meetings. It’s a great forum for finding out what clients need.

On a personal note, Lepage has his own patient-centred view of the challenges and needs of the healthcare system. He recently battled cancer, and is fortunately on the

The Intelrad booth at RSNA, already a large one, will be expanded this year to accommodate more meetings.

mend. He experienced first hand the MRI scans, and also the trials and tribulations that patients must go through.

“I’m a recent cancer survivor,” he said. “I’m personally very invested in making a difference in healthcare. I’m focused on improving the performance of systems and to improving patient access to care.”

cian enters an ‘admit to patient’ order.

“Single encounter means we can be less encounter-aware and more patient-aware,” said LHSC Director Nursing Professional Scholarly Practice Julia Marchesan. “An opportunity for stress has been taken away ... and we free bandwidth for practitioners to focus on

“Single encounter means we can be less encounter aware and more patient-aware,” said Julia Marchesan.

what we really want them to focus on rather than what our system demands they focus on.”

The single encounter project was led by Clinical Informatics, Clinical Appli-

cations, Clinical Solutions, in collaboration with Leaders and Physicians across all hospitals. The majority of the programming effort was completed in-house, supported by Cerner consultants as needed. When the system went live, less than 100 help desk tickets were logged, none of which were severe.

“This was one of the most complicated initiatives the team has ever had to embark on,” said Olanski, adding that the successful implementation speaks to the high level of expertise within the ITS portfolio and the strong partnership between ITS and clinicians.

“We really focused on consistent messaging and tried to emphasize the why behind why we’re doing this, not coming from the place of a technology-driven initiative but more from a patient safety and quality perspective,” said Olanski.

Single encounter

CONTINUED FROM PAGE 4

documentation for nurses and physicians, device integration and advanced analytics. It is also speeding up the process of assigning beds to inpatients, meaning patients are spending less time on stretchers in Emergency.

Specifically LHSC generally runs at more than 100 per cent occupancy. Prior to transitioning to single encounter, physicians would create an inpatient encounter for patients being admitted to hospital from Emergency. Clerks would watch for the order and notify Admissions to make a patient transfer request. Single encounter automates that step, sending a notification to start the bed hunt the moment a physi-

New facilities can enhance treatment for children with disabilities

BY ROBERT HOFMANN

In January 2018, ErinoakKids Centre for Treatment and Development (ErinoakKids) first opened the doors of three technologically advanced facilities that significantly enhance the treatment experience for children with disabilities.

ErinoakKids is Ontario's largest Children's Treatment Centre and serves a catchment area comprised of the Regions of Peel, Halton and Dufferin County, with a population base of greater than 2.5 million. The organization provides a wide range of services, serving clients with disabilities and chronic disorders including spina bifida, cerebral palsy, traumatic injury, muscular dystrophy, autism, developmental delay, and hearing and/or vision problems.

The new facilities are located in Brampton, Mississauga and Oakville communities and consist of a total of over 290,000 square feet of newly built space and 60,000 square feet of newly built exterior therapy space, hosting 850 staff and serving 17,000 clients annually.

Legacy facilities had consisted primarily of leased office spaces that had been transformed into exam rooms, treatment rooms and gyms. These converted office buildings significantly lacked current accessibility standards, acoustic properties and natural daylight. As well, they had numerous space and building code deficiencies. Exterior therapeutic play areas were significantly lacking and technology was outdated. All while demand for services was increasing at a rate of 10 percent to 20 percent annually.

When ErinoakKids was given the opportunity to create these three new children's treatment facilities, they were empowered with new therapeutic possibilities. Key design principles of the new facilities were established very early in the planning process by ErinoakKids as being:

- The provision of accessible space for all children;
- Focus on the impact of environment on children with autism;
- Focus on the impact of environment on medically fragile, technologically dependent (MFTD) children;
- Normalization of therapy for behavior



Multi-sensory stimulation rooms offer a relaxed environment with soothing sounds, aromas and vibrations.

ial skills, occupational therapy and physiotherapy; and

- Using the facilities as a therapy, learning and teaching tool.

Unique to the design of these healthcare facilities, ErinoakKids investigated the environmental experience of how children could interact with the building as a form of treatment.

Ages of ErinoakKids clients range from newborn to 18 years and it was also important to senior leadership that all ages of clients feel welcomed and engaged. The design therefore needed to incorporate unique principles of being "child friendly" but avoid the sense of being "child-like."

In order to achieve these child friendly goals, ErinoakKids focused on how technology could improve the impact of environment for all ages, such as voice lift systems for meeting spaces and for use throughout the facilities for clients with hearing disabilities, audiometric equipment, rehabilitation equipment and climbing walls.

Four specific examples of clinically focused technologies that are successfully enhancing the client experience in the new facilities today are described further as follows:

- Multi-Sensory Stimulation Rooms – multi-sensory environments at each facility offer a relaxed atmosphere for clients.

These rooms offer many sensory possibilities such as soothing sounds, aromas, tactile experiences, massage, vibration and gentle movement. Opportunities for interaction and engagement support a number of ErinoakKids client groups including occupational therapy and children with challenging behavior, learning disabilities and/or autism. Equipment in these rooms include image projectors, interactive wall panels, bubble tubes, wall and floor cushions and a ball pit. The design of the rooms and the supply and installation of the equipment was procured through a competitive tender process, which was awarded to Flaghouse, an official distributor of Snoezelen Multi-Sensory Environments;

- Audio Visual Recording – Treatment rooms within the new facilities were designed with audio visual recording capabilities. These systems allow clinical staff the opportunity to either broadcast live or to record treatment sessions for client files and for staff training purposes. The live broadcast and recording system is a secure, closed circuit configuration, specifically designed with strict confidentiality constraints. Observation rooms are strategically placed within the facilities to allow parents and staff the opportunity to watch live sessions remotely. During the design stages, ErinoakKids clinical subject matter

experts had expressed concerns that, in the past, parents or care givers observing a treatment session from within the room often become a distraction for the children. Remote observation rooms, equipped with video monitors and audio head-sets with password encrypted access, now enable parents to be fully engaged in viewing live or recorded sessions while avoiding the potential of causing disruptions;

- Audio Visual Interactive Mirrors – As a learning tool within the Autism program, mirrors were equipped with LCD screen monitors, which allow the play back of various educational and self-learning programs. The mirrors are installed in the autism washrooms and are used by clinical staff to teach the children washroom techniques, such as hand washing and brushing of teeth. When the audio-visual system is not in use, the screen is hidden within the reflection of the mirror to avoid potential distractions to the clients.

- Truth Windows – Openings in interior building surfaces, protected with transparent glazing, were created to reveal inner components within the walls, ceilings and adjacent rooms of the new facilities that visitors would not normally have the opportunity to view. The truth windows serve two purposes. First, to gain educational credits related to Leadership in Energy and Environmental Design (LEED) Certification, which supports the LEED Silver designation submission for the new facilities; second, as an interactive, entertaining and educational opportunity for clients and families. Examples of truth windows include an opening within the elevator shaft to reveal inner workings of the elevators and openings within Information Technology (IT) closets and server rooms to reveal the IT equipment.

Robert Hofmann, Principal of Hofmann PM Inc., is a specialist in Public, Private and Institutional Capital Redevelopment projects, with a focus primarily in the health care sector. He recently completed a development for ErinoakKids Centre for Treatment and Development, a 290,000 square foot development of 3 new Children's Treatment Facilities in Halton and Peel Regions. Robert Hofmann can be reached at Robert.hofmann@hofmannpm.com; or at 647 287-5315.

Poverty screening

CONTINUED FROM PAGE 14

Ontario families live in poverty – about 1.57 million persons. At the same time, she noted that 50 percent of a population's health is determined by social and economic environment, according to recent studies.

Indeed, all of the following have been strongly correlated with a person's environment: diabetes, asthma, arthritis, cancer, COPD and mental illness.

"Often, doctors don't have the resources, and we struggle with how to help patients living in poverty," said Dr. Elia.

The computerized intervention devised through the Centre for Effective Practice has been identified as a step in the right direction.

The tool was developed in partner-

ship with CognisantMD, which produces Ocean software, a system that helps automate information gathering as patients arrive at a clinic. Also involved is 211Ontario, a free helpline and online database of Ontario's community and social services. The Centre for Effective Practice has been producing other tools used in clinics; the one created for this project has been optimized to screen for patients struggling financially.

In the pilot, staff and clinicians at the four clinics were first given education about the topic and training on use of the tool. Dr. Elia said it wasn't difficult to implement at his clinic, as the office had already been using Ocean questionnaires to gather patient information.

All patients over the age of 18 were given tablet computers, on which the form to screen for poverty would pop-up. Questions included such examples

as, "Do you ever have difficulty making ends meet at the end of the month?" and "Have you filed your taxes?"

Not only does the tool effectively identify at-risk populations, importantly, it also provides physicians with sets of local supports and resources for patients.

50 percent of a population's health is determined by social and economic environment, according to recent studies.

Low income patients who haven't filed their taxes – because they fear they might have to pay – are often entitled to tax refunds. The tool shows doctors how to connect their patients with the right resources in order to file their returns and receive these refunds.

Other social supports are also available, making it much easier for physicians and their staff to help patients in need.

The Ocean tool integrates with EMRs, and can automatically create reminders on follow-up visits to inquire about different issues.

After the pilot project ended, each of the sites had the option to stop using the tool. However, they all wanted to continue using it, Stapon said.

Now the Centre for Effective Practice wants to spread the resources to other primary care practices in Ontario. They have created a modified version of the tool for Telus PS suite physician systems, to start. Eventually, they'd like to make the tool available for all EMRs in Canada.

Those who are interested in more information can visit cep.health/poverty

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