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PHOTO: DOUG NICHOLSON, SUNNYBROOK HEALTH SCIENCES CENTRE

Dr. Ed Etchells, Dr. Andy Smith and Sam Marafioti, at Sunnybrook Health Sciences Centre, are leading the drive to create a Canadian EHR that improves clinician workflow and reduces costs. They have teamed up with Evident, and will combine the Sunnybrook-developed SunnyCare workflow system, which eases the way EHRs function, with Evident's array of clinical solutions, such as lab and pharmacy.

Sunnybrook partners with Evident, creates new EHR

BY JERRY ZEIDENBERG

TORONTO – Sunnybrook Health Sciences aims to shake up the Health Information Systems (HIS) market through a new partnership with Evident, a unit of Computer Programs and Systems Inc. (CPSI) of Mobile, Ala. Sunnybrook will be joining its clinical workflow system – called SunnyCare – with Evident's Thrive platform, including a constellation of solutions for lab, pharmacy, imaging and more.

Together, they are creating an "easier-to-use" and cost effective HIS that will be marketed to hospitals throughout Canada, as well as in the United States.

"Together, we're producing something that is disruptive," said Sam Marafioti, Vice President of Corporate Strategy and CIO at Sunnybrook. "Disruptive in a good way."

He explained that one of the biggest problems faced by clinicians today is that electronic solutions are difficult to use and often create more work for doctors, when they're supposed to reduce their workload. Recent articles in U.S. publications have lamented that physicians are often working into the night to complete patient reports and documentation.

Sunnybrook and Evident believe they can disrupt the EHR marketplace in Canada.

By contrast, Sunnybrook has spent the past four years refining its SunnyCare front-end, which was designed by clinicians for clinicians to smooth their workflow and reduce the time spent on documentation.

One of the major advantages of the SunnyCare solution is its use of speech technology. Instead of typing notes into the computer at the end of the day, clinicians can dictate while seeing patients, or shortly afterwards, and the voice-notes are converted into text-notes in the SunnyCare patient record.

"We want an HIS that improves clinician

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Sunnybrook Health Sciences partners with Evident, creates new EHR

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efficiency and supports effective, safe care," said Dr. Edward Etchells, Medical Director of Information Services at Sunnybrook. "Our clinicians are telling us that SunnyCare is the best, easiest to use HIS they have worked with. One clinician last week told me that her working life has been enhanced by SunnyCare."

Speaking at the Internet of Things for Healthcare conference, held in Toronto in June, Sunnybrook President and CEO Dr. Andy Smith said the hospital's SunnyCare system promotes wellness for physicians, when many other EHR systems are causing burnout and fatigue.

Marafioti said the speech technology used in SunnyCare has smart features that have rapidly improved in recent years, due to the rise of intelligent algorithms and the spectacular increases in computing power.

"Speech is the future," he said. "We're not experiencing death by a thousand clicks, we're moving to no clicks."

Speech technology is enabling Sunnybrook's clinicians to spend more time with patients, instead of typing. "It's this kind of innovative and clinician centered workflow that made SunnyCare a perfect fit for us," said Boyd Douglas, President and CEO of Evident. "We are committed to continue to find ways to reduce the burden of documentation for clinicians. It's better care for patients".

The front-end also looks and acts like standard, web-based systems, so it's easy to learn how to use, said Marafioti. "It's intuitive. We haven't needed to invest in training, the users catch-on quickly and train themselves. We've really tried to use consumer technologies as the model, so that people are already familiar with the solution."

The system also allows clinicians to configure their own views, so they see information the way they like.

On the cost front, the Thrive HIS enjoys another advantage: it's much less expensive than the systems being offered by competitors.

"The Thrive system from Evident is significantly cheaper than the cost of the competitors," Marafioti said.

For its part, Evident has more than 900 customers in the United States using the Thrive electronic health records system. The company has been in business for 40 years and has been largely serving small to mid-sized community hospitals.

However, it wanted to expand on two fronts – internationally, and into the market for larger, academic hospitals. To do it, it is partnering with Sunnybrook, which is giving Evident a foothold in the Canadian marketplace and a new strategic advantage, with the front-end SunnyCare system that makes their HIS significantly easier to use by clinicians.

At a time when many EHRs are leading to physician burnout, SunnyCare is promoting clinician wellness, Dr. Smith said.

In partnership with Sunnybrook, it is launching an Innovation Centre on the Sunnybrook campus.

The centre will initially employ 35-40 persons – made up of engineers, programmers and clinicians from both organizations – to integrate SunnyCare with Thrive and continue developing the system.

Marafioti noted that as Canadian centres acquire the new Thrive solution, they will benefit from the Innovation Centre.

"They will be able to put people on the advisory council, and can help determine what is developed in future," he said.

He noted the development centre will be working to extend the solution to embrace virtual care. "This is a major issue," said Marafioti. "We can use technology to manage patients in the community, so they don't have to come into the hospital."

He said that artificial intelligence will be top-of-mind for the developers, as automated systems can easily monitor remote patients and reduce the need for human resources. "We'll have to be in the AI business," said Marafioti.

He observed that many Canadian hospitals are currently in a position of renewing their hospital information systems. Evident will be offering the new Thrive system, with its made-in-Canada SunnyCare front-end, as an option.

For Ontario hospitals, the Sunnybrook-Evident partnership offers another benefit. Sunnybrook is already deeply involved in one of the proposed Ontario Health Teams, and is working with regional partners to create a network of care providers that is electronically connected. Marafioti said this expertise can be transferred to other teams.

"It's another way that we can help solve problems for hospitals," said Marafioti.

They're also aiming to improve the healthcare experience of patients, he said. Both Sunnybrook and Evident are leaders in the use of patient portals.

For its part, Sunnybrook created the MyChart portal (not to be confused with the Epic patient portal of the same name), and the Sunnybrook-devised system has been adopted by hospitals across Ontario. In April, it was also adopted by Fraser Health, in British Columbia.

Meanwhile, in May, Evident announced the acquisition of Get Real Health, a company based in Rockville, Md., that has implemented its leading-edge patient portal in Alberta and Saskatchewan.

Marafioti said Sunnybrook hopes to work closely with Get Real Health to further refine the solutions of both organizations and to extend patient portals into other parts of Canada.

"MyChart has been an academic project that turned out to be highly successful," said Marafioti. "It has succeeded in empowering patients."

Now, he said, Sunnybrook is eager to work with Evident and Get Real Health "to design the patient portal of the future."

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St. Joseph's connects clinicians with post-op patients via 'virtual visits'

BY JERRY ZEIDENBERG

HAMILTON, ONT. – St. Joseph's Health System (SJHS) is using video visits to connect clinicians with discharged surgical patients at home.

The video-based care builds on St. Joseph's use of one phone-number access to an integrated care team, around the clock, for discharged patients and provides another dimension of support in their homes.

The video service was launched in January of this year, in conjunction with the Ontario Telemedicine Network (OTN), St. Joseph's Healthcare Hamilton (Hospital) and St. Joseph's Home Care, and started with patients discharged from thoracic, hip and knee surgeries.

Once at home, the patients can use computers, tablets or smartphones to interact visually and by voice with a coordinator who is able to answer their questions and can connect them with other members of the care team. Virtual "face-to-face" visits can be scheduled with clinicians, home care nurses, and the patients access these visits through a digital patient portal called MyDovetale.

Since 2012, St. Joseph's has pioneered a new model of care called Integrated Comprehensive Care (ICC), which gives patients and their families access to One Health Team, One Digital Record, and One Number to Call, 24/7.

Patients first meet their ICC coordinator while in hospital, to receive discharge information, learn about the ICC program and support they will receive at home. Once the patient is in the community, the ICC team uses 'virtual rounds' to discuss patients and their care plan together.

Everyone is in the loop and patients don't repeat their information every time.

"We're the first Hospital in Ontario to use integrated virtual care software, outside of the Ontario Telemedicine Network OTNhub, to support our patients," said Andriana Lukich, Program Manager.

The video service is integrated with the hospital's new Epic information system (branded as Dovetale), so that clinical records, including diagnostic images and lab test results, can be pulled up and shared while the meeting is going on.

Clinicians can write notes and update the records while they're conducting the video encounters. The proof of concept is now being expanded to new patient populations at St Joseph's and has paved the way for OTN's new Partner Video Project initiative, Lukich said.

The pilot project discovered that virtual visits are not for everyone. Some patients struggled with the technology, and small factors like lighting and avoiding the mute key on a phone could hinder interactions with clinicians.

For that reason, the standard telephone is available for all patients – it's still the easiest way to reach the ICC team, any time night or day.

Secure Messaging through the MyDovetale patient portal is also offered.

Lukich and hospital Chief Information Officer Tara Coxon discussed St. Joseph's virtual care solution at the Technology & the Future of Healthcare conference, held in Hamilton in May.

The ICC program has been further enabled by St. Joseph's Healthcare Hamilton's implementation of Epic (Dovetale), which went live at St. Joseph's in December 2017. At that time, said Coxon, St. Joe's became a digital hospital and jumped to HIMSS EMRAM Stage 6. "Previous to that, we were at EMRAM 1.2," she said. "It was an over-night transformation."

St. Joseph's Andriana Lukich spoke at the Technology & the Future of Healthcare Conference, in Hamilton.

The Epic implementation at St. Joseph's Healthcare Hamilton was named Dovetale to signify the joining of technology with compassion. The system is helping to smooth out some of the pain points in Ontario's healthcare system, specifically the hand-offs that occur when patients move from one level of care to another.

In one recent instance, a lung cancer patient who underwent surgery at St. Joseph's was discharged home to Beamsville, only to discover that his wound seemed abnormal. He was worried it might have become infected.

He contacted his ICC coordinator at St. Joseph's using the one-number service, and she instigated an ad hoc video visit to view the wound in real-time and determined that the patient should receive care right way.

This was arranged through St. Joseph's Home Care, and on the same day, a visiting nurse travelled to the patient's home and changed his wound dressings. She also updated his chart, right on the spot.

St. Joseph's is making medical records available to the patients themselves through the use of a portal – called MyDovetale. "We were hearing that patients wanted better access to their records, and that they wanted their records to be accurate and accessible throughout the system," said Lukich.

In the summer of 2018, St. Joseph's went live with the MyDovetale portal, extending it to patients in the mood disorder and kidney transplant clinics.

Patients can access their records on any platform, but it's been found that smartphones are now the most popular device. Access can be given to family members, loved ones and members of care teams. Lukich said that 88 percent of patients report that MyDovetale has allowed them to take better care of themselves. Meanwhile, the video visit service has saved some patients two to three hours of travel time.

Patients have been asking for enhancements to the MyDovetale solution – in particular, they'd like to see prescription renewals and diagnostic imaging reports made available on the system.

MyDovetale will soon be rolled out to 80,000 more patients – an organization-wide rollout.

According to St. Joseph's, the ICC program has resulted in a savings of up to $4,000 per patient, a 30 percent reduction in emergency department visits and 30 percent reduction in hospital readmissions with a 98 percent patient satisfaction approval rating. It's doing this by enabling patients to stay comfortably in their homes, getting the reassurance or care they need without visiting the hospital.

The program has been so successful that Ontario's health ministry would like to expand it to other healthcare providers.

"Already, St. Joseph's has coached over 30 other organizations on how they might implement an ICC model of their own," commented Fraser Edward, VP Partnerships at SJHS.

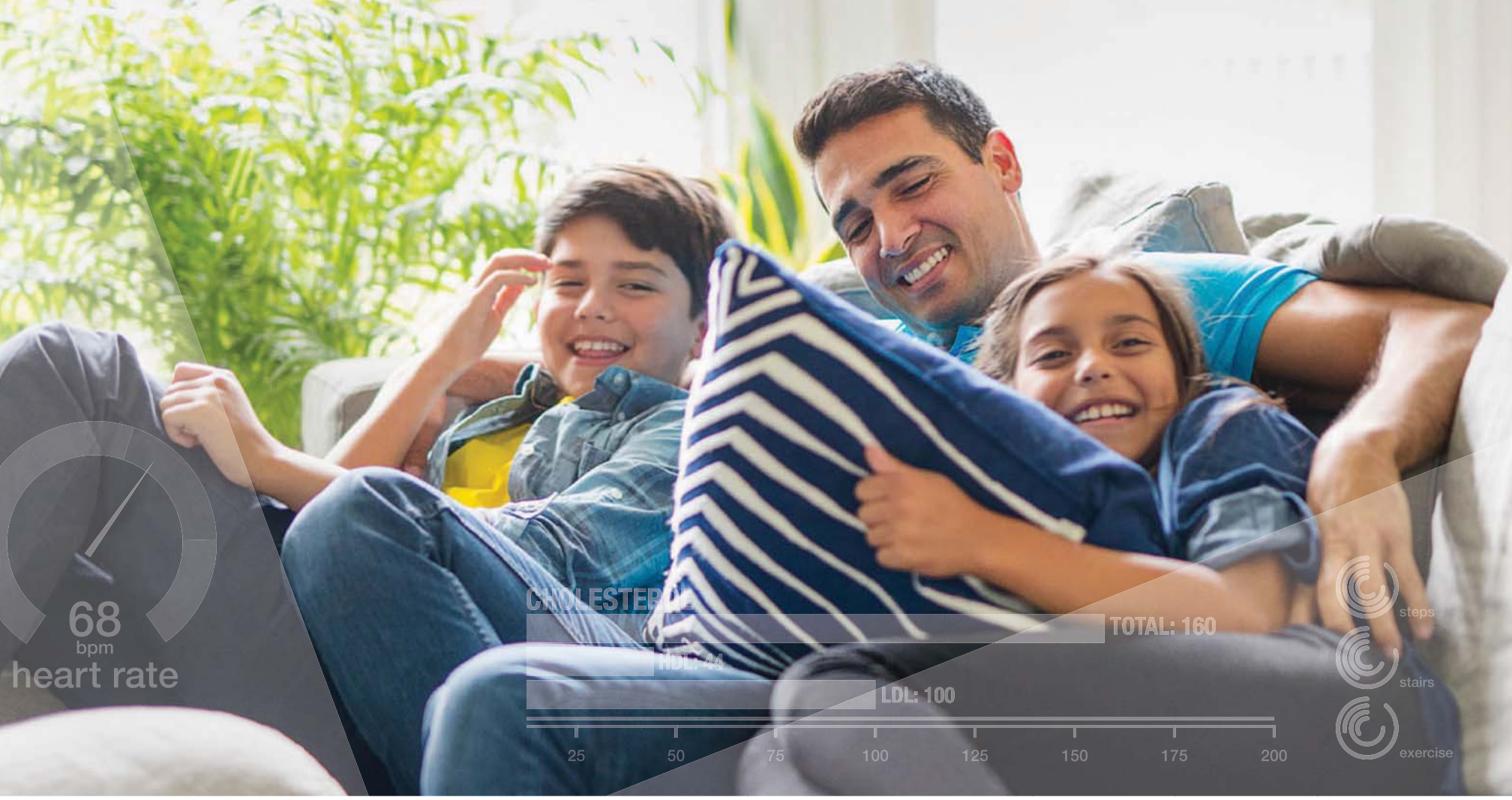
"We have established the Centre for Integrated Care to help support Ontario Health Teams and other healthcare providers wrap physical and virtual care around the needs of patients and their families." For more information, see: www.sjhs.ca/integratedcare/cic/

Robot in development for home care – will do windows

MONTREAL – The latest in robotics research and innovation was unveiled in May at the International Conference on Robotics and Automation (ICRA). It's the world's largest robotics event, and representatives from 71 countries participated.

Among the innovations showcased was "Eve," a humanoid home healthcare robot by Norway-based Halodi Robotics. The full-size robot, which operates silently and safely interacts with people, is geared towards helping seniors live at home longer by assisting them with everyday tasks such as helping to prepare and serve food, daily hygiene and tidying up.

"Eve gives the elderly the freedom to get things done whenever they want, instead of waiting for a healthcare provider to arrive," said Halodi Robotics CEO Bernt Oivind Bornich. "Not only does this give the elderly more independence, but enabling seniors to stay at home longer translates into cost savings for the healthcare system." Eve is expected to be piloted next year and commercially available in 2022.



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A sea-change is about to hit primary care, as virtual visits increase

BY JERRY ZEIDENBERG

HAMILTON, ONT. – On stage at a physician technology conference in May, Dr. Richard Tytus asked the audience – a hall filled with family doctors – how many of you are using virtual care in your practices today? Only four doctors raised their hands. "We're hoping that number will be 100 at this time next year," said Dr. Tytus.

A former president of the Hamilton Academy of Medicine and currently a board member of both the OMA and CMA, Dr. Tytus was co-chair of the Technology & the Future of Healthcare conference.

He went on to describe how family doctors have been practicing medicine the same way for the past century, in many cases without improvements in patient outcomes. He argued that it's time to introduce virtual visits as a major advancement.

Dr. Tytus pointed, as an example, to the population of downtown Hamilton – an area that contains many marginalized patients. "In the past 10 years, their life expectancy dropped by a year-and-a-half and ER visits increased by 30 percent."

The problem, he said, is that physicians are practicing medicine the same way as they were 10 years ago, and getting the same results – or sometimes even worse outcomes. "It's time to remove the barriers to care," said Dr. Tytus.

He himself has been using virtual care with considerable success. In the past few years, he and Dr. Dennis DiValentino, also based in Hamilton, have developed a telehealth system using Reacts, a two-way videoconferencing platform.

Dr. Richard Tytus noted a pan-Canadian task force is currently working on a report about virtual healthcare.

While the doctors can remain in their offices, using a desktop computer, a visiting nurse carries a laptop computer into the home of the patient. Not only can doctor and patient then see each other, via videoconferencing, but an array of medical devices can be attached to the laptop.

"We can do a complete assessment, using stethoscopes and otoscopes," said Dr. Tytus. And if blood work or urine samples are needed, they can be collected by the nurse and later picked up by the lab.

The solution replaces face-to-face meetings with electronic interactions. Dr. Tytus asked his audience, "Is it as good?" He quickly answered, "I think it's better."

He noted that using the virtual visit, he actually spends more time with the patient.

And you're reaching patients that may not otherwise see a doctor. He gave the example of one of his patients, a 400-lb. woman who lives a block away from his office. "She hadn't had healthcare for years," as she had trouble getting out of her home. By using virtual visits, "Now she's getting primary care."

In another instance, Dr. Tytus talked with a female patient about her UTI symptoms as she took a train into downtown Toronto. "By the time she got off the train, I had sent a prescription to a pharmacy near her workplace, to be picked up."

Her response? "Now that's service."

Dr. Tytus noted that virtual visits aren't only for remote patients in rural locations. They could be located around the corner.

They make it easier for a host of patients to receive care.

By going right into the homes of patients, moreover, many medication errors can be eliminated, as doctors can see what the patients are taking.

He explained that after discharge from hospital, some patients are given new meds, but they continue taking their old ones at home, as well – something they shouldn't be doing.

"We can reduce the re-admission rates," said Dr. Tytus, who noted that many re-admissions stem from preventable medical misadventures, what used to be called medication errors."

And of course, it's healthier to stay out of a doctor's waiting room that's filled with sick patients, many with colds and coughs. That's especially true for the elderly or patients with compromised immune systems.

As Dr. DiValentino observed, "One day people will wonder why we did [office visits]. Why risk getting sick, or paying for parking, or having to leave work to see the doctor?"

He quipped, "The only time you'll go is if the doctor has to put a finger somewhere."

Indeed, earlier this year the CMA launched a task force on virtual care to see what's needed to implement these solutions across the country. Dr. Tytus said the recommendations will be ready by spring 2020.

Top of mind will be how to remunerate physicians who use virtual visits. Currently, Dr. Tytus and Dr. DiValentino provide virtual visits on a pro bono basis, to improve the health of marginalized patients. If virtual care is to become ubiquitous, however, standardized methods of compensating doctors are needed.

Healthcare projected to be largest sector transformed by Blockchain

BY DIANNE CRAIG

TORONTO – Speaking at the Blockchain Revolution Global Conference earlier this year, technology guru Don Tapscott said, "We think healthcare might be the largest industry to be transformed by blockchain." Included with medical providers would be healthcare manufacturers, wholesalers, pharmacies, and insurance companies.

Tapscott, Executive Chairman, Blockchain Research Institute, cited the University Health Network (UHN) and how they are using blockchain for patient, provider and researcher identity, as one important example.

At a panel session titled Building Blocks for Future Healthcare, Dr. David Jaffray, the Executive Vice President, Technology and Innovation for UHN, said it is time for a transformation in how data is collected and managed. "More of a partnership needs to develop," he said.

UHN is one of the "data hoovers", noted Dr. Jaffray, and "we have to start thinking differently about how we structure our approach to data, and delivery of care to patients, in a way that's much more equitable, much more empowering for patients."

But we've also learned we're not built for it, he said, noting the current paradigm of data consists of silos of information stored for the providers to use, which doesn't necessarily foster collaboration with patients or researchers. UHN worked with the Government of Ontario on an initiative called Project Spark to allow innovators and start-up companies to get access to the info in these silos.

"There were so many documents that have to be signed off to get access to your healthcare data in those silos," recalled Dr. Jaffray. "We need to think about different paradigms, a different approach," he said.

Following a soul-searching process at UHN several years back, where they asked 'why do we exist?", and concluded it was to serve the needs of the patient, UHN launched the myUHN patient portal in 2017. Now 75,000 individuals are using it. "Sharing data, or letting them share data with others, is a critical paradigm reform. In fact it's going to be their data. We are just as interested in their FitBit data moving forward ... so that paradigm is clear," said Dr. Jaffray.

"There's strong evidence that patient participation in their healthcare improves outcomes. And we believe it can be unleashed with a value through the blockchain paradigm," he said.

He said it comes down to two things: security and consent. How do we bring tools forward to empower humans to participate in sharing their data? He revealed UHN has worked with IBM's Hyperledger framework and the Ministry of Health to develop a prototype. "This changes more than everything ... there's way more that's going to be possible with this technology," he said.

> **Blockchain provides a solution that disparate systems can hook into ... and also provides privacy and security.**

In a session titled Re-Imagining Privacy: Building Trust through Patient Control and Consent, Selina Brudnicki, Program Lead, Digital Patient Experiences, UHN, observed, "the reality is patients have never been able to gain control. We're finding patients have no visibility into their health data and where it lives. Patients want their information through portals, personal health records, and apps focused on a person's condition."

Patients are feeling a lack of trust, she adds. "They want to know that whoever has accessed their data is trusted. And we want also to know that systems we develop in future are private and secure."

"We have partnered with UHN, one of the largest academic hospitals in Canada," said Brian Addeman, Blockchain Market Leader, IBM Canada, noting together they are developing apps for researchers to connect with patients.

"Blockchain provides us with one system that disparate systems can hook into and also provides us with the security via privacy rules," said Brudnicki. "Blockchain creates a ledger of all the transactions – and also can show a patient when things were changed. It lets them select, for example, "I only want to share my psychiatric info."

"We're proposing a Blockchain Content Gateway, which includes a new user interface that allows patients to access (their information), and is also a way for researchers to access patients," she said.

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Home dialysis system transmits nightly session results to care teams

BY STEVEN GALLAGHER

Inside his Niagara Falls home, the machine that acts as Luc Lessard's kidney is asking him to enter information about his health. Luc records his blood pressure, weight, temperature and heart rate on the touch screen.

Luc is using the innovative Amia system, a peritoneal dialysis cycler that is improving care and increasing independence for people who receive dialysis at home.

Niagara Health, a regional healthcare provider, was one of the first hospitals in Ontario to introduce the system, and now has more than 20 home dialysis patients using the technology. It's another example of how Niagara Health is providing more seamless care outside of its hospital walls.

For Luc, who suffers from kidney failure, the Amia system acts as his personal navigation system. It guides him through his treatments enhanced by simple voice-guided, step-by-step directions and full-color animations.

The Sharesource system also connects him remotely to his healthcare team in the Kidney Care Program at Niagara Health's St. Catharines hospital.

Every day, the team can view results of Luc's nightly dialysis sessions and other important health information on a computer dashboard. Any issues are flagged, allowing his care providers to address them in real time.

In the past, Luc, a married father of seven and an elementary school vice-principal, would record that information in a binder and present it to his healthcare team at his monthly appointment at the hospital's Kidney Care clinic.

"It's like having a nurse at home 24/7," says home dialysis patient Luc Lessard, an elementary school VP.

"It's like having a nurse at home 24/7," the 52-year-old says of the new technology. "I feel secure. The nurses are seeing things that I know they can use to help me immediately."

The healthcare team's ability to monitor treatments remotely improves patient safety, provides more seamless care and helps to reduce visits to Emergency Departments and kidney care clinic. It has also reduced the need for in-home nursing support.

Recently, Luc received a call from a nurse at the St. Catharines hospital who told him his blood pressure was low.

"They adjusted my medication right away," he says. "I didn't need to go to the hospital. I didn't have to wait a couple of weeks for an appointment. I feel like I'm being taken care of right away."

Arden Gibson, a Peritoneal Dialysis Charge Nurse, is one of the nurses monitoring Luc's health remotely from the St. Catharines hospital. She says the new system is a remarkable development in her 30 years of caring for home dialysis patients.

"It's a dream come true," she says. "I like to know everything about my patients and now I do. I can look every day and see if there are any issues."

Arden says the system is easy to learn for patients, allows them to "take charge of their dialysis" and empowers them to become partners in the care of their chronic condition. It has also helped people to feel more comfortable about receiving dialysis at home, rather than travelling to a hospital or other healthcare setting three days a week to receive the life-sustaining treatment.

"Everything is right on the machine," Arden says. "They can hear, read and see the instructions. If they have a problem, they can call the manufacturer Baxter's technical assistance resource team 24/7. Patients can place their own telephone handset on the back of the machine, and the machine explains the issue to the technical support team. It really takes the pressure off the patient to explain what's happening."

"With the Sharesource platform, Baxter is advancing dialysis care by improving the patient experience as well as their treatment," adds Victoria Jurincic, Baxter's Business Unit Head, Renal Care and Acute Therapies. "Clinicians have told us that having visibility to patient data allows them to make clinical decisions in a more timely manner, and at times, allows them to be proactive in addressing potential barriers to treatment. Patients want to be at home and are comforted knowing their healthcare teams are monitoring their care. Clinicians want to offer the best, most effective care by bringing that care closer to home. This technology allows us to facilitate both."

Luc says he's thankful for the difference it is making in his life, including increased independence.

"I find it a lot easier to use," he says. "It's like brushing my teeth in the morning and at night; it's part of the routine."

Steven Gallagher is a Communications Specialist at Niagara Health.

Mackenzie Health to install 'smart' systems at patient bedsides

BY JERRY ZEIDENBERG

RICHMOND HILL, ONT. – Mackenzie Health is investing in "smart" interactive bedside systems for patient rooms at its new hospital, called Mackenzie Vaughan Hospital. Currently under construction, the 1.2-million square foot hospital is scheduled to open in late 2020.

When that happens, each of the 350 beds at the hospital – mostly in private rooms – will feature bedside computers, along with a 60" monitor on the wall of every room and a tablet computer right outside the door.

Rather than being standalone systems, each component will be integrated with the hospital's Epic information system and will offer useful information to patients and clinicians. Altogether, the multi-faceted audio-visual technology is expected to raise hospital efficiency and improve safety, quality and patient outcomes.

Mackenzie Health is buying the solution from GetWellNetwork, of Bethesda, Md. It's the first Canadian installation of the company's GetWell Inpatient system, which has been implemented at healthcare sites across the United States and around the world. FlexITy, of Richmond Hill, Ont., is the Canadian distributor for GetWellHealth in Canada and will be assisting with the implementation.

"Many hospitals have bedside systems, but they're mostly for entertainment, while a few have nurse-call and meal ordering," said Richard Tam, Executive Vice President and Chief Administrative Officer, Mackenzie Health. "This new system brings all that together, and then some."

In particular, he pointed to the connection with the hospital EMR. "There is integration with the clinical side, and that will be the differentiator." Tam pointed out that the GetWellHealth system will display patient charts to doctors and nurses at the bedside – not only can clinicians get quick access to information, but they can also discuss results and images with patients.

Moreover, educational modules will be available to patients in several languages. In addition to English, Chinese and Russian are popular languages for patients in the Mackenzie Health catchment area, and the educational systems will inform patients of what they can expect during their hospital stays – including upcoming procedures and medications – and what will be needed afterwards in a comfortable language.

Mary-Agnes Wilson, Executive Vice President, Chief Operating Officer and Chief Nurse Executive, Mackenzie Health, explained that once patients are settled in their rooms, their nurses will provide them with customized education modules.

"Nurses can assign packages tailored to their patients' needs," said Wilson.

> **Educational modules will be available on the bedside monitors, informing patients about their procedures.**

"These educational packages will contain important information about things like exercise, diet and medications. We see them as educational prescriptions."

She noted the nurses and health care professionals will be able to see whether their patients have looked at the educational materials, and for how long. "The goal is to ensure we're helping all patients access important information about their health and wellness, while also giving them the opportunity to access entertainment, when they choose. They can also take control of their environment, order meals and much more."

The tablet computers mounted outside the patient rooms will provide useful information to clinicians and families entering – such as whether the patient is under infection precaution or is at risk of falling.

And the large, 60-inch monitors on the inside walls of the rooms will offer a variety of information and entertainment programming. They, too, will be integrated with the Epic HIS, and will greet the patient with a welcome message after checking in. They can tell the patient who the attending physician is, and who their nurse and healthcare team is.

Mackenzie Health will start testing the system at Mackenzie Richmond Hill Hospital in mid-2020, which will also have many of the same features after 2020. A lot of fine-tuning needs to be done before the rollout at the new hospital. "We have a lot of work to do on the software and integration side to ensure that we're best supporting patients, families and health care professionals and teams," said Tam.

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Digital recreation platform helps older adults lead healthier lives

BY REBECCA IHILCHIK

As Canadian life expectancy rises, so does the chance that older adults will struggle with isolation – a risk factor for ill health.

It's a problem that innovator Charles de Vilmorin knows well. For years he watched his grandmother, who lived with Alzheimer's, spend her days alone in her nursing home room, bored and lonely.

He found resident engagement – involving older adults in recreational activities like music and games – an effective antidote. At the same time, he saw frontline recreation staff struggle to deliver personalized care using paper-based tools – an enormous challenge when there can be up to 100 residents per staff member to engage.

Inspired, de Vilmorin co-founded Linked Senior, a platform that digitizes workflow to help staff engage residents in meaningful and personalized activities. The program offers access to cognitive exercises, music, interactive games, and trivia, and is suited for older adults with a wide range of physical and cognitive abilities, including dementia.

But even with a tool like Linked Senior, recreation staff face a bigger challenge: convincing institutional leadership to prioritize resident engagement.

"There are still homes in North America where the activity budget is one dollar per resident per month," says de Vilmorin. "And that's because there isn't enough evidence yet of the correlation between resident engagement and clinical and financial benefit."

Linked Senior is a platform that offers access to cognitive exercises, music, interactive games and trivia.

Validation in a real-world setting: Linked Senior is overcoming that obstacle by partnering with the Centre for Aging + Brain Health Innovation (CABHI), powered by Baycrest. CABHI's Industry Innovation Partnership Program (I2P2) gives companies in the aging and brain health space the opportunity to test and validate their innovations in a real-world setting.

Washington, D.C.-based Linked Senior partnered with three Toronto long-term care homes for validation testing, each managed by Responsive Health Management (RHM). 265 residents selected from the sites participated in a clinical study over a one-year period, to determine if residents using Linked Senior had better health outcomes than those who did not.

The preliminary I2P2 study results were extremely positive. Over the first nine months of the study, residents who were highly engaged using the Linked Senior platform showed:

- 20% decrease in antipsychotic medication use
- 18% decrease in aggressive behaviours
- 20% increase in social engagement
- 3% increase in cognitive functioning

The results are poised to advance the field, as others will be able to draw on the study's clinical and financial outcomes to advocate for increased resources in resident engagement. And the I2P2 results are helping Linked Senior significantly strengthen its market value proposition, says de Vilmorin.

"I would invite any entrepreneur or innovator in the aging field to consider the I2P2 program," he says. "From a company standpoint, it's one of the best things we've done with the highest return on investment."

Cedarvale Terrace: Christine is a Toronto-based scientist whose mother has been a resident at Cedarvale Terrace, one of the RHM trial sites, for five years. She says using Linked Senior has given her mother the opportunity to maintain her interests even while in long-term care.

"My mother has always liked the sciences, so we use Linked Senior to watch videos about science experiments," Christine says. "When she's just sitting there, sometimes it can get depressive – she'll start thinking about the past. But the Linked Senior activities give her a way to be present in the moment and keep her mind active."

Clinical staff also see the benefit. RHM senior nurse consultant Marion Godoy, who oversaw the I2P2 trial, says her staff would like to keep using the Linked Senior platform past the trial period.

"Using Linked Senior really encouraged the whole interdisciplinary team to come together and look at behaviour management and meaningful recreation for our residents," she says. "I really appreciate that the platform uses a holistic approach."

Rebecca Ihilchik is a Marketing & Communications Specialist at the Centre for Aging + Brain Health Innovation, Baycrest Health Sciences.

Canadian care-providers make strides in using artificial intelligence

BY DAVE WEBB

TORONTO – We may never be able to explain why machine learning-enabled computers make the decisions they do, but the human brain is also a "black box," Dr. Geoffrey Hinton told a 100-plus audience at the Machine Learning for Health conference in Toronto on May 29.

Dr. Hinton, a vice-president and engineering fellow with Google Inc. and professor emeritus at the University of Toronto, was a featured speaker at the conference, presented by Trillium Health Partners and Vector Institute (where Hinton serves as chief scientific advisor).

The conference highlighted how Canadian hospitals and clinicians are deploying AI, now that it is a viable technology.

Dr. Peter Laussen, chief of critical care medicine at Toronto's Hospital for Sick Children and professor of pediatrics at U of T, discussed how the medical centre uses machine learning in it critical-care unit. The Atrium data management system collects roughly 20,000 data points per second and perhaps 400 physiological signals per hour, in the 42-bed unit. ML's ability to capture and process huge volumes of disparate information can recognize patterns and discriminate between "noise" and relevant information.

On a different healthcare front, BlueDot is a surveillance system that tracks the migration of infectious diseases for governments, airlines, insurance companies, and other clients. BlueDot is the brainchild of Dr. Kamran Khan, an infectious disease physician and scientist at St. Michael's Hospital and an Associate Professor of Medicine at the University of Toronto.

Dr. Khan returned to Toronto after earning his master's degree in public health at Columbia University, just as the SARS epidemic that wracked Toronto was beginning to take hold in 2003.

Speaking on a panel discussion on deploying ML in healthcare settings, Dr. Khan called BlueDot a "global early warning system" for the spread of infectious diseases. Ground zero countries are often slow to report outbreaks of disease, or they may suppress information about them entirely. The Internet is a valuable source of information, but it's the proverbial haystack hiding the needle in a sea of unstructured, multi-lingual data.

Blue Dot scrapes the Internet for references to diseases, classifying data as explicitly about an outbreak, related to outbreaks, or irrelevant. To do this, Blue Dot must be able to understand the context of the information with which it's dealing. For example, "Is this an outbreak of anthrax, or a reunion of the heavy metal band Anthrax?" he quipped.

Panelist Dr. Sonny Kohli, an ICU physician at the Oakville Trafalgar Memorial Hospital, was inspired by his work during the 2010 earthquake and tsunami in Haiti to create CloudDX, a portable diagnostic tool that helps overcome geographic impediments to patient access. "We wanted to develop the world's first tricorder," a reference to a vital signs scanning instrument from the 1960s Star Trek series.

> **Machine learning systems at the critical care unit of SickKids are collecting 20,000 data points per second.**

CloudDX, an XPrize winner for innovation in the United States, is now focused on keeping chronic care patients with congestive heart failure (CHF) and chronic obstructive pulmonary disease (COPD) out of hospital.

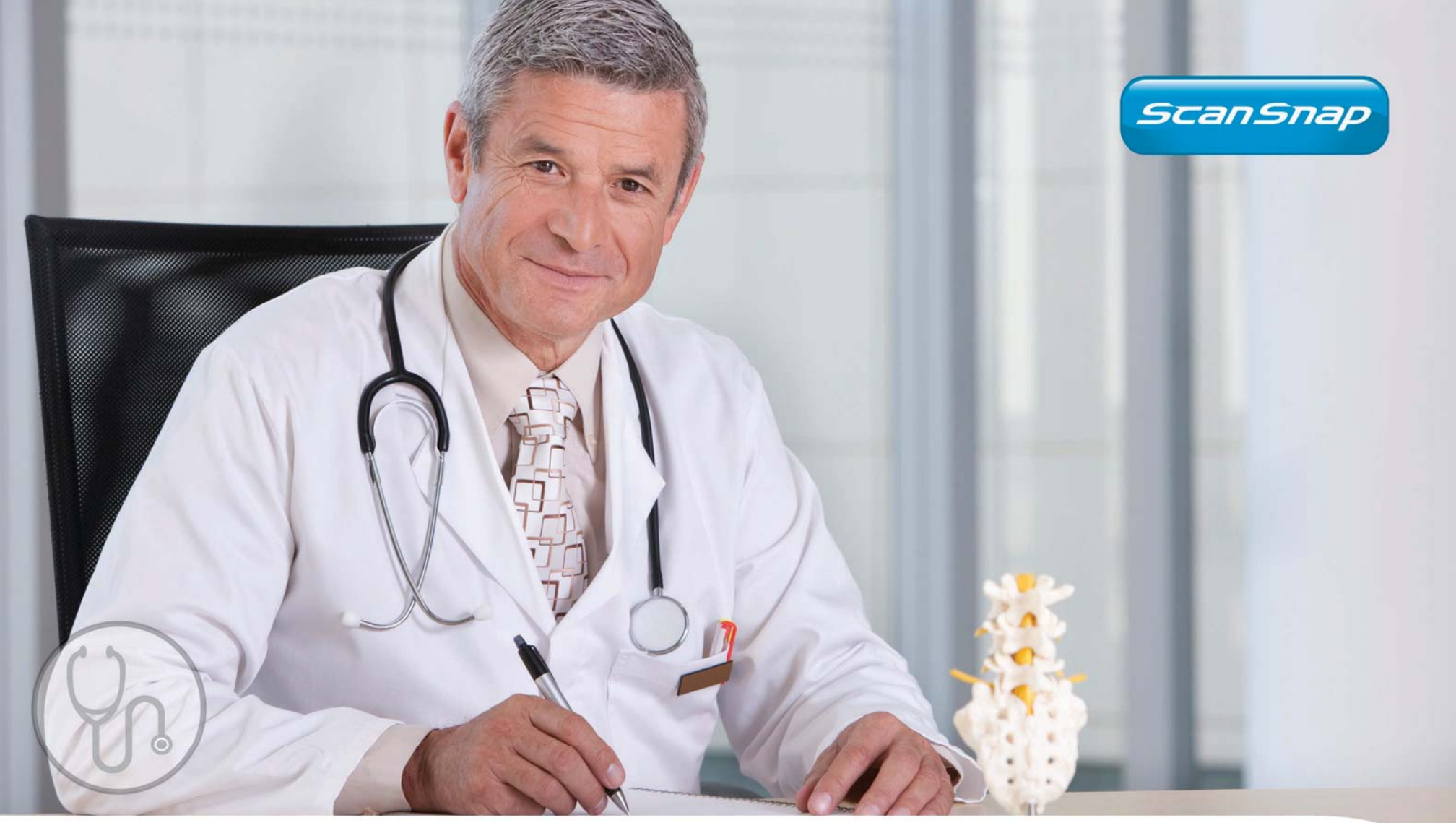
The CloudDX device uses AI processing in the cloud to determine whether a patient shows signs of disease, along with its severity. For example, when a patient coughs, the CloudDX system can determine, using pattern matching and other technologies, whether the cough signifies TB, influenza, asthma, bronchitis, pneumonia, upper respiratory infection, or other problems.

CloudDX is using a variety of sensors to monitor patients for other diseases, applying AI so that a doctor doesn't even have to be present to make a diagnosis.

Machine learning's ability to process and integrate data is also central to Douglas Queen's work as commercial development lead for Swift Medical Inc., a wound management technology company based in Toronto and Chicago.

Integrating that data with images of wounds is a job for AI and ML. But clinicians must abide by privacy regulations and patient ownership of data. For example, on the one hand, wound patients frequently take pictures themselves of their wounds as they heal or worsen. At the same time, extraneous details like faces in the background can compromise privacy.

Swift's wound management solution offers organizations and clinicians the option of toggling photo capabilities on or off. Those that ask for the imaging capability to be turned off inevitably turn it on eventually, Queen said.



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FUJITSU

Intelerad plans further growth, spurred by $75 million investment in R&D

The company expects to double its workforce to 800 in the next five years.

BY JERRY ZEIDENBERG

MONTREAL – Intelerad is celebrating 20 years in the healthcare IT business with a move to a new high-rise building on the east side of Montreal – a stone's throw from the massive, new CHUM medical centre and across the street from the Université du Québec à Montréal (UQAM).

The company occupies several floors of the building, and will likely need more, as it is rapidly growing – with sales in the United States, Canada, the UK and Oceania.

"We reached $70 million in revenues last year and we'll exceed $100 million next year," said Paul Lepage, President and CEO of Intelerad, which specializes in diagnostic imaging and radiology workflow software.

That kind of technology development and support takes brainpower and teamwork. So, no wonder the company now employs 400 people, and expects to double its workforce to 800 in the next five years. Most of the staff are in Montreal, but there are groups in Toronto, Calgary, Seattle, Australia and the UK.

To help drive growth, the company announced an additional investment of $75 million in R&D over the next five years – on top of what it has already planned. Most of the effort will be directed into three areas: cloud-based solutions; web technologies; and artificial intelligence.

Lepage noted that hybrid cloud environments are expected to expand quickly in healthcare over the next five years, and Intelerad plans to extend its solutions in lockstep with this trend.

As well, it is further developing its zero-footprint technologies, so that clinicians can reach their work "anytime, anywhere."

And finally, the company has launched a major push into artificial intelligence, particularly on the workflow side. "What we're doing in AI is to focus on machine learning to drive productivity," said Lepage.

As examples, he said the company is creating solutions that automatically spot urgent cases for radiologists and move them up in the reporting worklist. Intelerad's solution is also predicting workloads, so radiology groups know how many clinicians they will need.

The system will divide caseloads, sending studies to appropriate radiologists for load balancing.

Already, Intelerad's assignment engine software dynamically assigns studies to the most appropriate radiologist based on a number of pre-defined criteria, such as sub-speciality and expected turn-around time, automatically managing load-balancing and enabling high quality.

On the clinical AI side, Intelerad's strategy has been to partner with companies that are providing the most advanced image analysis algorithms through a platform approach, with partners like Blackford and EnvoyAI. Clinical AI algorithms analyze images in the background and draw attention to potential areas of concern in the studies – such as potential tumors, tears or bleeds.

Lepage observed that Intelerad has roughly more than 40 percent market share of the largest radiology practices in the United States. "Nurturing these customers and providing them with innovative and updated solutions will drive their growth and generate a lot of growth for us," he said.

At the same time, there is currently a significant amount of new business on the horizon, as many hospitals in Canada and abroad are now refreshing or replacing their diagnostic imaging systems. That creates a big opportunity for a company like Intelerad. "There are RFPs being issued everywhere," said Lepage.

Another of the company's vaunted advantages is its longstanding emphasis on interoperability. Not only does it play well with other information systems, but the technology is also offered with a modular approach.

> **The company is directing its new product development into three main streams: cloud-based solutions; web technologies; and artificial intelligence.**

For example, the worklist module, the picture archiving repository and the image viewer are all available as separate components or as a consolidated system.

Hospitals are free to buy the components they need, and to mix and match with what they already have. "Many hospitals use our workload systems with their own PACS and viewers," said Lepage.

Intelerad, he said, has been strong on the scalability side – the solutions easily expand from serving smaller hospitals and reading groups to some of the biggest practices in the world.

As a matter of national pride, it can be noted that most of Intelerad's solutions have been developed in Canada. The company has R&D groups in Montreal and Toronto and enjoys close relationships with universities in both cities.

This year alone, Intelerad is spending $16 million on R&D. That's split about 50/50 on further enhancing existing products and developing new ones.

In the future, however, a premium will be put on innovation and the development of new technologies and solutions.

In total, it plans to invest $125 million to $155 million in R&D and support over the next five years. Another point of pride: that investment is all being generated from the company's own growth and not from borrowings.

Part of Intelerad's growth stems from acquisitions; notably, in 2018 it acquired Clario Medical, a zero-footprint worklist company based in Seattle. Intelerad and Clario had already been collaborating in the marketplace, 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."

Francois Laflamme, a senior partner at Novacap and chairman of the board at Intelerad, observed in remarks from the podium that the software company has benefited from a talented and creative workforce over the past 20 years.

So, it's fitting that it has set up its new digs in a very creative part of Montreal – just around the corner from lively Ste-Catherine Street, with its restaurants, music and nightlife. "It's a different dynamic," said Laflamme, and one that reflects the energy and innovation that's at the core of Intelerad.

Paul Lepage, president and CEO of Intelerad, asserts the company has an aggressive strategy for product development and growth.

MIIT 2019 sheds light on use of AI and cloud in Diagnostic Imaging

BY DAVID KOFF, MD

MIIT, the annual Medical Imaging Informatics and Teleradiology conference, has proven to be the premier event of its kind in Canada, bringing relevant content to Diagnostic Imaging professionals. The 14th edition, which took place last May in Hamilton, Ontario, didn't disappoint.

Intended to bridge the gap between engineering, industry, and healthcare users, MIIT focuses on emerging technologies and practices for acquiring, processing, managing, accessing and sharing medical images, along with topics driving changes in relevant policies within Canada, which makes it unique to this country.

It is a networking opportunity where participants can ask questions of experienced speakers and domain experts. Users and industry mingle in an informal setting and exchange ideas, sometimes a very easy way to solve technical or business issues.

It is encouraging to see attendees return year after year and become good friends of the conference. This event wouldn't be possible without our sponsors who have supported the conference, some from Day 1, and are our trusted partners.

Each year, my co-Chair, Don Dennison and I invite speakers who can talk about relevant topics for our Canadian audience. We want the talks to be informative and practical, answer questions and address issues we face in our daily life. This year, the main themes of the conference were around patient care, quality improvement, artificial intelligence, and the growing adoption of Cloud solutions.

Patient-centered Care: The conference started on a strong note, with a long-awaited announcement from Dr. Ted Scott, Vice-President Research at Hamilton Health Sciences, who unveiled a plan to invest $200 million in a large IT overhaul, including a new Hospital Information System, as well as an additional investment of $200 million to renew outdated equipment across the system.

This will pave the way for the Hospital without Walls, an initiative to use digital and technological innovations to transform care by creating a more connected system, empowering patients to be more involved in their care, prevent hospital stays by predicting complications before they happen, and improve access to virtual care, while decreasing costs for the healthcare system.

Dr. Tessa Cook, radiologist, at the University of Pennsylvania, was unable to attend in person— due to bad weather in Philadelphia – but she delivered an outstanding talk by teleconference, discussing challenges toward achieving patient-centered radiology.

She told us how her department facilitates access to images for their patients and how they can contact a radiologist expert to help them understand their report. Hopefully, next year, she will be able to speak in person.

Dale Anderson from Clinical Connect told us how expanded datasets, through a network of 74 sites, offer a powerful tool to improve patient care.

Artificial Intelligence (AI): As you know, Artificial Intelligence is now a reality in Medical Imaging, with new publications almost every day showing how computers can detect lung nodules, pneumonia, strokes, and aneurysms.

Radiologists have been at the forefront of AI for healthcare, even if there have been other major developments in retinal screening for diabetes and vascular disease, as well as detecting melanoma on the skin.

Radiologists have been anxious about Artificial Intelligence taking over their profession, but in fact, AI has proven to be a strong tool to improve quality and reliability. Ultimately, it will augment and assist radiologists in their roles.

Roger Tam, Associate Professor at UBC, told about a workgroup that the Canadian Association of Radiologists (CAR) has as-

CONTINUED ON PAGE 23

The Biomedical Zone aims to help more clinicians market their innovations

BY ANA GAJIC

Dr. Ori Rotstein's motivation to help found a biomedical technology company came from years of experience in the operating room.

"As a surgeon, you're always imagining gadgets to improve patients' outcomes and experience," he said.

When the former surgeon-in-chief of St. Michael's Hospital in Toronto was approached by fellow surgeon Dr. Joao Rezende-Neto to form a company to commercialize such gadgets, Dr. Rotstein saw it as an opportunity. Alongside Chris Bass, who would be the CEO, the three founded Inventorr M.D. Inc., focused on developing solutions to surgical problems.

Now, Dr. Rotstein has taken on the role of vice-president of Research and Innovation at Unity Health Toronto (consisting of St. Michael's, Providence Healthcare and St. Joseph's Health Centre in Toronto).

A foundation of innovation: At St. Michael's, Dr. Rotstein's commitment to innovation propelled him to play a key role in developing a unique partnership between the hospital and Ryerson University, creating Canada's first and only physician-led, hospital-embedded, health technology incubator – the Biomedical Zone.

As director of the hospital's Keenan Research Centre for Biomedical Science at the time, Dr. Rotstein worked closely with Dr. Linda Maxwell, founder and executive director of the Biomedical Zone, to build a space for the hospital to be a true leader in holistic innovation that supports clinicians and scientists from research to commercialization. Now, Inventorr M.D. Inc. holds a spot among 16 other startups at the Biomedical Zone, benefitting from the business expertise the incubator offers.

"We know that clinicians can innovate – in fact, the solutions that clinicians create are poised to meaningfully impact patients," said Dr. Maxwell, who is also a surgeon and an associate scientist at St. Michael's. "But the number of clinicians like Dr. Rotstein and Dr. Rezende-Neto who take their solutions to commercialization are few and far between.

Dr. Ori Rotstein, a biomedical innovator, is the new VP of Research and Innovation at Unity Health in Toronto.

"We want to see that change by providing the resources and expertise to clinicians in order to commercialize their solutions to make a tangible impact on our health-care system."

While most startups incubated in the Biomedical Zone don't have two surgeon-scientists at the helm, they all focus on health and biomedical technology geared at finding needs-based solutions to real clinical challenges and ultimately reducing health-care costs and delivering high-quality care. The Biomedical Zone offers dedicated clinical expertise and entrepreneurial resources to accelerate product development from early prototype stages to commercialization.

Since its inception in 2015, the incubator has advanced 37 companies, creating more than 100 jobs, impacting more than 60,000 patients and partnering with 15 hospitals along the way. It has incubated companies such as HelpWear, which is a medical grade, wireless, remote ECG monitoring system to aid in the diagnosis and management of heart-related illness; and RetiSpec, a non-invasive eye scanner for early detection of Alzheimer's disease pathology before clinical symptoms occur.

For Dr. Rotstein, Dr. Rezende-Neto and Bass, the Biomedical Zone has offered key learnings about commercialization, engaging investors, and scaling innovation. Inventorr M.D. Inc. is now in the process of commercializing two initial devices – a cardiac plug, which temporarily controls hemorrhage wounds to the heart, and a tracheotomy device used to improve the performance of percutaneous tracheotomies and enable the procedure in a wider range of traumatic instances.

"There's a lot of learning that comes from networking," Dr. Rotstein said. "With the Biomedical Zone, we learn from other companies, we learn about competitive opportunities, and we learn how to approach potential investors."

The go-to place for innovation: The model of the Biomedical Zone is one way in which Dr. Rotstein sees potential to continue to build up innovation across the three hospitals that make up Unity Health Toronto.

"I want us to become the place people go for innovation – both for our staff who have ideas, and for companies that want direct ties and access to clinical expertise," he said. "We need to continue to nurture and build the Biomedical Zone and enhance its relationship with the hospitals. I think there's virtue in that because our secret sauce is that the companies that come here can find ways to interact with clinicians – and that improves their products."

Other avenues Dr. Rotstein is keen to explore include continued support for the growth of the hospital's Li Ka Shing Centre for Healthcare Analytics, Research and Training (LKS-CHART). Led by Dr. Muhammad Mamdani, the full-service healthcare data analytics centre builds artificial intelligence and machine learning algorithms to research and improve patient care.

Dr. Rotstein also sees opportunity in recruiting researchers with an eye for innovation. In his work as the former surgeon-in-chief at St. Michael's, Dr. Rotstein hired the hospital's first surgeon-innovator, whose job is to focus on innovation in the hospital and research institutes.

From bedside, to bench, to bedside: The unique lens that Dr. Rotstein will bring to his new role is his vision to translate patient needs into research that will then improve patient care.

That, Bass said, has been Dr. Rotstein's strength as an innovator in the startup sector and will be his challenge as the vice-president of Research and Innovation.

"Crossing the gap from exceptional research to innovative product is a difficult task," Bass said. "We are grateful to count Dr. Rotstein as one of our co-founders as we continue to work to bring our innovative medical devices to market. We look forward to seeing him integrate this expertise into his work as vice-president at Unity Health.

Physician-entrepreneurs have a unique perspective on pain-points

HAMILTON, ONT. – Dr. Sunny Malhotra, a cardiologist and technological innovator, Dr. Arjun Malhotra, and Dr. Ashley Qaderi, a physician lead in the Burlington North Family Health Organization have announced the launch of Ashley, a software robot that automates the functions of physician practices to improve their productivity and clinical outcomes.

Ashley uses process automation, a novel form of artificial intelligence, to act as a digital employee at a fraction of the cost, said Dr. Sunny Malhotra.

In a time of rising employee costs, Ashley increases operational efficiencies while also spotting sources of revenue, such as bonuses for screening patients. In this way, it also improves the health of patients.

The system is important for future Ontario Health Teams seeking solutions that provide value based care and solve interoperability issues.

"Ashley is a digital employee that automates repeatable tasks," said Dr. Malhotra. The software is powered by AI, and learns to read EMRs, e-faxes and Excel files. For example, it can receive lab reports, discharge summaries, imaging reports and other documents such as e-faxes, and file them in the correct patient record.

It can also identify which patients in a roster are due for screening, and can help with referral coordination by collecting notes that go back and forth. It automates billing, collecting the right billing codes from referral documents or the EMR, and send reports electronically to the appropriate government office. It can improve the number of actionable rejections to termination rejection codes used.

Interestingly, Ashley only requires a log-in and password to work like an employee behind firewalls for safety of patient information.

"Ashley has metaphorical hands which enter keystrokes and mouse clicks," said Dr. Malhotra. By taking care of repeatable tasks, it reduces the load on support staff in clinician practices, and on physicians and mid-level providers.

Dr. Malhotra announced the software, produced by his company, RP Automation at the Technology & the Future of Healthcare conference in May. Dr. Malhotra can be reached on Twitter at: @DrSunnyMalhotra

Dr. Sunny Malhotra introduces "Ashley".

He noted these AI technologies are already used in other industries, primarily banking and finance. "Now we're bringing them into healthcare."

Another nice feature: no staff training is needed, as the system learns on its own.

While these functions may seem futuristic, Dr. Malhotra asserted that the world – and healthcare – are quickly changing. "AI will soon be as ubiquitous as electricity," he said.

Dr. Yanick Beaulieu, a cardiologist practicing in Montreal, described the innovative product he launched, Reacts. Originally, it was designed as a telehealth platform to help physicians learn the art

CONTINUED ON PAGE 23

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VIEWPOINT

MEDIC opens new lab, shifts Apps for Health to fall

The centre has even greater capacity to help companies and providers develop solutions.

BY BRIAN VANOOSTEN

HAMILTON, ONT. – The Mohawk College applied research centre, MEDIC, marks its 12th anniversary this summer. MEDIC has built a reputation of delivering high-quality solutions for industry partners while producing highly skilled industry professionals for the digital health workforce.

The centre began its journey working successfully with government and industry to advance healthcare system interoperability and later focused its efforts on building healthcare software – both web and mobile applications – with attention to the needs of end-users. These applications, developed in partnership with government agencies and industry partners, have been deployed across Ontario and the world.

In order to best serve the current needs of the marketplace, MEDIC launched its new Digital Health User Experience Lab earlier this year. This new purpose-built facility was designed to support the critical work of the MEDIC team in integrating user testing at every stage in the development of digital health solutions.

The new lab allows the team to work more quickly with industry partners to employ design thinking and agile development approaches to solve today's pressing healthcare challenges. Problems are evaluated and solutions designed in the new design thinking facility.

Rapid prototyping, testing, and feedback follow in quick succession, allowing all stakeholders to refine and validate solutions early in the development lifecycle. This collaborative model of design and development ensures each digital health solution meets real-world needs and will be adopted by users.

Apps for Health: The annual Apps for Health conference held at Mohawk each spring has been shifted to the fall to ensure the new Digital Health User Experience Lab would be open and active for the benefit of the industry community. As in previous years, the Apps for Health one-day conference will be followed by FHIR North, co-hosted by Gevity and Smile CDR, on the Mohawk campus. Apps for Health will take place on Tuesday, October 15, and FHIR North will run on Wednesday, October 16. Visit http://appsandfhir.mohawkcollege.ca/ for more information.

> **The new lab allows the team to work more quickly with industry partners to employ design thinking and agile development approaches.**

Looking to the Future: Although MEDIC has worked in many areas of healthcare – supporting public health, building clinical applications, and even creating blockchain solutions – there are three main areas of focus that the team is committed to tackling at present: aging at home, care coordination, and machine learning.

Aging at home includes any initiatives that support individuals as they strive to live active and healthy lives into their senior years. Keeping people living in their own homes is desirable for them and their families and is critical to protecting valuable healthcare resources. The MEDIC team is excited to be working alongside researchers who are studying and promoting strategies to meet these objectives.

Care coordination is a high priority across Canada and is receiving recognition as an area of focus for the provincial government in Ontario. Ontario Health Teams have been proposed and are being built to link care providers across the spectrum of care, from critical care hospitals to long-term care facilities and home nursing services. The focus throughout this journey is on patients and the coordination of their care from community to hospital and back to community.

The construction and launch of the new Digital Health User Experience Lab has provided MEDIC with increased capacity. If you are a digital healthcare provider with an opportunity for growth, reach out to the MEDIC team (medic@mohawkcollege.ca) to explore how they can help you overcome your technical and business challenges.

Niall Wallace (right), CEO of Infonaut, demonstrates a new system for measuring hand sanitation at a MEDIC event.

Brian vanOosten is Digital Health Product Specialist at the mHealth and eHealth Development and Innovation Centre (MEDIC). It is part of Mohawk College, in Hamilton, Ont.

Tailoring technology: Mental healthcare should fit like a glove

BY PUNEET SETH, MD AND ALISON BRUNSKILL

There is perhaps nothing more intimate than that which lies within our minds. Our thoughts, perceptions, moods and desires represent the very fabric of what makes each of us individual human beings. Mental health is thus a deeply personal and unique experience.

With the growing ubiquity of apps and technologies that seek to help manage our health and well-being, it is important to acknowledge the distinct needs of mental healthcare. Despite being a health technology company (InputHealth) composed of a diverse team whose experiences range from being healthcare providers to working in management and administration at the frontlines of care, we too have been humbled by the variation in needs that arise with building and deploying solutions for mental health.

Our platform, the Collaborative Health Record (CHR), is being utilized by hundreds of healthcare providers across Canada and the world, including dozens of clinics and organizations that are involved in delivering mental healthcare. Our experience in working closely with these organizations has allowed us to refine the CHR to meet the evolving needs of care delivery in a mental health setting.

We are currently involved in a large project in southwest Ontario called TELEPROM-Y (TELEmedicine and Patient-Reported Outcome Measurement in Youth). This initiative, which has been funded by the Ontario Centres of Excellence, involves the use of our CHR platform in numerous outpatient mental health centres in and around London, Ont., to support the ability of care providers to connect and engage with youth receiving mental healthcare through a mobile app interface.

> **The idea of choice is central to the function and application of the CHR technology.**

The project involves validation and research that is being led by Dr. Cheryl Forchuk and her team at the Lawson Health Research Institute, involving the recruitment of over 100 youths in the southwest Ontario region. The project started at the beginning of this year and will run for 24 months.

The CHR serves as a toolbox with which care providers and youth can keep in touch by selecting various technologies. For example, some youth may prefer to only use secure instant messaging to speak with their care providers, while others may wish to have the option to occasionally use video conferencing. This idea of choice is central to the function and application of the technology, and is supported by data from previous work done by Dr. Forchuk.

Similarly, we have been working with centres of excellence in mental

CONTINUED ON PAGE 23

Shared care plans, for all providers, are needed to improve outcomes

BY DR. CHRIS HOBSON

The Ontario government announced recently that it is consolidating local and provincial health organizations to create a central super agency, designed to end silos and fix a disconnected system. The system is fragmented for many reasons. A lack of data and information sharing between healthcare providers is a persistent problem that has been resistant to change.

The government's goal is to improve the patient's journey through the health system, so it is more efficient and better serves patients' needs. Providers readily admit the system's different elements don't communicate well. As a consequence, patients may be discharged after surgery without follow-up home care being arranged. Additionally, hospitals may be unaware of a patient's medical care that has already been provided by a family doctor.

Dr. Chris Hobson

The Orion Health Chronic Care Index, a poll of 1,551 Canadians, found that healthcare delivery is fragmented into silos that do not communicate well together. People with chronic conditions such as arthritis, diabetes and mental illness/addiction are the biggest users of healthcare.

Nearly one-in-five Ontarians with chronic conditions have experienced medication errors or duplications and more than one-in-10 often undergo unnecessary repeat procedures. Additionally, nearly half of Ontarians living with chronic conditions describe repeatedly outlining the same information about their condition every time they visit a care provider.

Among Ontarians with chronic conditions, one-in-four said their specialist didn't have their primary care physician's information about them available. The same amount said nobody at the hospital let their primary care doctor know when they were discharged. Three-in-10 say their complete healthcare record is not available every time they see a clinician.

Experience in Canada and internationally has shown that integration of care delivery is best achieved by means of a single, complete, electronic patient health record that is made easily accessible wherever the patient is seen. This improves the accuracy of diagnoses and treatment, facilitates healthcare coordination, and enables seamless transitions of patients across healthcare settings and providers.

Care coordination should be targeted at those who are most at risk of falling through the cracks, as they are being cared for by many providers for several different reasons. Integration of information across the community can help significantly.

However, there is more to care coordination than simply having access to a single, complete record. Care coordination involves the creation and use of a single, patient-centric care plan that synchronizes all providers involved in the care of each patient. There also needs to be regular analysis and reporting of care gaps and overall health system performance.

There is a massive increase in the amount of data available to patients and providers, including from wearable devices, social and environmental determinants of health, and genetic data. Finding ways to best use this data and make it appropriately available is challenging. Nevertheless, digital health technology provides an opportunity to improve the existing disconnected system and significantly advance patient care; once this has been achieved, an integrated care plan is possible, along with a streamlined, coordinated healthcare system.

Dr. Chris Hobson is a former family physician with 15 years of experience and the Chief Medical Officer at Orion Health, a global provider of health information technology.

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ILLUSTRATION: LINDA WEISS

Compugen to Provide Platform for New Mackenzie Vaughan Hospital's Integrated "Smart" Technology

Mackenzie Health has awarded the contract to Compugen for Managed ICAT (Information, Communication and Automation Technology) Services (MIS) at the future Mackenzie Vaughan Hospital. Compugen will be working with Mackenzie Health to provide and support an integrated technology platform to help build and implement its smart hospital vision. The partnership is expected to create new jobs to benefit the local community.

Scheduled for completion in 2020, Mackenzie Vaughan Hospital will be the first hospital in Canada to feature fully integrated "smart" technology, which features systems and medical devices that can speak directly to one another to maximize information exchange. Through modern and proven best practices, the hospital will provide state-of-the-art health care and positive outcomes for patients and their families.

"We are delighted to be supporting Mackenzie Health as they implement their remarkable smart hospital vision. Compugen's managed information services will provide the hospital with a highly available technology platform that is stable, adaptable and secure. The mission-critical platform will allow for the introduction of cutting-edge medical technologies and connectivity both inside and outside of the hospital walls to enable integrated care. We applaud Mackenzie Health for their commitment to transforming healthcare delivery to better serve patients and their families," said Harry Zarek, President and CEO, Compugen.

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Physician-entrepreneurs acquire a unique perspective

CONTINUED FROM PAGE 14

of conducting ultrasound exams; an expert in one location could assist a doctor in a remote location using "hyperpresence," a mixture of real-time video, audio, instant messaging and on-screen drawing.

There was so much demand, however, that Reacts has morphed into a multi-purpose telehealth platform. One of its benefits is that it offers real-time imaging and voice even over low-bandwidth connections. It's also a highly secure system, offering a high level of protection.

"We're now working in 70 countries," said Dr. Beaulieu. "Wound care is one of the biggest uses, and we're also doing work in the remote assessment of respirators."

The system is ideal, too, for marginalized populations, where there is often a shortage of skilled physicians and specialists. Doctors Without Borders, for example, is a user of Reacts.

Dr. Sonny Kohli, an ICU physician at the Oakville Trafalgar Memorial Hospital, in Oakville, Ont., described his creation of Cloud DX, a technology powered by AI in the cloud that can be used to diagnose patients at a distance. It can also be used within hospitals, to better monitor patients in the ICU or in other departments.

While volunteering in Haiti after the devastating earthquake in 2010, Dr. Kohli was deeply affected by the lack of medical resources and decided to create a device that could do the work of a physician when a doctor wasn't present. "It can make a diagnosis without a doctor in the room."

> **Reacts morphed from a telehealth system for teaching ultrasound to a full hyperpresence platform.**

It does it by monitoring vital signs including blood pressure, heart rate, ECG, respiration, oxygen levels and others. It uses artificial intelligence to make the diagnosis.

For example, its microphone can pick up the sound of the patient coughing; using AI, it can determine whether the cough signifies TB, influenza, asthma, bronchitis, pneumonia, an upper respiratory infection or a virus.

"We're now using this technology for other problems," said Dr. Kohli.

The device he and the Cloud DX team came up with, called Vitaliti, can diagnose a variety of medical problems with great accuracy. It won an XPRIZE Award in the United States for innovation.

He mentioned it's being tested by the Markham Stouffville Hospital; there, a respiratory therapist has been supervising a group of COPD patients using the device in their homes. In the test, it has reduced re-admission rates by 80 percent, and has lowered ED visits by 36 percent.

MIIT 2019 sheds light on use of AI and cloud in DI

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sembled to create a framework for the profession and address the ethical and legal issues linked to practical implementation of Artificial Intelligence. Brad Genereaux, Medical Imaging Alliance Manager at NVIDIA, gave his roadmap to make AI a reality in our Hospitals.

Dr. Alex Towbin, Chair of Radiology Informatics at Cincinnati Children's Hospital, told us about the different methods to collect data to facilitate change from manual, concentrated small projects to fully automated extraction and analysis for large projects.

Cloud in Healthcare: As Cloud is expanding all over the world (at least virtually), Patrick Kling, Technical Lead, Manager Healthcare Imaging, gave us the Google perspective and told how we can leverage Cloud services to solve some of the problems we face in healthcare – such as ever-increasing data, limited human resources and need for high security. The Cloud brings all this, as well as new ways to leverage healthcare data at scale. It also allows supports development of artificial intelligence applications and models training.

> **Cloud is a solution for coping with fast-growing data, a shortage of employees, and the need for greater security.**

In an excellent panel discussion moderated by Don Dennison, Christine Coz from HDIRS and David Veeneman from SWODIN shed light on the future of the Diagnostic Imaging Repositories (DIRs) in Ontario.

In our final talk, Kevin O'Donnell, R&D Manager Canon Medical Research, standards guru and an anchor of this conference since the first edition, told us about the new developments in DICOM, IHE, and QIBA. We look forward to seeing you next year.

Dr. David Koff is Professor and Chair, Department of Radiology, McMaster University.

Tailoring tech: Mental healthcare should fit like a glove

CONTINUED FROM PAGE 16

healthcare in BC, including the Mood Disorders Association of BC (MDABC) and the Canadian Mental Health Association (CMHA) BC.

Through our pioneering work with MDABC, we have been able to demonstrate that technology can help streamline the delivery of rapid access to mental health counseling and services, including group therapy.

The results have been both greater participation by patients (as seen through a reduction of no-shows rates from 30% to 5%) as well as an improved ability for the organization to deliver care to more people (with number of patients seen per year going from 1,600 to 3,500 with the same number of staff).

Our work with CMHA-BC has involved an entirely different model of care through its BounceBack program. Through the use of "BounceBack Coaches", adults and youth with mild to moderate depression and anxiety can receive personalized education and therapy to help manage their symptoms.

This successful program enables people to choose the way they'd like to receive treatment, and the options include self-directed learning through web-based courses and video/text/in-person engagement with a coach, with the process streamlined through the CHR.

> **Self-reporting is being used by mental health patients, who can deploy their phones to convey symptoms.**

In an attempt to push the envelope of choice further, we are integrating a learning management system that will provide organizations with the ability to deploy web-based courses to patients directly through the CHR.

Yet another tool in the digital toolbox of the CHR, this furthers the paradigm shift that a health record system can be go beyond being a static documentation system to being a dynamic platform that is designed to facilitate personalized care.

Patients are able to self-report symptoms and mood scores through their own devices, when the organization using the CHR is able to support this form of communication. The key factor here being that the limitation of how a communication platform is utilized should not be coming from technology itself.

By providing options and allowing people to choose how they wish to engage with their care based on comfort, preference and readiness, we take important steps forward in moving mental healthcare beyond a one-size-fits-all model.

Puneet Seth, MD, is Chief Medical Officer at InputHealth Systems Inc. Alison Brunskill is Client Success Manager at InputHealth.

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Visit us at **ca.medical.canon** to register and view the agenda.