FEATURE REPORT: DEVELOPMENTS IN CONTINUING CARE – SEE PAGE 18

Publications Mail Agreement #40018238

CANADIAN Healthcare Technology

CANADA'S MAGAZINE FOR MANAGERS AND USERS OF INFORMATION SYSTEMS IN HEALTHCARE | VOL. 23, NO. 6 | SEPTEMBER 2018

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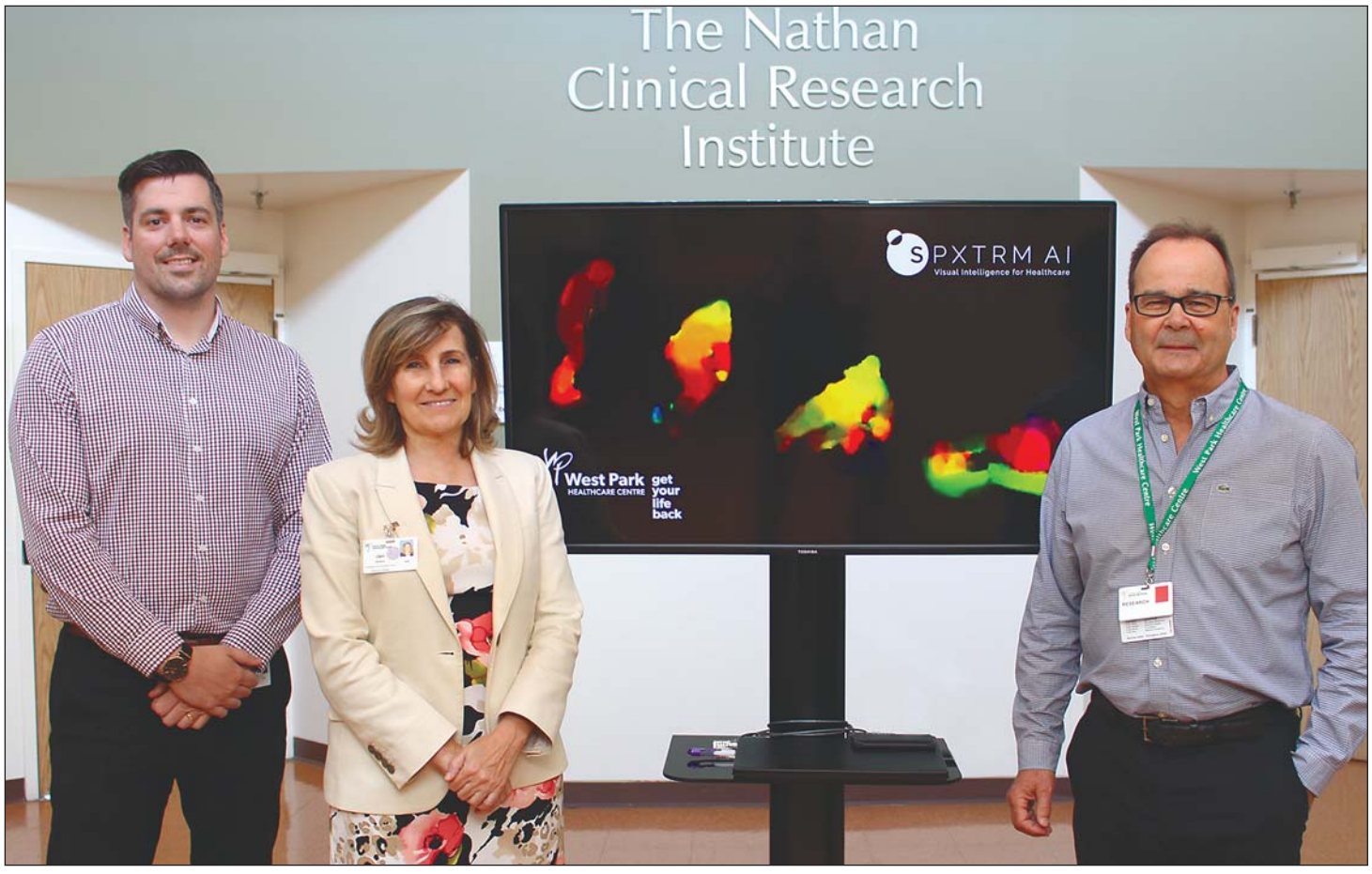

PHOTO: COURTESY OF WEST PARK HEALTHCARE CENTRE

West Park Healthcare Centre has a strategic plan to boost innovation at the hospital as a way of improving quality and establishing a leadership position in rehab and complex care. The plan includes collaborations with small, technologically savvy companies, such as Spxtrm.AI. Pictured above: Tim Pauley, Manager, Research; Jan Walker, VP, Strategy and Innovation at West Park; and Jay Couse, CEO of Spxtrm AI.

Video cameras and AI help manage aggressive patients

BY JERRY ZEIDENBERG

TORONTO – West Park Healthcare Centre, a 470-bed rehab and complex care facility, is working with a private-sector partner to develop an "intelligent vision" system that can immediately spot aggressive behaviour in patients by using autonomously monitored video camera feeds and machine learning.

The system – which makes use of video cameras placed in strategic spots in the hospital – employs artificial intelligence to detect signs of aggression. It then connects to the nurse call and alerting system to send for help in instances of conflict, potentially saving staff and other patients from injuries.

The problem it solves is that there's usually not enough staff in hospitals and long-term care facilities to adequately monitor potentially aggressive patients.

In some cases, this lack of resources prevents patients moving from ALC beds in hospitals to nursing homes and other facilities, as there aren't enough resources to care for them. That, in turn, creates logjams in the acute care centres.

"Many hospitals and long-term care centres have patients with behavioural issues," said Jan Walker, VP, Strategy, Innovation and CIO at West Park. "What we're creating here will have benefits for all kinds of facilities, as well."

> **It's difficult to constantly keep an eye on aggressive patients; AI-powered video is a big help.**

West Park's private-sector partner, Toronto-based Spxtrm AI (pronounced Spectrum AI), is developing an automated, visual alerting system in the Acquired Brain Injury Behavioural Services, which cares for people with severe brain injuries who also have behavioural issues.

These residents require quite a bit of attention – staffing for this group is normally one-to-one, and sometimes two staff members for a patient. Moreover, the patients can be challenging.

"They can be quite an aggressive population," explained Walker. They may have suffered a brain injury from a road or boating accident, and when they become upset or angry, they can be difficult to control.

It's difficult to have adequate staff keeping an eye on them around the clock.

So, when it was suggested that today's AI technology is capable of monitoring patients like these, Walker and the team at West Park were extremely supportive.

On a related note, West Park is about to embark on a renewal and expansion– it's constructing a new building on its 27-acre campus to replace older structures that date back 50 years or more. And it intends to incorporate the latest innovations in technology to help achieve the highest medical outcomes for its patients.

To do that, said Walker, it is creating joint

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Durham College offers bachelor's degree in healthtech management

BY RICK TIDMAN

There was a time, not long ago, when the pace of change in healthcare was less dramatic and disruptive, and the turnover of medical technology was measured in years. As healthcare technology management (HTM) professionals, we know better than anyone that those days are gone.

A coalescing of technology, information and analytics is under way on a global scale – its momentum is inescapable and the potential for better care is unlimited.

However, we also know better than anyone that this staggering and disruptive rate of change within medical technology is causing organizations to struggle.

Behind each technology decision made in local health integration networks, hospitals and clinics are people doing the best they can. Yet the problem remains that neither purchasing organizations, administrators nor clinic professionals are equipped with the professional experience or academic knowledge and training needed to navigate the complexity and far-reaching effects of their technology decisions.

It's important to note that fault does not lie with these parties. Fingers need not be pointed.

The reason why the myriad of medical technology decisions made every day – from the extraordinarily complex to the routinely mundane – are being done without the necessary expertise is because to date, the right specialist has not existed.

But take heart – a new type of healthcare leader is on their way.

This month, the labs and classrooms at Durham College (DC) will welcome the first cohort of students in the Honours Bachelor of Health Care Technology Management program, the first degree of its kind in Canada.

Yes, the first HTM degree in Canada is being launched by a college. It's a perfect fit too, as Durham College is already home to Ontario's leading Biomedical Engineering Technology program.

In collaboration with our graduates in the field and industry partners, we have not only identified the need for a new kind of practitioner but taken swift action to address it. Our program will produce the practitioners needed to fill the knowledge gap and lead the rapid, ever-evolving tech transformation of our healthcare system.

Rick Tidman coordinates the Honours Bachelor of HTM program.

Ontario's colleges have been offering degree programs since 2002, providing unique options for students who want the benefits of theory integrated with intensive applied learning.

So, then, who are the members of this inaugural cohort? What's drawing them to our program and qualifies them to pursue the role of the modern HTM professional?

The answer is as diverse as the field itself.

Based on the conversations I've enjoyed with our incoming students, I can tell you that they are indeed innovative thinkers and early adopters who are fascinated by technology. They share traits with the clinical specialist who is passionate about the life sciences.

They understand and aspire to become leaders whose strategic minds chart the most effective routes to achieve short and long-term operational goals. Most of all, like each of us, they share in the satisfaction that comes with helping others restore their health.

These students are recent high school graduates; they are experienced nurses and engineers.

We have drawn a diverse, ambitious group of people who are choosing to study at DC because they want to engage in hands-on learning. They want to access and contribute to our leadership in artificial intelligence (AI), and to develop the interdisciplinary skill set that will prepare them for the jobs and careers – jobs that may not even exist today, but will be realized tomorrow.

There is a transformation under way in our healthcare sector, the likes of which has never been experienced. Behind every differential diagnosis is a series of tests involving medical technology, and behind every clinical advancement and contribution to patient outcomes are new and innovative medical technologies.

Disruptive medical technologies – AI-embedded medical technology, in particular – are game changers that will transform the sector. They will also pose the greatest challenge to our healthcare system as AI-enhanced medtech continually learns, tests, analyzes, predicts, treats and moves into the surgical theatre.

The launch of the Honours Bachelor of Health Care Technology at DC is the recognition of this coming reality.

It only makes sense that in the most disruptive period in the history of healthcare, a specialist should exist who can guide their organization through such transformation, ensuring it reaps all the benefits technology has to offer.

This is the domain and role of the healthcare technology manager, and it is thrilling to be part of the emergence of this entirely new discipline in HTM.

Rick Tidman is a professor at Durham College and the program coordinator of the college's Biomedical Engineering Technology program and the Honours Bachelor of Health Care Technology.

CANADIAN Healthcare Technology

CANADA'S MAGAZINE FOR MANAGERS AND USERS OF INFORMATION TECHNOLOGY IN HEALTHCARE

Volume 23, Number 6 September 2018

Address all correspondence to Canadian Healthcare Technology, 1118 Centre Street, Suite 207, Thornhill ON L4J 7R9 Canada. Telephone: (905) 709-2330. Fax: (905) 709-2258. Internet: www.canhealth.com. E-mail: info2@canhealth.com. Canadian Healthcare Technology will publish eight issues in 2018. Feature schedule and advertising kits available upon request. Canadian Healthcare Technology is sent free of charge to physicians and managers in hospitals, clinics and nursing homes. All others: $67.80 per year ($60 + $7.80 HST). Registration number 899059430 RT. ©2018 by Canadian Healthcare Technology. The content of Canadian Healthcare Technology is subject to copyright. Reproduction in whole or in part without prior written permission is strictly prohibited. Send all requests for permission to Jerry Zeidenberg, Publisher. **Publications Mail Agreement No. 40018238.** Return undeliverable Canadian addresses to Canadian Healthcare Technology, 1118 Centre Street, Suite 207, Thornhill ON L4J 7R9. E-mail: jerryz@canhealth.com. **ISSN 1486-7133**.

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SickKids patients and staff see benefits after Epic implementation

BY VANESSA MILLAR

In June, The Hospital for Sick Children (SickKids) launched its Epic integrated health information system. SickKids partnered with Ottawa's CHEO, which was already using Epic, to implement the first integrated paediatric health information system of its kind in Canada.

Prior to the launch of the new information system, SickKids staff used numerous electronic systems, combined with paper charts, to document patient information. In SickKids' ambulatory clinics (which support over 200,000 visits per year), all clinical notes, flow sheets, charting and assessments were manual.

Staff were required to spend time looking for information in multiple places when looking after patients. This meant more time at the computer, on the phone and looking through paper files, and less time at the bedside with their patients.

All patient information is now in one system with real-time access to the information the care provider needs. Patients and their families can feel confident that no matter where they go in the hospital, staff will have the full view of their information.

This means patients and families will spend less time repeating their information as they interact with different staff throughout the hospital. The burden is removed from parents to have to carry around their child's records to ensure everyone on the care team has the same, most up-to-date information.

Having all information in one place enables SickKids' collaborative approach to care.

As part of the implementation of Epic, SickKids launched a patient portal, MyChart. The portal provides patients and their families with better access to their health information.

Joshua came for a visit to SickKids and Ivy, a registration clerk, gave him a new patient ID band, which is barcoded for enhanced patient safety. It's part of the new Epic integrated health system at the hospital.

Enhancing the patient and family experience at SickKids to provide the best child and family-centred care was an important part of SickKids' transformation to Epic. Patients can access parts of their SickKids health record online and through a mobile app, including their medications, allergies, upcoming appointments and lab results.

They also have the ability to send a message directly to members of their care team. Like their partners at CHEO, SickKids staff and patients and their families have been quick to adopt MyChart.

"Our patient portal is an important part of our transformation. We are eager to grow the platform across the hospital and enhance it to meet our patients' needs, enabling patients and their families to be well informed and better able to be active in their own care," says Helen Edwards, Director of Clinical Informatics and Technology-Assisted Programs.

Through this transformation SickKids has refined its processes and made improvements. The new system enhances patient safety because it provides an integrated view of the patient's care.

It also includes alerts, flags and hard stops to prevent potential errors. Numerous efficiencies have been created by removing manual transcription, allowing for physician personalization, including common orders and notes, and introducing front-end dictation that immediately populates in the system.

This enhances the high-quality care that SickKids delivers by empowering best practices and standardization. SickKids has also seen a significant reduction in paper!

A key safety feature consists of new patient ID bands, which have been enhanced with barcodes to enable safer patient care. Additionally, patients with allergies wear black ID bands, instead of the standard white ID band, prompting the checking of the allergy before administering any treatment.

If medication needs to be given, the medication will be scanned and the patient ID band will be scanned. This ensures that the right medication is given to the right patient at the right time. The barcodes can be scanned with a barcode scanner or a smartphone camera, used by nurses when delivering care. SickKids is the second organization to ever use the native camera on the iPhone for barcode scanning.

The partnership between SickKids and CHEO has allowed for better coordinated paediatric care. When a child has been a patient at CHEO and then comes for an appointment to SickKids, the SickKids care team can immediately gain access to the health information that was documented at CHEO, avoiding costly delays, duplication and errors. The same is true for a SickKids patient visiting CHEO.

SickKids has not only gone completely digital, it has also adopted mobile applications to allow for flexible and remote access. The Epic mobile apps, Haiku and Canto, are being used by SickKids physicians and nurse practitioners and Rover is being used by nurses, phlebotomists, patient service aides and transport aides.

Electronic system for non-urgent consultations proves valuable

VANCOUVER – Waiting for an in-person visit with a specialist can delay a patient's treatment, especially if a confirmation of the referring physician's initial treatment plan is all that's required.

Waiting to see a specialist for a non-urgent case can also cause unnecessary stress for a patient. Since the introduction of dr2dr Secure Messaging into Providence Health Care's eCASE project this past year, however, healthcare providers are seeing greater improvements in patient care and treatment timeframes.

Providence Health Care now operates 17 sites in British Columbia. In 2016-2017, it had almost 635,000 patient visits and 118,000 ED visits alone.

In 2010, Providence Health Care launched Rapid Access to Consultative Expertise (RACE), an organized telephone-based service to connect GPs with specialists who could respond to urgent consultation requests over the phone within a two-hour timeframe.

As soon as RACE was introduced, the program was quickly picked up as both GPs and specialists recognized its potential. With RACE's quick response time, urgent consultations could be dealt with almost immediately, expediting the treatment plans and care of patients.

However, as the adoption of RACE increased, Providence Health began to see an increased, non-urgent use. GPs wanted a system for clinical questions that might not be urgent, but still required a specialist's consultation.

In 2017 Providence Health launched eCASE, electronic Consultative Access to Specialist Expertise, using Microquest's dr2dr Secure Messaging Platform.

According to Providence Health Care, "for traditional referrals, patients might wait months to see a specialist, however, minor advice may be all that is needed."

Enter dr2dr. Using a number of dr2dr's built-in features, Providence Health Care created a unique consultation service: Specialists are grouped together based on their specialty, and given access to a clinic mailbox.

Depending on which specialist is on call, that specialist will be set to receive notifications when a new message has arrived in the clinic mailbox. When that specialist is done their on-call rotation, notifications are turned off for them and turned on for the next on-call specialist.

Providence Health Care has already started seeing dramatic results with dr2dr and eCASE. Since the pilot started, the majority of eCASE questions sent through dr2dr have avoided unnecessary specialist referrals.

For Dr. Micaela Coombs, dr2dr and eCASE have become a welcome tool for patient care. "As a rural family physician, I use eCASE frequently," says Dr. Coombs. "The consultants are able to provide definitive, practical advice. It has allowed me to safely reduce the number of investigations and referrals I order. With each consultation I learn something new. And my patients are happy they don't need to travel to see a specialist."

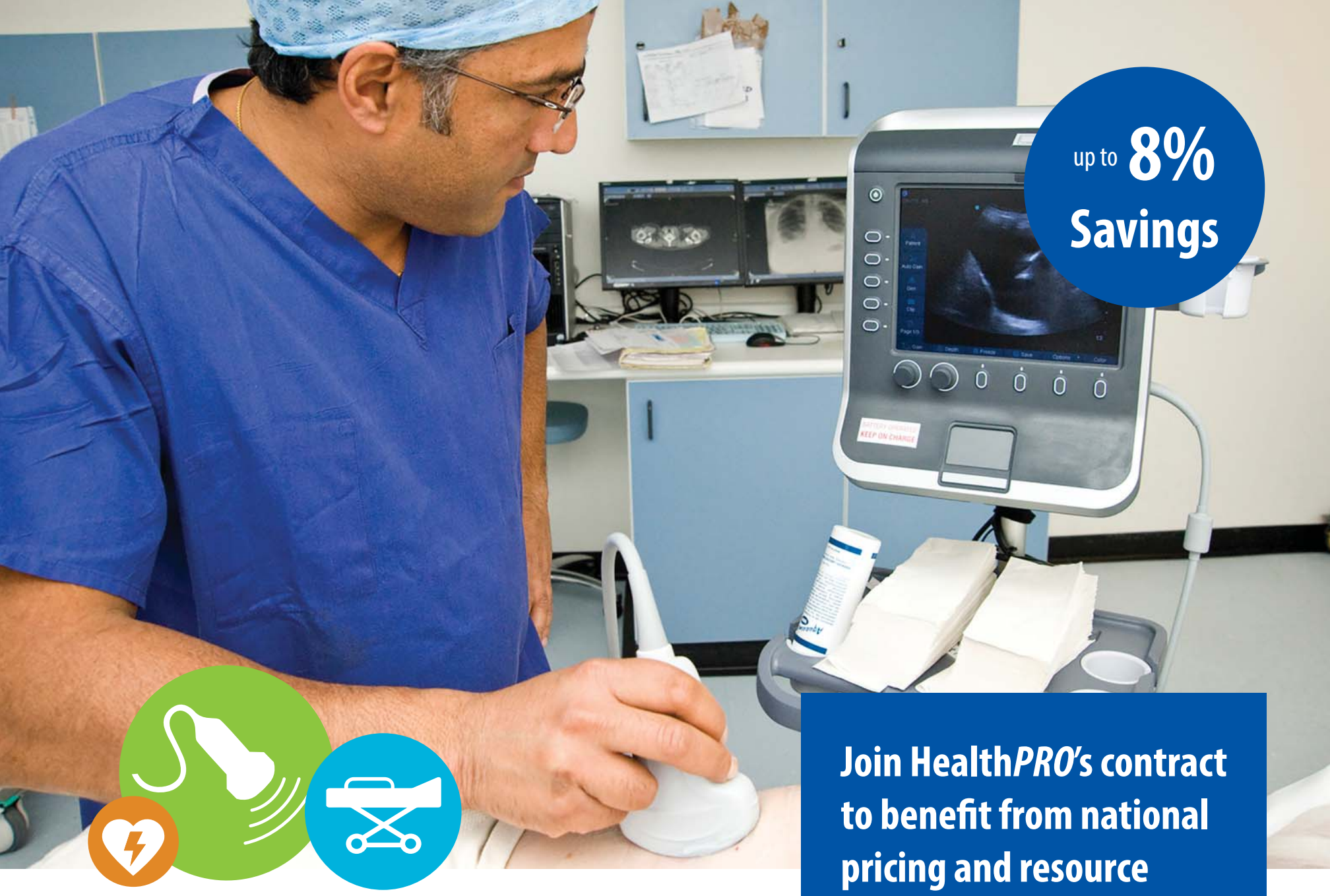
Using eCASE, the majority of questions sent through dr2dr have avoided unnecessary referrals for patients.

In cases where a consultation with a specialist might be needed, but where that particular consult doesn't require an in-person visit between the patient and specialist, dr2dr provides GPs the ability to still consult with a specialist.

"A recent case that I recall involved a question about some incidental findings on an echocardiogram, which was done on a 29 year old woman with a family history of bicuspid aortic valves," recalls Dr. Brett Heilbron of St. Paul's Hospital. "I was able to reassure the physician that the echo findings were likely of no clinical significance, and hence avoided the need for an office consultation."

The value of dr2dr and the eCASE system has been recognized throughout the dr2dr user base.

"eCASE is a great tool for clinical care and for education," says Dr. Stephane Voyer, General Internal Medicine at St. Paul's Hospital. "I recently addressed a GP's concerns about a DVT. There were questions about the need for a workup, the choice of agent to use, and the duration of treatment. I was able to answer the questions to the referring doctor's satisfaction, providing an up-to-date, tailored plan, without having to bring the patient in for an in-person assessment. In my opinion, this provides incredible value for the patient."



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Union Villa early adopter of quality program to improve care delivery

With today's residents requiring more support of their daily activities, and providers facing funding and resource limitations, long-term care in Ontario is on the brink of profound change. Union Villa, a highly regarded long-term care home based in Markham, Ont., is leading the charge.

Over the past year, Union Villa has been an early adopter and champion of a vital program to bring technology, in the form of Clinical Support Tools (CSTs), to long-term care homes across Ontario.

This innovative initiative is funded by the Ministry of Health and Long-Term Care (MOHLTC), and is being rolled out across the province by Think Research, along with two long-term care associations: AdvantAge Ontario and the Ontario Long Term Care Association (OLTCA).

The associations play a strong role in ensuring the continuous spread of the program, which will deliver meaningful benefits for Union Villa residents, families, clinicians, long-term care homes and the system at large, ensuring that residents receive the highest standard of care.

Union Villa, an AdvantAge Ontario member, has already seen success through implementing a new evidence-based CST into their home.

A CST is a decision support tool that enables clinicians to provide individualized and holistic care for residents, from assessment to care planning and beyond. The CSTs provide guidance for clinical practitioners, enable an efficient, paperless work environment and assist in the individualized care planning that greatly impacts a resident's quality of life.

Union Villa's Project Lead Mackenzie Ralph and Unit Nurse Maria Bautista make use of the quality system.

The CSTs developed as part of this program target six specific clinical conditions, including urinary continence, behavioural symptoms of dementia, hypoglycemia, palliative care, and end of life. The CSTs also integrate with an organizations' existing health information systems, such as PointClickCare and are tailored to align with individual workflows.

Based on a strategic decision to improve continence, along with a provincial quality indicator related to this area, Union Villa selected the Urinary Continence CST to use at the bedside and as a training tool to inform staff of best practices.

Helping to standardize continence assessments, this new tool outperformed all previous continence tools used by Union Villa, allowing clinicians to identify and also fully address the root causes of incontinence – a level of decision support that previous tools did not provide.

In collaboration with Think Research, Union Villa began planning and implementation in late 2017, with staff training completed in February 2018.

By March they had trained 12 nursing champions and had completed 20 assessments. The tools have been in use at Union Villa now for over 5 months, and in this short time, have already helped to strengthen communication amongst care team members, reduce administrative work, improve assessments, increase efficiency and support informed and structured clinical decision-making.

For residents, the result is an increased quality of care in this fundamental area. Regular quarterly assessments and participation in scheduled toileting programs has dramatically reduced the demoralizing accidents that can negatively impact a resident's experience within a long-term care home.

Union Villa's project lead, RAI-MDS/Informatics RPN Mackenzie Ralph, was instrumental in ensuring the uptake and utilization of the tool. She says, "We've fully replaced our previous continence assessment tool with Think Research's Clinical Support Tool. The innovative technology has opened lines of communication among our care team and helped to standardize assessment, as well as other care practices within Union Villa.

She added, "It's completely changed how we approach continence management. Now, residents, families and caregivers are all speaking the same language."

Mackenzie Ralph recently presented the outcomes of the project to several long-term care homes in the Greater Toronto Area, with adoption expected to increase as more homes implement CSTs across Ontario.

Building upon this early success, Union Villa also plans to advance to their project's next phase, which involves implementing the Skin and Wound Management CST under the direction of Eli Vega, Director of Care.

It's a program that marries the ideals of

CONTINUED ON PAGE 8

Cornwall Community Hospital reaches Level 6 on HIMSS EMRAM scale

CORNWALL, ONT. – Cornwall Community Hospital recently stepped up to Stage 6 on the HIMSS Analytics EMRAM ladder. The adoption of a leading-edge Electronic Health Record (EHR) has provided significant clinical and operational benefits.

The hospital undertook a 20-month project to install a fully integrated Healthcare Information System inclusive of the majority of modules available to an acute care hospital. Cornwall Community Hospital successfully went live with the fully integrated electronic health record in December 2016, with official accreditation in April 2018.

The transformation to the electronic system required collaboration of the entire organization, from senior leadership to front line, from housekeeping and porters to physicians.

The silo approach of building out individual applications was removed and integrated, with cross-departmental teams formed. The assessment of approximately 136 current state workflows, transitioned to 257 future state workflows, with the goal of improving patient care and efficiencies.

The custom of maintaining historical processes and practices was discouraged without adequate review of their appropriateness in the digital world. A much more sophisticated maturity model was used in the build out of processes in the digital workflow for the clinicians.

With that, the review of efficiency, quality, risk, and mandatory data collection was incorporated within each functional build. Cornwall clinical staff now have a better understanding of the system they helped build and the rationale behind much of its design approach.

A secondary organizational benefit realized from this cross-functional team philosophy was the growth of relationships and awareness of departmental processes affecting the delivery of service and quality of care a patient receives.

Of great benefit are the clinical decision support tools that were built. Comprehensive screening tools and prompts to mitigate risks for (VTE) clotting, delirium (CAM), Influenza, and others were designed to assist the clinicians to use a best practice methodology to treatment.

Together with Zynx Healthcare, Cerner Corporation, and Think Research, Cornwall Community Hospital employed evidence-based practices to improve patient outcomes using Computerized Physician Order Entry (CPOE).

Cornwall Community Hospital developed approximately 300 'powerplans' (electronic order sets) across clinical disciplines and effectively addressed the assessment, monitoring and treatment of the many of the Ontario Quality Based Procedures (QBP). Most broadly used are plans for COPD, heart failure, hip and knee arthroplasty and stroke.

Members of the health information system team at CCH.

The ability to report on the utilization of the powerplans and clinical support tools provides the organization an opportunity to analyze and address any shortcomings with corrective actions.

Dashboard reports include metrics outlining compliance with best practices and clinician use of the powerplans, thus ensuring that patient outcomes are at the forefront of orders.

Prior to the electronic health record, and working with paper tools, the organization was not able to analyze the adoption of its quality-based procedure metrics and patient outcomes effectively. Inclusive in the powerplans created, approximately 30 Quality Based Procedures incorporate thousands of clinical categorized standards that can now be monitored. Cornwall Community Hospital continues to revise the QBP powerplans as new handbooks are published, and is refining the analysis and utilization of the QBP metrics. The transition from paper to a fully integrated electronic health record has resulted in a clinical transformation for Cornwall that continues to evolve and improve the medical outcomes for our patients.

Osler collaborates with Brampton, private sector and Ryerson to fuel growth of biomedical cluster

The Brampton region is home to a fast-growing number of clinical trials and tests, centred on diabetes, cardiac care, long-term care and home-care technologies.

BRAMPTON, ONT. – William Osler Health System – a bustling community hospital with three sites – decided five years ago that it wanted to boost the amount of research and development it does. The move to more R&D was made to improve the health of the local patient population and act as a driver of economic development in the city.

Today, Osler is running more than 200 research projects in partnership with large pharmaceutical and medical device companies, as well as with start-up technology firms, other hospitals and with educational institutions. That rapid growth in R&D is unusual for a community hospital – it's like zooming from 0 to 100 km in 5 seconds, in automotive terms.

"It's an elaborate R&D program that's evolving and coming together very nicely," says Dr. Ron Heslegrave, with his characteristic modesty. Dr. Heslegrave, Corporate Chief of Research at Osler, was given responsibility for organizing the expansion of R&D at the hospital. He was recruited from the University Health Network and has brought his real-world expertise, and corporate and academic connections to Osler.

Dr. Heslegrave also credits the hospital's leadership with providing the right corporate culture for R&D. Osler's President and CEO, Dr. Brendan Carr, is a strong proponent of the program, as are Executive Vice President of Quality, Medical and Academic Affairs, Dr. Naveed Mohammed and Chief of Staff, Dr. Frank Martino. Tellingly, both Dr. Mohammed and Dr. Martino are running their own research projects, assisted by students.

> "We've positioned ourselves as a hub to evaluate new drugs, devices, procedures and technologies, in order to get real-world experience in a multi-cultural community."
>
> *– Dr.Ron Heslegrave*
> *Corporate Chief of Research*
> *William Osler Health System*

"Osler has one of the busiest Emergency Departments in Canada, we deliver more babies than most hospitals in the province, and our clinicians still make time for research and innovation," said Dr. Mohammed. "That shows you our commitment to R&D."

Another key to igniting the fast take-off of healthcare R&D in the region has been the close partnership between the City of Brampton and Osler's executives and clinicians. For its part, Brampton is already home to over 800 health sector businesses and agencies, and the city is actively building a health cluster by providing incentives to new companies, and creating synergies with existing corporations – which include Medtronic Canada, Canon Canada, Dynacare labs and surgical robotics developer MDA Corp.

"We're very collaborative here," notes Martin Bohl, Sector Manager, Health and Life Sciences at the City of Brampton. A brand-new collaboration is with Ryerson University, which has just announced the construction of a campus in Brampton. With a focus on science, technology, engineering and math (STEM), the school will provide a new source of talent for local healthcare and tech businesses.

Moreover, Brampton is encouraging Ryerson to establish a business accelerator, along the lines of its top-ranked DMZ and Biomedical Zone incubators, which it runs in downtown Toronto. The goal is to generate new biomedical businesses in Brampton, in collaboration with the hospital and the large base of players that are already there. "Ryerson will be a game-changer for Brampton," asserts Bohl.

Through Osler's efforts, the Brampton region has already become a centre of excellence for leading-edge solutions in cardiology, diabetes, kidney disease and oncology. Indeed, the region is a living laboratory for researching solutions to these ailments, due to the nature of the local population. "Fifty percent of the population here is of South Asian origin," notes Dr. Heslegrave. "Research shows South Asians carry a heavier incidence of these diseases."

Studies currently under way include:

- AutoRIC. This armband, likened to the cuff worn to measure blood pressure, applies pressure to the arm, but in this case, it is intended to trigger a cascade of molecular events designed to protect the heart and vascular system in patients experiencing heart attacks. The creators of the device, Toronto-based CellAegis Devices Inc., found through research that the device can set off a physiological response in the body that rescues heart cells during a heart attack and the re-perfusion injury that occurs during treatment. It's now being tested in ambulances, in Peel Region and Halton Region in Ontario. The company is working with Osler's team, and researchers at the Institute for Clinical Evaluative Sciences, to determine the efficacy of the device and has enrolled 1,800 patients in the trial. Funding of $700,000 was obtained for the project with the Ontario Centres of Excellence. "If we obtain the expected result, such as decreased readmissions to hospitals, autoRIC could be put into ambulances across the province," said Dr. Heslegrave. "It could have a huge impact on the community we serve."
- An innovative platform is being developed to help aging patients, who need assistance at home, manage their day-to-day tasks when discharged from hospital and living at home. Called MATCH (Marketplace to Access Trusted Care at Home), the system connects patients with people who can help, usually provided by family, with regular tasks in the home and personal support. "A patient and their families may qualify for a certain number of hours of help from the local LHIN, and after that, they're on their own," said Dr. Heslegrave. "This gives them a safe and easy way to obtain the extra help they may need." This innovative project has attracted $250,000 in funding from the Centre for Aging and Brain Health Innovation, powered by Baycrest; the technology platform has been developed by uCarenet.
- A new app that is under development called RELIEF, will link – in real time – the daily symptoms, pain and distress levels of palliative patients living in the community, with their palliative care team at Osler. It will help ensure, for example, that an elderly patient whose symptoms, pain and distress levels are increasing, are sent to their clinical team to determine whether an earlier intervention or home visit is necessary to avoid a trip to the Emergency. Alternatively, knowing that your condition is being monitored on a regular basis by your clinical team and assured that there is no need for an earlier intervention, may provide psychological support and relief.

Dr. Ron Heslegrave displays an autoRIC armband, which is being tested by paramedics in Peel and Halton.


Osler's Peel Memorial Centre for Integrated Health and Wellness is a major part of the biomedical cluster.

For the City of Brampton, the goal is to build synergies among Osler, large and small biomedical companies, and the new Ryerson University campus, which will soon start construction. The city intends to become a powerhouse among biomedical clusters in Canada. "We've positioned ourselves as a hub to evaluate new drugs, devices, procedures and technologies, in order to get real-world experience in a multi-cultural community," said Dr. Heslegrave. "We do represent the diversity of Canada here in Brampton."

Youthful entrepreneurs adapt consumer technologies to healthcare

BY JERRY ZEIDENBERG

MARKHAM, ONT. – At the end of a two-week boot camp, held in July at the Markham Stouffville Hospital, five teams of young innovators stood up and made their pitches. The participants, including students from Seneca College and York University, had created solutions to challenges in the hospital's emergency and childbirth departments.

Their ideas included technologies and apps seldom seen in hospitals – including 'heat maps' that measure whether patients are content or irate in waiting areas; AI-powered kiosks that can translate languages when patients and clinicians can't understand each other; and wearables that can be used en route to the emergency department, to automatically collect data before a patient arrives.

They're technologies and applications that have been used in consumer and retail settings – often by youthful, early adopters – but which haven't yet appeared in hospitals.

> **"We've made some changes already, and we want to continue to work with the groups," said Elena Pacheco.**

The entrepreneurs were enrolled in Seneca College's Helix Summer Institute, which partnered with the hospital to provide workshops and meetings with mentors, clinicians, staff and patients. The goal was to devise solutions to real-world, healthcare problems – all in a tight, two-week timeframe.

"For the second year, Markham Stouffville Hospital has been our lead partner, and has given us access to staff and patients," said Chris Dudley, director of Helix, the college's accelerator and innovation unit. Other partners included IBM Canada; local business accelerator VentureLAB; and the regions of Markham and York.

Each of the five teams came up with viable solutions to problems that seem to stymie all hospitals, such as long wait-times in the ED, communication gaps between patients and clinicians, and the quality of the patient experience.

The groups, said Dudley, plan to go on developing their solutions, after being encouraged by hospital staff and partners.

Moreover, the hospital itself has benefited from the experience. "We've made some changes already, and we want to continue to work with the groups and to innovate," said Elena Pacheco, VP of Support Services and Transformation at MSH.

In a nutshell, here is what the five groups devised:

Emerge.AI: Hospitals often conduct surveys about the patient experience – in the ER or other areas – but it's done well after the fact. However, what if you could gauge the patient experience in real-time, as it was happening? That's what Emerge.AI is working on.

The group is using AI-powered voice and video technology, placed in waiting areas of a hospital, to monitor facial expressions and voice patterns. No facial recognition is being used, nor are conversations being monitored. Instead, it's whether patients are content, happy, sad, or irate that can be determined through both visual expressions and the tenor of the voice.

Using this technique, colour-coded GIS maps can be created showing 'hot spots' in the hospital, where patients may be discontented. A red area on the map can alert hospital staff that there's a problem in need of fixing. If an area – such as the ER or DI waiting room – constantly displays red, rather than green or yellow, it signals to staff that processes need to be improved.

As one of the group members explained: "It's emotion mapping of the ER, with instantaneous feedback."

Another team member noted the technology is already being used in the retail sector; it has been tested by fast-food chains, to monitor customers in drive-throughs. The restaurants, too, want to measure – in real-time – whether their processes are resulting in satisfied customers.

The Emerge.AI team created a system that gauges the emotions of patients in the ER, to improve quality.

Becka – The Digital Concierge: Becka is using artificial intelligence to create an instant translation system. If a new Canadian from Sri Lanka, for example, is having trouble explaining her pain to a clinician, the Becka device could be used to translate.

As one team member noted, "Ontario welcomed 100,000 immigrants last year. And in this area, Markham, 63 percent of the population has a mother tongue other than English."

Needless to say, communication can be a challenge, especially in an emergency situation. But Becka can translate and give answers in a person's own language.

Of course, the device could translate the physician's diagnosis and instructions back to the patient. It can also provide directions around the hospital, answering questions like, "Where is the fracture clinic?" It might even offer clinical information, such as, "Why am I taking a certain medication."

Team members said it's like Apple's intelligent assistant, Siri, but optimized for the hospital environment. The self-learning database will be initially set up with data and scenarios that are envisioned to be most useful, but it will be able to add more as it goes along – likely through its own intelligence.

The group members are now looking at forming an alliance with providers like Microsoft, Google, Amazon, or possibly with IBM and its Watson AI engine.

Passport: The team at Passport wants to speed up the registration process at hospitals by adopting the techniques used at airport check-ins. "We want to bring the airport experience to hospitals," said a presenter from the group. "It should be like scanning your passport."

The group envisions a multi-lingual kiosk that can speed up the check-in process at Emergency Departments and other intake areas; the plan is integrate the solution with the Meditech electronic patient record system, which is used at Markham Stouffville Hospital and many other Canadian hospitals.

Proactive Triage: The group is using intelligent "wearables" as a way of tracking and recording vital signs in patients on their way to the hospital. By using technology like the Hexoskin wearable, data can be automatically collected and transmitted to the hospital, where it can be reviewed – even before the patient arrives.

This means the hospital will be aware of patients who are on the way and will have a better idea of their medical condition. Moreover, by automatically taking readings, a good deal of rote work will be eliminated.

The group is primarily concerned with low-acuity patients – called C4s and C5s.

As another innovation, it is reaching out to Uber Health, which is providing rides to hospital for low acuity patients, as well as transports between medical facilities.

The key to this association is that Uber is already highly computerized; it is tracking patients and performance, and the Proactive Triage app could be connected to the Uber app.

"It's possible that we could do 60 percent of the registration and data collection in the car, before the patient reaches the hospital," said a Proactive Triage team member.

Along Comes Baby: When partners arrive at a hospital with the wife in labour, they're often excited – and sometimes in a frenzied state. As one presenter said, "The wife may be yelling for an epidural, and the husband is irate, and asking why she isn't receiving it." In short, there's lots that expecting couples don't know about pregnancies and hospital processes.

The Along Comes Baby app is designed to inform them about labour and delivery – from before they get to hospital, to what to do when they arrive, as well as what to expect during their stay and what should be done afterwards.

In essence, it's like a 'best practices' guide to pregnancy and childbirth, optimized for a specific hospital.

It should be noted that the projects are, so far, works-in-progress. The teams had only 10 working days to put together their game plans. Now, they're out to develop them further. For more information, please contact Chris Dudley at Seneca College. Chris.Dudley@senecacollege.ca

Early adopter

CONTINUED FROM PAGE 6

holistic care with the potential of technology, and partners are delighted with its early success.

Alka Modi, Program Manager and project lead at Think Research, is inspired by the experience of working with Union Villa: "This sector is demanding change and deserves it. The Clinical Support tools are being adopted by leading homes like Union Villa, and this adoption is having incredible impact on the system. With these tools, nurses, personal support workers, administrators and other care staff can spend less time reporting and more time on what matters most – keeping residents healthy and happy."

Shilpi Majumder, Director of Public Policy at AdvantAge Ontario and a member of the CST Advisory Committee, is also delighted to see early adopters Union Villa take an active role in implementing this innovative tool.

"We have been collaborating with the project partners and our members to spread the uptake of the Clinical Support Tools across the sector. Our members have provided valuable feedback about the process which we've brought back to the team and worked with them to facilitate ease of uptake and minimize barriers. The learnings from Union Villa will help other LTC homes implement this program more effectively."

Union Villa Administrator Roxanne Adams noted the progress on this initiative: "Our staff are committed to providing resident-centred care while enhancing the quality of life for our residents as they age well and live better, one person at a time.

"In collaboration with our partners, we are happy to share our outcomes in order to advance the quality of life for residents living in long-term care homes across Ontario."

The University of Ottawa Heart Institute's improvement project reaches Phase 3

Expansion provides new advanced technology, a state-of-the art working environment, and better outcomes.

BY DAVE WEBB

The expansion of the University of Ottawa Heart Institute gives the facility some of the most advanced surgical technology available, but a focus on a state-of-the-art working environment is almost as important.

Inaugurated in the Spring, the Life Support Tower – "The Tower," to its staff – marks the completion of Phase 3 of the planned hospital improvement project, says Dr. Tim Zakutney, Vice-President, Medical Equipment and Chief Medical Technology Officer.

The five-story building, three years in construction, adds 145,000 square feet, 27 critical care beds, nine cardiac catheterization and electrophysiology (EP) labs, and six cardiac operating rooms.

One room is a 1,000-square-foot hybrid OR, featuring robotic and image-guided surgical equipment. (Another room is shelled in for a future use hybrid OR.)

The hybrid OR is home to the hospital's da Vinci Surgical System, produced by surgical robotics manufacturer Intuitive Surgical Inc. of Sunnyvale, Calif.

Da Vinci is a surgeon-helmed robot that allows less invasive surgical procedures, minimizing danger and recovery time. The Institute has one of the world's largest installations of Azurion image guided therapy equipment from Philips, which helps perform complex procedures more consistently and efficiently.

In fact, surgeons could perform various procedures – open heart, robotic and image-guided – simultaneously in the hybrid OR, says Dr. Thierry Mesana, President and Chief Executive Officer of the Institute.

The Institute performs about 12,000 surgical and non surgical procedures a year, about 80 percent of them complex operations – such as open heart surgery, coronary bypasses, heart transplants – that can only be done in a handful of Ontario hospitals, says Mesana.

It's the cardiac referral hospital for 14 others in the Champlain Local Health Integration Network (LHIN), which serves about 1.2 million people.

"We need very specialized operating room procedures," Mesana says. Much of the Institute's infrastructure dates back to its 1976 opening, and "needed updating," he says.

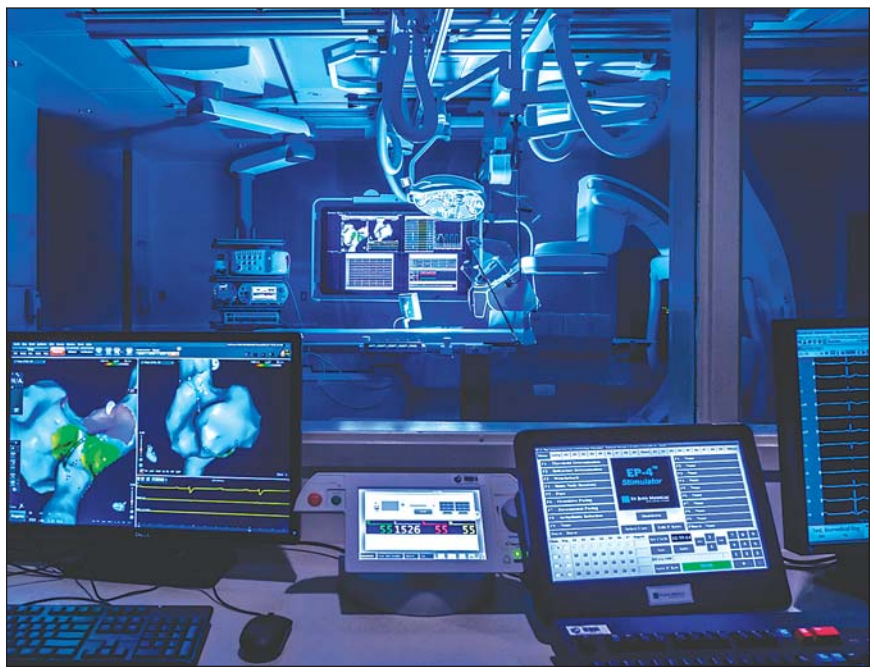
The redevelopment began in 2014 with new cardiac magnetic resonance imaging (MRI) and computed tomography (CT) facilities. They were bumped up in the schedule, a sort of "pre-Phase 1" project, according to Zakutney.

"We needed to address that immediately for our patients, so we moved that ahead," Zakutney says.

Phase 4 will see a new cardiac imaging centre (to open in the first quarter of 2019), new general radiology and gamma photography equipment, and the relocation of stress and CT labs. It will be 2020 before the five-phase redevelopment is complete, Zakutney says.

"It's about creating more space, safer space for staff and patients, and having space to expand," Zakutney says.

Perhaps nowhere is this theme more obvious than the relocated surgical intensive care unit (ICU), its beds moved from a windowless room in the basement of the Institute to the top floor of the new tower. The spacious rooms include a nursing station for a one-to-one patient-nurse ratio; importantly, they're brighter and quieter.



An electrophysiology lab at the University of Ottawa Heart Institute contains the latest technologies.

A hybrid operating room at the hospital allows for both open and minimally invasive procedures.

"Being in the basement for so long (a post-surgical stay) was traumatic to patients," Mesana says. And it could be demoralizing to staff as well. "The wellness of our staff is very important," he says. The effect of the new environment has been "invigorating", he observes. "The staff is much happier."

The ceilings lift for more headroom. Articulated arms can position patients to allow them a window view. There's even a balcony for chronic care patients. "The windows we had downstairs were something you'd see in your own basement," Zakutney says.

One ICU room is dedicated to morbidly obese bariatric patients, but the other four can be adapted to accommodate them as well. And new monitoring equipment is designed to integrate with the hospital's coming electronic health records (EHR) system.

Zakutney and Mesana are monitoring a number of metrics to validate the performance improvement at a hospital that already ranks well below the Canadian average in post-operative mortality rate and 30-day readmissions, according to a three-year study by the Canadian Cardiovascular Society and the Canadian Institute for Health Information. The Institute also boasts a 98 percent patient satisfaction rate.

"The bar was pretty high already," Mesana says.

Mesana has already seen a 10- to 15-percent volume increase in treatments, shortened wait lists and wait times; he's expecting a drop in wait times to two to three weeks for non-emergency patients from the current six weeks.

Zakutney says the opening of another shelled floor in the tower will have "a dramatic impact" on patient volume. Better heating and ventilation systems should reduce infection rates and more non-invasive surgical procedures, using robotics and image-guided technology, should lead to shorter hospital stays.

More imaging equipment will help shorten patient wait times, and the centralization of imaging disciplines will allow closer collaboration and the selection of the best imaging options for each patient.

Zakutney stresses that while the construction of the Life Support Tower was funded to the tune of $135 million by Crown agency Infrastructure Ontario, the local share, which included all medical equipment, was funded through community donations to the University of Ottawa Heart Institute Foundation, which provided an additional $63 million for the project.

e-Health 2018 emphasized the patient experience, electronic solutions

VANCOUVER – The importance of patient-centric approaches to digital health was an overarching theme at the 18th annual e-Health Conference and Tradeshow, which took place in Vancouver in May.

The opening session of the Sunday Symposium set the tone with the story of Greg Price, a young man from Alberta who lost his battle with cancer in 2012 after spending much of the previous year navigating a disconnected healthcare system. Throughout Greg's journey, there were many gaps in the continuity of care, which led to delays in treatment and may have contributed to his untimely passing.

There were a number of takeaways from this session and for a digital health audience. In particular, the need to break down the current siloed approach to healthcare delivery is greater than ever and that technology can help drive the change.

After all, one of the culprits in the story was the fax machine – a technology that is largely considered extinct. Except in healthcare.

The message hit home that innovation and interoperability between EMR and EHR systems can reduce harm and save lives. And it needs to happen fast.

Since Greg's passing, the Health Quality Council of Alberta (HQCA) launched an investigation into his story. The result was a report that recommends 18 changes that can lead to better care delivery – including a province-wide personal patient portal and e-referral system.

Greg's story has catalyzed patients and citizens to become engaged in healthcare issues and use their voices to effect change.

More and more, patients are driving changes in the healthcare system. They have first-hand experience of navigating our hospitals and clinics. As recipients of care, they also have invaluable input on what works well, and how to improve interactions among care-providers.

Patient engagement at e-Health 2018: "Nothing about us without us" has become a popular turn of phrase used by human interest groups, including those representing patient groups.

Canada Health Infoway's Shelagh Maloney.

To that end, the e-Health organizers committed to incorporating the experience of patients as experts in living with their conditions.

In fact, e-Health 2018 received Patient Included Accreditation for meeting all five criteria identified by the Patient Included Charter.

As part of this commitment, e-Health 2018 Conference awarded two scholarships to patients and/or caregivers to attend the conference: Kerri Mackay of Winnipeg, and Francine Buchanan of Toronto, were the recipients of the scholarships.

The conference brought together some of the top minds in digital health, but they, like everyone else, were able to learn from patients who are passionate about sharing their stories to improve the health system.

As in most things, there is always room for improvement. Patient Scholarship winner, Kerri Mackay, who has represented the patient voice in a number of conferences across North America, said: "I think including patients via a scholarship program is just the beginning of good things to come for the e-Health conference.

"There were some sessions where the patient experience was highlighted, but I do feel there were many missed opportunities for patient engagement that could be grown into in the future, to become a more truly

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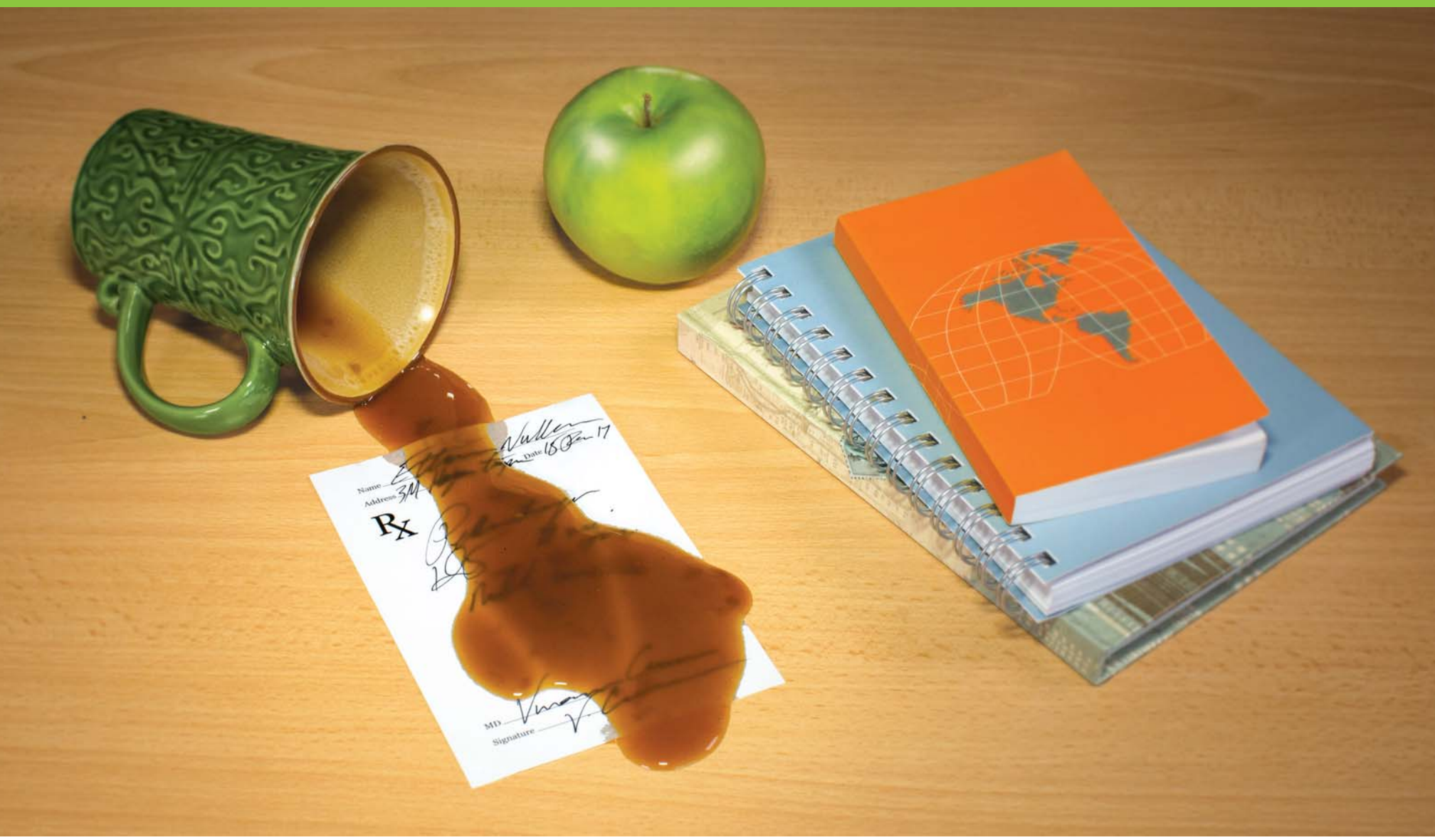

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E-health 2018

CONTINUED FROM PAGE 6

and effectively Patients Included conference. In the future, I'd love to see patients presenting on a greater majority of panels, and sessions led by patients."

On your mark, get set, HACK! The "patients included" theme carried into this year's hackathon, which set out to tackle the pressing issue of chronic disease management. According the Public Health Agency of Canada, chronic disease affects three out of five Canadians over 20 years of age.

The theme struck a chord with hackers and attracted 29 participants from as far away as Newfoundland and Labrador. Over the course of the conference, participants from five teams worked hand-in-hand with patients and clinician experts, building innovative prototype solutions focused on prevention, home care, and community care.

Nancy Roper received a patient scholarship sponsored by Gevity and Tableau. As an IT professional and patient, Nancy was driven to build a solution to help patients get to appointments.

"I was really thrilled at the number of people who came up to me and said, 'I never thought about how hard it is for patients to get to their appointments – thank you for enlightening me about that challenge.' So even if our application doesn't come to market, I still think there was benefit," she commented.

From her idea, the Patient-appointment Drop-Off Assistant was born, which took away the Patient Choice Award.

CareCircles (now ShareMyCare) was a stand-out winner this year, walking away with three of the six prizes (CIHI, Infoway, People's Choice).

The team of nine built a patient-centric platform that connects the circle of care (clinical) with the circle of support (family & friends) to enable the flow of information between the groups based on consent set by the patient.

Since e-Health, ShareMyCare continues to be in development. A research team has been established at Memorial University and the team anticipates being able to deploy the solution in Newfoundland & Labrador as a pilot project.

Other Hacking Health winners included:

- SAM: The Smart Automated Medical Assistant (Digital Health Canada Winner)
- Wikimeds (Orion Health Winner)
- Patient-appointment Drop-Off Assistant (Patient Choice Award Winner)

Plenaries to talk about: The plenary sessions peppered throughout the conference offered a range of invigorating discussions on topics ranging from the future of Canadian digital health, the trials and tribulations in the health start-up industry and space medicine.

Panel discussion at eHealth 2018 in Vancouver.

To close the conference, Nova Browning-Rutherford offered a powerful message, reminding us of the importance of wellness and self-care to prevent us from one day being on the other side of the hospital bed.

Towards the future – e-Health 2019: The vision for e-Health 2018 was to Celebrate, Grow & Inspire Bold Action in Canada's Digital Health Community. Between the 250+ presentations, social events and award ceremonies, the event offered an abundance of opportunities to do all three.

There is no doubt that the patients-included movement is building steam across the sector and we can expect this will continue to shape the e-Health Conference and Tradeshow.

Mark your calendars, as e-Health 2019 will take place in Toronto at the Beanfield Centre from May 26-29.

Missed Out on e-Health 2018? If you could not attend e-Health 2018, you do not have to miss out on all of the fun. The Virtual Library, available at http://library.e-healthconference.com/virtual-library offers access to recorded presentations (including all the plenary sessions), and all PDF/Presentation slides that took place at the conference.

Just Discharged... Now What?

For millions of aging Canadians, getting help in the community after being discharged from hospital can be a challenge. It is critical that patient care is transitioned and coordinated from the hospital into the community.

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ORION HEALTH

Telemedicine and automation are hitting the clinical trials sector

New applications bring trials right into the patient's homes and help with compliance.

BY DR. SUNNY MALHOTRA

Clinical trials are expensive and often inefficient ways to validate new drugs, devices and medical interventions. Enter the age of digital clinical trials. Pain points include recruitment, data collection, adherence and logistical challenges.

A remote trial is a form of a digital trial that leverages digital technology to improve clinical trial efficiency. Web-based outreach increases the pool of potential qualifying patients and can speed up recruitment.

Increasingly, organizations are using new software and services to streamline the clinical trial process. They're utilizing hardware and coaching mechanisms to promote adherence and reduce losing patients during the study.

Hardware can objectively track patient outcomes and digital pills, which have been newly FDA-cleared, to objectively measure patient outcomes. If data input can be automated, there is accuracy and adherence data improvement which can validate the above issues.

Doctors can attempt to conduct a randomized control trial and recruit patients online. This allows patients to participate from their homes via drug deliveries and a mobile application without a clinical trial site.

Science 37 (www.science37.com) is a leader in the space and can tackle issues of geographical constraint by developing patient-centric models for clinical research to accelerate biomedical discovery.

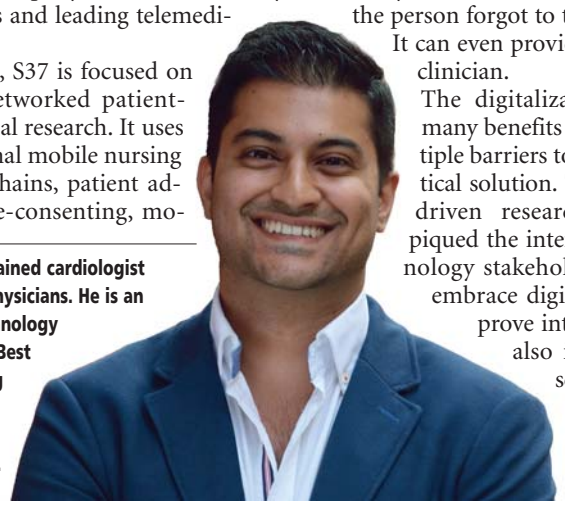
It is important to recognize the value of telemedicine's role in conducting remote trials. It needs to be ubiquitous and reimbursable to overcome barriers such as patient dropout. (Go on Science 37's website and you see that participants are compensated – in some cases, $50 to $100 — for completing clinical trials, in addition to learning more about their own conditions and possibly finding remedies.)

There is a focus on improving the patients experience during a clinical trial and improving ways of communicating patient data. Site-less trials can be distributed through mobile devices like Apple's research kit platform. This is an open-source platform that researchers built medical applications and recruit patients for clinical trials.

For its part, Science 37 uses telemedicine technology to accelerate biomedical discovery and bring down the costs of clinical trials. In addition to its own researchers, the company also works closely with physician-scientists and leading telemedicine companies.

> **Science 37 brings clinical trials into the homes of patients using telemedicine, mobile nursing companies, pharmacy chains, and other methods.**

Based in Los Angeles, S37 is focused on the development of networked patient-centric models for clinical research. It uses partnerships with national mobile nursing companies, pharmacy chains, patient advocacy groups, virtual e-consenting, mobile devices, and other techniques to bring clinical trials right to their homes.



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 company's proprietary technology platform, NORA (Network-Oriented Research Assistant), bridges the gap between traditional trial management software, an EMR, and an advanced telemedicine platform to support all participants in Networked Clinical Trials (NCTs).

On a related front, Pillo (www.pillohealth.com) is a company which makes personal home robots to improve medication adherence as an adherence tool in their Phase 3 and Phase 4 trials.

The device provides facial recognition, time stamping and a digital interface inside the patient's home as another method to communicate patient data.

Pillo will tell you when it's time to take a particular medication, lets you know whether you're out of pills, asks you if you want a refill, and will also answer questions about diet.

If you are looking after someone, it can send you alerts by email or other formats, to let you know if the person forgot to take his or her meds. It can even provide videoconferencing with a clinician.

The digitalization of clinical trials has many benefits but needs to overcome multiple barriers to become a widespread practical solution. The rise of digital outcome-driven research and development has piqued the interest of pharma and biotechnology stakeholders. Many have started to embrace digital adjunct solutions to improve interactions and insights while also improving operational and scientific efficiencies. This has led to many opportunities in digital health space where many sectors are updating their clinical trial strategies.

FHIR delivers more effective interoperability, at lower cost

BY CARYN HARRIS

Gone are the days when patients saw one doctor for all their health needs. Now patients are often cared for by a team of providers with different specializations. This is especially true for patients with chronic conditions, who often see multiple clinicians on a regular basis as part of their ongoing management.

A chronic-care patient, in the course of a week, could visit a primary care physician, a radiology clinic, a lab, and a cardiologist, for example.

The stakes are high, as clinicians require comprehensive patient records to ensure they make the best decisions for the safety of the patient. Getting the latest test results and encounter records can be problematic, however, as many systems still don't talk to each other.

Interoperability: Interoperability – or sharing information between systems – is a frequent pain point for hospitals and clinics for a number of reasons, including the lack of agreed standards that make information exchange possible, and frequent advances in technology that are only partially adopted – leaving many systems incompatible with each other.

Cost is also a major factor. The sheer volume of data that needs to be stored, shared, exchanged and accessed quickly becomes a major expense. Coupled with the fact that there are many different systems speaking to one another, interoperability is a modern healthcare issue in need of fixing.

The FHIR standard: Fast Healthcare Interoperability Resources (FHIR) is the next generation Health Level Seven (HL7) international standard in healthcare data integration. It is focused on reducing the cost of interoperability in terms of both time and money and unlocking technical innovation in healthcare. It was created with implementers in mind and is broadly supported in the vendor community, as well as by many healthcare providers.

Caryn Harris

FHIR provides a framework for the exchange, integration, sharing, retrieval and even storage of electronic health information. Built around existing industry approaches, FHIR's purpose is to make it easier to exchange all healthcare data between systems in a straightforward yet secure manner.

Central to FHIR is the concept of resources – self-describing, discrete blocks of data that make sense in the healthcare environment, and which can be adjusted (or "profiled" in FHIR speak) to meet specific scenarios.

FHIR aims to speed application development and interoperability, thereby giving a boost to information sharing in healthcare.

FHIR helps to make health information easily and securely accessed from any device, anywhere. It is an open source standard, available for all to use at no cost. As well as being easy to use for implementers, it is de-

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AGFA HEALTHCARE ADVANCES GREENVILLE HEALTH'S IT STRATEGY

The go-live of the latest version of AGFA HealthCare Enterprise Imaging is enhancing patient care and clinician workflow at one of the most innovative health systems in the U.S.

AGFA HealthCare and Greenville Health System – based in Greenville, S.C. – have announced the successful implementation of a comprehensive Enterprise Imaging system. The solution will facilitate greater efficiencies in clinical operations, improve clinical confidence, and enable cost reduction through convergence of systems and timely access to medical images and diagnostic tools.

The solution consolidates access and allows for care-team collaboration with Radiology, Cardiology, and other medical images while converging multiple legacy picture archive communication systems (PACS) onto a single platform. The result is the creation of one of the United States' largest integrated digital imaging systems in the prestigious HIMSS Electronic Medical Record Adoption Model (EMRAM) Stage 7-awarded health network.

VNA (vendor neutral archive) services facilitate Visual Intelligence – rapid cross-enterprise access to clinically relevant imaging information – and leverage diagnostic information from Enterprise Imaging PACS' advanced task-based workflow. Merging the familiarity and functionality of PACS with the power, access, and scalability provided by a single standards-based technology platform, the solution is designed to improve both the delivery of patient care and operational efficacy throughout multiple locations and clinician groups.

ENTERPRISE IMAGING PLATFORM

The Enterprise Imaging system implemented at GHS includes the following suite of applications on a single platform:

- Enterprise Imaging for Cardiology (PACS) – improves clinical productivity and reduces application overload by using a single user interface supporting all cardiology clinical workflows.
- Enterprise Imaging for Radiology (PACS) – a highly customizable diagnostic workflow tool designed to help radiologists achieve optimal efficiency in reading radiological studies.
- Standardized Departmental Workflows – allows all image-producing service lines, including Point of Care Ultrasound, Dermatology, photo capture for Wound Care, and Opthalmology to capture and associate imaging studies with an episode of care and drive enterprise-wide efficiency.
- Enterprise Imaging Vendor Neutral Archive (VNA) – consolidates all imaging data from multiple systems, departments, and vendors into a central clinical data foundation.

ADVANCING CONNECTIVITY

The recently implemented system has converged multiple PACSs onto a single platform, allowing the 1,627-bed multi-hospital system to seamlessly connect over 400 imaging modalities across 50 individual provider facilities to patients' medical imaging data. Nearly 4,000 clinicians are now relying on the Enterprise Imaging system to deliver patient care daily throughout the greater northwest South Carolina region.

Greenville Health System is renowned for its clinical efficiency improvements and commitment to transform the quality of care and patient safety using innovative information technology. The healthcare system recently achieved the prestigious HIMSS Electronic Medical Record Adoption Model (EMRAM) Stage 7 Award, the highest achievement level awarded. The near paperless environment achieved by GHS harnesses the integration of EMR and Enterprise Imaging technologies to advance the clinical, operational, and financial vitality of the health system.

The complex implementation exemplifies recognition given to AGFA HealthCare recently by KLAS Research, the healthcare research and insights firm. The KLAS Enterprise Imaging Performance Report 2018 identifies AGFA HealthCare as a 'strong and guiding partner' and cites strategic guidance, strength of the new platform, and integration as keys to the company's success in driving desired outcomes for clients. No vendor scored higher than AGFA HealthCare as a strong partner to create and/or develop an organization's enterprise imaging strategy. The study found that organizations seeing the most outcomes are those using AGFA HealthCare VNA and universal viewer, both of which GHS elected to rollout in their initial stage of the multi-year deployment

"We are proud of the technical and clinical enhancements accomplished across the Greenville Health System that will help improve the care we deliver to the patients we serve. The Enterprise Imaging platform integrates with our EMR to benefit our growing network's clinical, operational, and fiscal health," said Richard Rogers, vice president and CIO, Greenville Health System. "In reducing complexity and cost – and increasing efficiencies across our clinical and operational processes – we view AGFA HealthCare's solution as key to our digital health strategy. The AGFA HealthCare team has been an excellent business partner and their guidance and collaboration have been instrumental to our controlled rollout's continuing success."

"Two years ago, GHS and AGFA HealthCare embarked on a journey together with a shared strategic vision of leveraging an integrated patient data platform and it is wonderful to see this come to fruition," commented Frank Pecaitis, senior vice president, North America, AGFA HealthCare. "The implementation of Enterprise Imaging with Greenville Health System continues validation of the platform's scalability, convergence power, and the fundamental contributions Enterprise Imaging can deliver to a health network's transformation to standardize and personalize care."

AGFA Agfa HealthCare

Community paramedicine reduces trips to the ED, before patients need to call 911

Paramedics are becoming pro-active in reaching out to the elderly and infirm, reducing trips to the ER.

BY DIANNE DANIEL

"911 What's your emergency?"

"Thanks to community paramedicine, I no longer have one."

This is the new reality in several populations across Canada as community paramedic programs continue to make a positive impact, from improving patient wellness to preventing 911 calls and emergency room visits, to helping chronic disease sufferers manage conditions better at home.

Starting in remote areas of Nova Scotia, community paramedicine programs have launched in several provinces, each with its own success story.

One of the primary challenges, however, is to sustain funding so programs can scale. That's where measurable outcomes and technology implementations are helping.

In Ontario, the Community Paramedicine at Clinic (CP@Clinic) research program led by Dr. Gina Agarwal, a primary care epidemiologist and associate professor in the Department of Family Medicine at Hamilton's McMaster University, published noteworthy results earlier this year.

The report showed that a "paramedic-led, community-based health promotion program significantly lowered the number of ambulance calls, improved QALYs (quality-adjusted life-years) and ability to perform usual activities and lowered systolic blood pressure among older adults living in subsidized housing."

What started out as an evidence-based trial study in one social housing building is now operating in 16 of Ontario's 52 paramedic services.

Funding was also acquired to support an expansion project called CP@Home in which community paramedics make house calls in addition to operating drop-in clinics.

"These are community paramedics who are designated for a different role, a new role," explained Dr. Agarwal. "You're actually getting to people before they call 911, and that's the whole point."

Both CP@Home and CP@Clinic target frequent 911 callers identified by the McMaster Community Paramedicine research team. The drop-in clinics are held in social housing buildings identified as having high need populations.

Paramedics take participating residents through health risk assessments, using the CP@Clinic app on a laptop as a support tool to identify next steps and maintain records for each visit, which are shared with primary caregivers and other community health professionals.

In addition to providing guidance and counselling, they connect patients to community resources and provide health educational materials.

Paramedics involved in CP@Home complete a similar patient assessment using computer tablets, considered less obtrusive in a home setting. Both programs use Bluetooth-enabled blood pressure cuffs, weight scales and other wireless devices as required.

When assessing patients, the software provides intelligent decision support based on the information they input.

"We developed a database with automatic, algorithm-based decision support in it. Once they put the risk assessment information in, the database tells them what they need to do next," explained Dr. Agarwal.

By comparing buildings running CP@Clinic to similar buildings without it, McMaster researchers found a 22 percent decrease in 911 calls over a one-year period. Considering that the cost for one 911 call is anywhere between $500 and $2,500, and the average building has 200 units, a savings of roughly $20,000 per building per year is plausible, she said.

The study also measured sustained decreases in participants' blood pressure leading to a lower risk of future heart attack or stroke and showed a lower risk of developing diabetes due to participants making lifestyle changes.

Primary care paramedic Allen Rennie, from the Cochrane District EMS in Timmins, Ont., works with both CP@Clinic and CP@Home programs.

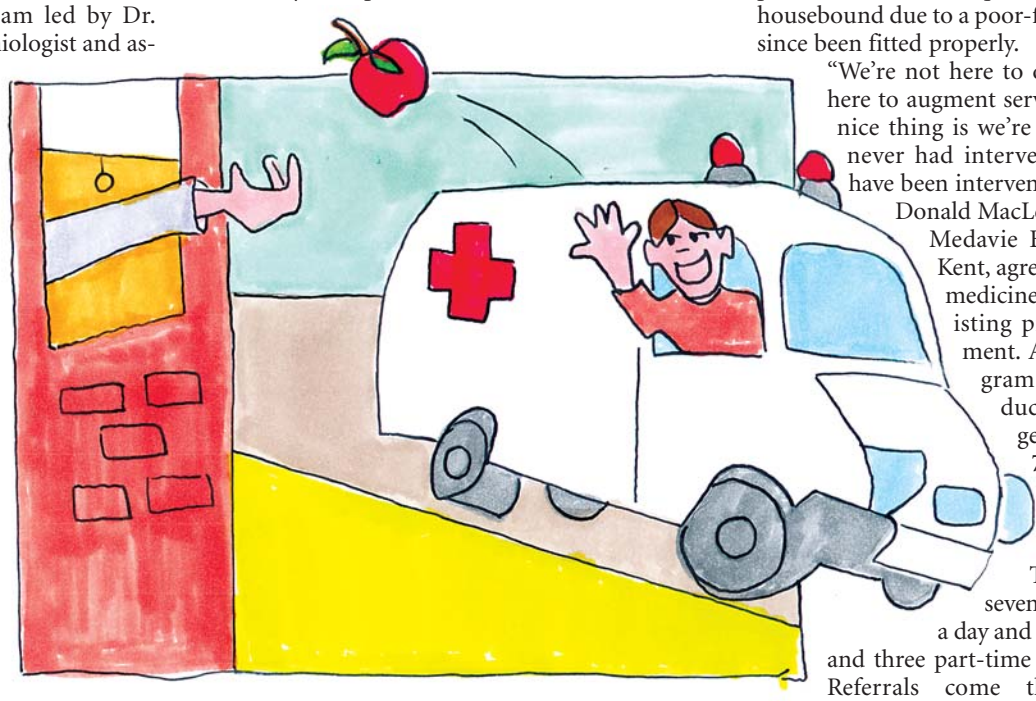

ILLUSTRATION: LINDA WEISS

Because funding for community paramedicine is limited in the north – the program receives $20,000 per year from the North East Local Health Integration Network (LHIN) – every paramedic is dually trained to be a community paramedic and to deliver primary care. If an emergency occurs during clinic hours or a home visit, the 911 call takes obvious precedence.

Rennie averages four to five home visits per shift, each one lasting 30 to 60 minutes. His initial assessment of a patient includes a list of criteria-based questions, a cognitive function test and a general health check of their blood pressure, weight and other baseline measures. He also captures the layout of their home.

CP@Home is easy to administer, he says, because all activity is governed by the app designed and supported by McMaster researchers and available on his Apple iPad. If a participant answers yes to one of the screening questions, the app automatically determines if they are eligible to participate in the program and provides the next question and/or suggested activity.

Response to the home visits is very positive, he said. "We've had people quit smoking. We can refer them to meal plans. We're allowing them to become healthier and to live a better lifestyle," said Rennie. "We're there as their voice. A lot of times they don't actually know how to receive the services they need."

The Cochrane District EMS currently staffs 12 community paramedic hours each week, which is more than its funding can support.

It has been running clinics at Cochrane District Social Services Administration Board housing units for two years and became the first EMS to start using CP@Home in May. Members of the Porcupine Health Unit are also present at each community paramedicine clinic.

According to Derrick Cremin, Commander, Operations and Community Paramedicine for the district, the number of patients with high blood pressure has decreased by two-thirds and 911 calls are fewer.

Among the success stories is a patient who lost 67 pounds, another who quit smoking and one who was housebound due to a poor-fitting prosthetic who has since been fitted properly.

"We're not here to duplicate services. We're here to augment services," said Cremin. "The nice thing is we're reaching people who've never had interventions, nor would they have been intervened."

Donald MacLellan, general manager of Medavie EMS Ontario, Chatham Kent, agrees that community paramedicine is a complement to existing programs, not a replacement. After four years, the program in Chatham Kent is reducing 911 calls and emergency room visits by about 70 percent on average, he said. Hospital bed day utilization is down by roughly 72 percent.

The program operates seven days a week, eight hours a day and is staffed by one full-time and three part-time community paramedics. Referrals come through primary care providers in conjunction with Ontario's Health Links program, as well as through regular operation paramedics who identify patients requiring follow-up.

Some clients are also referred through Future Health Services, a service that monitors chronically ill patients at home, including those with congestive heart failure and chronic obstructive pulmonary disease (COPD).

A paper-based system initially, the program is in the process of implementing an electronic medical record from Interdev Technologies Inc. that will integrate with the region's paramedic operations software.

It is also working with Sensory Technologies Inc. and the Erie St. Clair LHIN to implement the charting function in Sensory Technologies' eShift platform, giving community paramedics access to real-time patient care information while they are in a patient's home, and ensuring clinicians in the region receive updated records related to the visit.

"This model is working," said MacLellan, who expects the integration of technology will simply add efficiency so that more patients can be served. "The partnerships are there. The communication is there…We're all striving toward the same client goal

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CANADIAN Healthcare Technology

Study shows benefits of paramedics managing the chronically ill at home

BY DAVE WEBB

A soon-to-be-released white paper from Queen's University will show an astonishing return on investment for a paramedic program involving 20 services in southwestern Ontario. The program provides remote technology to frequent 911 callers with chronic illnesses; using the technology, they can alert staff to changes in their condition.

In what's being called the biggest study of its kind providing objective cost-benefit of such a remote monitoring program, the paper from the Smith University School of Business reports a 542 percent ROI to the health system for the Community Paramedicine Remote Patient Monitoring (CPRPM) pilot project. The program ran from April 2015 to December 2017.

Patients who suffer from chronic obstructive pulmonary disease (COPD), congestive heart failure (CHF) and diabetes were equipped with plug-and-play wireless technology to report changes in their condition, so staff from the Middlesex-London Paramedic Service could follow up with phone calls or home visits, as necessary.

Rick Whittaker, general manager of Wellington-Waterloo Community Futures, which helped finance the pilot with Canada Health Infoway, said while several programs were looked at in the development of CPRPM, "a lot of the other programs had an extra layer of technology."

He explained that some systems have patient information going to an intermediary who makes the judgment call of whether to escalate. In contrast, CPRPM operates on an "ATM" model – paramedics self-serve, rather than having a figurative bank teller handle the transaction.

Paramedics handling 911 calls are tied up until their patient is admitted to a hospital, consuming a lot of time and stretching resources to the point where a dreaded "Code Zero" – no available transport – could occur, said Harvey Goldberg, director of Ideal Life Inc., the platform provider for the CPRPM system.

John Clarke, paramedic, and Dustin Carter, Superintendent, Community Paramedicine, Middlesex-London Paramedic Service, are among the leaders in a regional test to manage the chronically ill in their homes.

Users are equipped with self-pairing Bluetooth-enabled sensors that connect to a transmitter in the home, which is constantly scanning for and connecting to new devices.

The transmitter sends readings over the cellular network. This no-touch approach was necessary to the ROI equation. With the break-even point calculated at saving three 911 visits per patient per year, tech support calls would eat into balance quickly, Whittaker said.

The study shows a 26 percent reduction in 911 calls at a cost reduction of almost $4.8 million for 650 users, or about $7,300 a patient. Patient-centred outcomes also showed a remarkable improvement, with 30 to 35 percent reductions in ER visits, hospital admittance and readmissions.

Ideal Life had anticipated setting up the in-home equipment for the 90-plus people involved in the pilot, Goldberg said, but found the paramedics wanted to do it themselves – it gave them an opportunity to do a home visit and to check that user environments were safe and healthy.

"That relationship is the very most important part of the program," he said.

The model makes the community paramedic a sort of lynchpin in the management of patients with chronic illnesses. When glucometer readings or O2 saturation levels pass predefined thresholds, paramedics have several escalation options, said Dustin Carter, superintendent of community paramedicine for the Middlesex-London Paramedic Service.

If oxygen levels report slightly low, a paramedic can phone the patient and ask clinical questions: Was there shortness of breath after exertion? Or the paramedic could pay a visit in a non-emergent response vehicle for a more thorough assessment, communicating with healthcare providers, rendering care on scene, or further escalating to the 911 system.

"We encourage people to do daily monitoring," Carter said, a personal touch that leads to better patient compliance and contributes to patient education. While patients are receiving education from clinical visits, it's often a struggle for them to see a primary care doctor or specialist. And those clinicians don't have the in-the-field view of patient circumstances.

Community paramedic John Clarke recalls a diabetes sufferer who was generating as many as 100 911 calls a year. She was receiving instruction from a specialist and had been issued a Glucagon kit for severe hypoglycemic episodes; the specialist hadn't been aware that the family member she lived with was developmentally delayed and couldn't safely handle the mixing of ingredients and injection of the solution.

Recently, an emergency call led Carter and Clarke to a chronic illness sufferer "living in squalor," unable to ambulate, dress or feed herself.

"You think of impoverished areas," Clarke said. "This wasn't the case at all. You would never have known what was going on if you didn't walk through that door.

"There are certain things it's beneficial to lay your eyes on."

The system also allows inclusion of the patient's entire "circle of care", such as the GP, nurses, specialists, and family members. For her part, Jocelyn Kohlmaier can monitor the vital signs of her parents, both 87, from her office in Toronto. It's coincidental that she's the executive director of Canada Health Infoway's Ontario Region.

Infoway ponied up about $1.6 million to Community Futures's $500,000 for the CPRPM pilot as part of a mandate to foster innovation in healthcare.

CPRPM resonates with Infoway's goals:

Innovating cost models. Many programs are short-term and funded on the cheap with no continuity; CPRPM's cost model is sustainable and scalable; Innovating delivery models. CPRPM allows in-home management of chronic illnesses without the cost of mobile nursing staff hospitalization; Innovating care models. Traditionally, clinicians have access to patient information in a siloed fashion, while CPRPM includes the entire circle of care.

The Kohlmaiers – a father with COPD and a mother with diabetes, daughters in Toronto and Cambridge, and a primary care physician in Waterloo – are poster perfect for the paramedic-patient relationship. "They listen to their paramedics more than to my sister and I," she said.

FHIR delivers

CONTINUED FROM PAGE 16

signed to be comprehensive with resources already defined for much of healthcare. Examples of resources include a Patient, Condition, or an Observation.

Use of this standard will help to break down the information silos that exist in healthcare. For example, a readily available patient health history can help ER physicians make educated assessments about an appropriate medication when there is no one to speak for a patient.

FHIR supports access to such vital data at the push of a mobile app button. It also supports the creation of an "app store" of independently developed mobile applications because it supports the collection of data and availability via APIs.

Using FHIR and APIs, interfaces can be quickly produced that offer patients the ability to add their own health data to patient portals, even from their smartphones – an emerging trend.

In addition, data from genomics and precision medicine has increased the amount of data available in a patient's record. As the population of aging patients and the prevalence of chronic disease has increased, the ability to data mine and to be proactive with population health management has emerged as a key driver for health systems. Implementers needed a modern standard to handle this huge increase of data.

For clinicians, FHIR improves access to a more complete, higher quality EHR by including data from traditional sources like lab results and also evolving sources such as personal devices and genomic information. The standard allows for a greater choice of applications and devices to support clinical workflow. The ability to share information seamlessly will result in time-saving for clinicians, placing their focus back on the patient.

The proliferation of patient apps means more forms of asymmetrical data exist than ever before. FHIR helps remove the technical barriers for data from patient engagement apps and allows it to be included in clinical systems while also preserving provenance.

> **FHIR makes it easier to include information from evolving sources of data, such as personal devices.**

A boon for developers is that FHIR uses familiar tooling and web related technologies such as XML/JSON, HTTP, REST, SSL and OAuth2. Predefined resources and APIs allow implementers to focus on the core application functionality.

FHIR has resulted in lower cost-of-entry for new vendors, improved access to data and an increase in the commercial viability of app development. The standard encourages the development of an ecosystem of FHIR compliant apps that can work with different FHIR servers.

Challenges: Despite all its advantages, FHIR is not a panacea for interoperability. There are many other requirements that need to be met, particularly establishing data-sharing agreements between the involved business level participants, developing and verifying safeguards for security and privacy, defining a common terminology among healthcare partners, and agreeing on the workflows involved.

Caryn Harris is the Canada Health Infoway eReferral FHIR Working Group Co-Chair, and Principal Consultant at Orion Health.

Huddol and Teva Canada find solutions to caregiver challenges

BY NEIL ZEIDENBERG

TORONTO – A recent national study by Teva Canada, a global leader in generic and specialty pharmaceuticals, found that more than 8 million Canadians are unpaid and unrecognized caregivers – people helping family or friends with acute or chronic conditions.

Moreover, seven in 10 Canadians believe caregivers aren't supported by the current healthcare system, and almost half say they don't have anyone to speak to about their experiences as a caregiver.

Teva Canada has teamed up with Canadian Caregiver Network (CCN) to launch a new caregiver pilot project in Quebec.

The pilot provides in-pharmacy support to caregivers and an accredited caregiver-focused training program for pharmacy teams. It also encourages caregivers to join

Christine Poulin

Mark Stolow

Huddol – a social collaboration platform connecting caregivers to a network of peers and healthcare professionals.

"It's really about people helping people," said Mark Stolow, Founder and CEO of Huddol, and President of CCN.

Huddol (www.huddol.com) refers to the word huddle, meaning a gathering, and aims to connect individuals caring for friends or family with healthcare experts. "Whether they're seeking expert insight, or the life experience of their peers, caregivers always have a network to depend on," said Stolow. The pilot program with Teva launched in Quebec on June 1, and the plan is to start rolling it out to other Canadian provinces beginning in January 2019.

By joining Huddol, caregivers can connect with healthcare professionals who can answer questions, find other caregivers on a similar path, and locate information on a broad range of health conditions. "They can also participate in live group chats and make use of other supports like online learning and more," said Christine Poulin, SVP and Country General Manager, Teva Canada.

A key goal of the pilot is to optimize the pharmacist-caregiver team, making them partners in the care of patients and ensuring the well-being of caregivers in the process. Pharmacists can play a more significant role in interacting with and supporting caregivers, and hopefully improve patient outcomes.

They can help by providing a medication review with both patient and caregiver present, so it's more clearly understood what the medication is, and how it should be administered.

They can also provide information about an illness of the patient being cared for, and offer health tips and recommendations on how to manage the caregivers' own health and well-being during this stressful period.

"Caregivers who wish to communicate directly with a pharmacist on a patient's behalf can simply download and fill out a proxy template at TevaAidants.com. Once signed and shared with the pharmacist, they can communicate by phone, email or text," said Poulin.

Success from the pilot will be determined in various ways. "The pilot program in Quebec is designed to generate learning and opportunities for future enhancements for a planned national roll out," said Poulin.

"We'll be aggregating caregiver survey results, tracking the numbers of Care Kits distributed, tracking the number of pharmacists registered and completing our related continuing education program, measuring traffic to our Caregiver website and click through rates on our email communication to pharmacists."

Community ASAP recruits from public to help adults living with dementia

BY REBECCA IHILCHIK

Toronto caregiver Ron Beleno knows what it's like to have a loved one with dementia go missing. "My dad had Alzheimer's for over 10 years. He used to be a wanderer – he'd go on walks, become confused and get lost," Beleno says. "As a caregiver, it's one of the scariest times. Worst-case scenarios always pop into your head. You know their life could be at risk."

Beleno's father wasn't the only one. Wandering is one of the many anticipated symptoms of dementia; it's commonly cited that three out of five people with dementia will wander from home. For families and caregivers, the disappearance of a loved one with dementia can be devastating.

Motivated by his own experience and those of other families he knows, Beleno set out to find a better solution. He teamed up with Dr. Lili Liu, a professor of occupational therapy at the University of Alberta, to create Community ASAP: an alert system that allows first responders to trigger localized notifications to community volunteers when an older adult goes missing.

"When you interview individuals after a person who goes missing is found, either injured or deceased, you find out many members of the community spotted the person but didn't report it because they didn't think the person was lost," Dr. Liu says. "It seemed first responders were not using the biggest resource at their fingertips, which is community citizens."

Ron Beleno

Dr. Lili Liu

With support from the Centre for Aging + Brain Health Innovation (CABHI) – a solution accelerator focused on driving innovation in the aging and brain health sector, led by Baycrest Health Sciences – Community ASAP is on its way to changing how we search for missing seniors.

How it works: When a volunteer signs up for Community ASAP, that individual can select up to five neighbourhoods they usually frequent – for example, those near their home and work. If an older adult goes missing in one of the designated areas the volunteer selected, all volunteers who have signed up to monitor that neighbourhood will receive an immediate alert through email or an app notification with a description of the older adult.

Community members are asked to keep an eye out and contact first responders if they come across the individual.

Alerts will be sent out by the designated community coordinator, which, depending on the area, could be the police or an organization such as the local Alzheimer's Society. In some jurisdictions police already have their own public alert strategies, says Dr. Liu, in which case they would simply integrate Community ASAP into their protocols.

The hope is that the service will ultimately lead to shorter searches for missing older adults, which will in turn save first responders time and money.

The alert system, once available to the public, will be free for volunteers. Users will be able to customize their experience by selecting the exact radius of areas they're willing to receive alerts for. By honing in on such a localized level, the app founders hope to prevent "alert fatigue" – the desensitization to a constant barrage of alerts.

Community groups, police, businesses, caregivers, and individuals living with dementia alike are eager to get involved, Beleno says. And, with support from CABHI, the Community ASAP team has been able to mobilize the grassroots-level interest quickly.

The CABHI connection: The Community ASAP team successfully applied to CABHI's Spark Program, receiving $50,000 to test and validate their early stage innovation.

"I was just thrilled to hear that CABHI involvement comes with a whole fleet of acceleration services like guidance and consultation related to commercialization, licencing, and intellectual property," Dr. Liu says. "Those are services on top of the financial support which, I think, is brilliant."

The Community ASAP team is now in the process of testing early versions of the software in simulations with groups of volunteers, caregivers, and police in Calgary, Toronto, and Coquitlam, BC. They'll be using the feedback from participants in these trials to tweak the system.

The plan is for Community ASAP to recruit thousands of subscribers across Canada. In this way, the program will act as an awareness campaign in its own right: a call to action that will educate those who wouldn't necessarily know about dementia-related wandering.

Hope for those living with dementia and their families: The first target group, and the heart of the project, includes families of older adults with dementia and their communities. By harnessing the power of communities, the Community ASAP model has the potential to save the lives of older adults living with dementia – and give caregivers more peace of mind.

Sam Noh, a caregiver from Coquitlam, is hopeful about the prospect of Community ASAP. His father Shin Noh, who lived with Alzheimer's, has been missing since September 2013. "There were confirmed sightings of my father on the day he went missing. Unfortunately, news of my father's disappearance spread slowly and we received confirmed sightings days after," Noh says. "I truly believe if an alerting system such as Community ASAP were in place, my father may have been found."

Roger Marple is an individual living with dementia from Medicine Hat, Alberta who recently joined the Community ASAP team as a lived experience advisor. He, too, sees tremendous potential in the system.

"I've wandered and gotten lost about four times in my life – I even got lost at my job. It's a dreadful feeling when you're in a situation like that," Marple says. "Community ASAP resonated with me personally. I see such a benefit from this program in our communities. It's different from other programs because it's so localized. It makes total sense."

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

Paramedicine

CONTINUED FROM PAGE 18

at the end of the day and that's improving their overall healthcare and confidence in their ability to care for themselves at home in a very safe and appropriate manner."

In Alberta, the model for community paramedicine is working so well, it recently expanded to be a province-wide initiative under Alberta Health Services (AHS). Referred to as EMS Mobile Integrated Healthcare, the program launched in Calgary in 2013 and in Edmonton in 2014. By last year it was supported by 33 paramedics who handled approximately 12,000 patient events.

This year, as it rolls out to include Peace River, Grand Prairie, Camrose, Red Deer, Lethbridge and Medicine Hat, it is expanding to more than 100 paramedics with 25,000 patient events anticipated.

Intake for community paramedic referrals is handled by two coordination centres located in Calgary and Edmonton.

When the team first goes into an area, it partners with community healthcare and continuing care staff – primarily supportive living, long-term care and private home care facilities – as well as with primary care networks to identify patients who may be managing chronic illness or are experiencing symptoms that require triage.

"Our team focuses on what we consider providing acute, episodic illness support," explained Ryan Kozicky, director, AHS's EMS Mobile Integrated Healthcare. "So, we do diagnostic treatments and assessments in the home, but not case management."

Activities performed by Alberta's community paramedics range from collecting blood work or performing ECGs, to applying sutures or administering blood transfusions. Uniforms are business casual and the paramedics drive SUVs, working seven days a week from 6 a.m. to 10 p.m. in most regions.

Paramedics are using tablets, as well as Bluetooth-enabled devices, but coordination of information is expected to improve when the province's Epic electronic health record implementation goes live within the next few years. Preliminary cost analysis indicates that the treatments provided by paramedics in the home are $1,100 less expensive on average compared to providing the same treatments in a hospital's emergency room, said Kozicky.

Treatments provided by paramedics in the home are $1,100 less expensive on average than in the ER.

"The paramedic scope of practice really meets the needs of what we're doing in terms of providing those skills-based treatments," he said, adding that "the EMS infrastructure itself in terms of being able to provide mobile medicine, is something that's quite unique and paramedics can leverage."

Quebec-based Prehos Inc. is taking the same approach, leveraging its three-year investment in developing EMS operational software to develop an EHR tailored to community paramedicine. Originally developed for Renfrew Country in Ottawa, the software is being used by five services in Ontario, including Parry Sound and Lanark County.

The app runs on an Apple iPad and is centrally managed by Prehos. "If a tablet gets stolen, we can erase it. If we have updates, we can push them over the air," said Prehos CEO and co-founder Christian Chalifour. "There's no IT involved at the user end and on our side, it's quite simple."

In addition to providing portable access to patient health records, the software is integrated with dispatch and scheduling so that an employee at the paramedic base knows what's happening in the field in real time, explained Chalifour.

Each patient record has a progress note that covers past visits and past reports, as well as information on medications, allergies and medical contacts. Paramedics can also take photos and add media files to their notes when visiting patients.

Chalifour heard about one incident when a paramedic observed a strange rash on a patient's leg, took a picture and sent it to the primary caregiver, receiving a response before the visit was complete.

Addressing aging and loneliness: What role can technology play?

BY IAN FISH

Many of us appreciate the opportunity to disconnect from the hustle and bustle of our everyday lives to give our bodies and minds a chance to re-charge. But when solitude becomes long-term and turns into persistent loneliness, the results can be detrimental and potentially devastating, particularly for older adults.

In fact, as evidenced by the following media headlines, the risk related to "loneliness" is a new and emerging public health theme in Canada:

• Loneliness even unhealthier than obesity, should be a public health priority (Global News, August 17, 2017)

• Loneliness and Social Isolation Becoming an Epidemic (Global National News, January 18, 2018)

• Should Canada Develop a Strategy to Combat the Growing Problem of Loneliness? (CBC Radio, January 21, 2018)

For many, loneliness arises from unmet needs for social interaction.

Representing more than just an unwelcome break in one's fabric, loneliness is a precursor to a host of poor health risks including heart disease, dementia and increased risk of mortality.

Loneliness also has an economic and social ripple effect across families, industry, and society. In Canada, while citizens aged 65 and older account for 15 percent of the population, they consume more than 45 percent of the public-sector healthcare dollars, according to CIHI.

So, where do we go from here?

Establishing a flexible platform for sharing, disseminating, and accessing information is sorely needed and the power of a host of innovative technologies, such as machine learning, artificial intelligence, IoT platforms, and blockchain-enabled consumer consent, can open the door to a host of new possibilities, including:

• Seniors creating a virtual community: To maintain mental wellness, it is crucial to communicate and stay connected, feel motivated to engage with other people, and have a sense of purpose.

A virtual community – virtual "town halls" so to speak – can help seniors lead fuller lives by helping them connect with each other over personal interests, shopping, health support, entertainment, and social events accessible to them.

• Both current and new service providers could gain new insights from large data stores, information previously locked into information silos (finance, retail, government, healthcare, etc.) to identify and predict adverse events such as financial fraud.

• Similar to treating illnesses such as diabetes and heart disease, the most effective approach to addressing loneliness is early identification of the problem and taking preventive action. Knowing when people are at risk, family and provider organizations can proactively help them build and maintain their "social capital" as well as mitigate the physical and social losses that naturally occur as one ages.

• Descriptive: Is Mom okay today? Is she showing signs of decline? What help does she need?

Ian Fish

• Predictive: Is Mom likely to be okay tomorrow? What problems is she likely to have? What help is she likely to need?

• Prescriptive: What steps can we take to give Mom the best chance of being ok tomorrow?

• Cognitive: How do we learn to understand elderly individuals so that we can help them achieve their best outcomes, self-sustainability?

Avamere (an independent healthcare provider for seniors based in Wilsonville, Ore., is a great example of an initiative focussed on addressing the specific needs of the aging and lonely population.

Together with IBM Accessibility Research, Avamere has embarked on a six-month project that will use IBM Watson's data interpretation capabilities to decide how best to care for individual elderly residents.

This pilot will involve hundreds of people in Avamere's independent living, assisted living, and skilled nursing settings, as well as its rehabilitation arm.

The pilot will use Avamere's historical, de-identified patient data, plus real-time data from sensors placed throughout each resident's living space.

Most sensors will be set in residents' rooms and will collect data related to an individual's behaviour and movements, such as gait analysis, factors that could lead to fall risk, and daily activities, including personal hygiene, sleeping patterns, incontinence and trips to the bathroom.

For example, a higher frequency of transitions from bedroom to bathroom could predict higher fall risk, possible urinary tract infection, or increasing confusion with respect to time and place.

This is an example of "Global Age-Friendly Cities" as proposed by World Health Organization, which allows seniors to remain in their homes, close to friends and social support, and contribute actively to their communities.

Ian Fish is Canadian Healthcare Services Leader, IBM Canada.

Cameras and AI

CONTINUED FROM PAGE 1

ventures with innovative companies like Spxtrm AI. Other areas in which West Park has formed partnerships include 3D printing, for prosthetics, and smart textiles.

In this instance, "We're actively looking at ways to reduce aggressive behaviour," said Walker. "We brought Spxtrm AI in, so they could contribute."

Indeed, Spxtrm AI has set up shop at the hospital so that it can not only devise a solution right on the premises, but so it can also readily draw on the expertise of West Park's clinicians and IT staff. "They've provided us with a development sandbox," said Jay Couse, co-founder and CEO of Spxtrm AI. "We can develop the solution four times faster here than we could in a lab."

Meetings are held with West Park staff every two weeks to discuss progress and work out solutions to new challenges. And by being embedded right into the West Park campus, there's a constant flow of information to the developers. "It's the water cooler effect," said Couse, explaining that even informal discussions can have an enormous impact on the solution.

Couse leads the project as the "entrepreneur-in-residence". The company also has a computer vision expert and Spxtrm AI Co-Founder on site at West Park guiding the application development, along with two other staff members. As well, an AI team in Edmonton is also working on the project.

The company and West Park were awarded a $75,000 grant from the Ontario Centres of Excellence, to which they have contributed matching funds and resources. Couse said Spxtrm AI will raise additional development funds from private investors.

Both Couse and Walker emphasized that patients and their families have provided full consent for the research project, and that a formal privacy impact assessment was conducted. The team even met with the Ontario Privacy Commissioner's office to ensure it was compliant with the rules and regulations.

As well, over 99 percent of the autonomously monitored video that is ingested by the AI system is discarded immediately; the less than 1 percent of the images that remain – consisting of the incidents of aggressive behaviour or other aberrant conditions, such as falls – are securely stored in a blurred, redacted format for a minimum period of time to allow for professional staff review. It's all designed to protect the identities of the patients.

Couse noted that West Park already has cameras mounted throughout the Acquired Brain Injury Behavioural Services unit. The problem has been that it's difficult for humans to monitor the video feeds 24 hours a day. "Very quickly, there's a 98 percent drop-off in attention after 20 minutes when people are monitoring video screens," said Couse.

However, by using machine learning, computers can be taught to detect signs of aggression and to alert the appropriate staff. And of course, computers never get tired.

How does a computer detect aggressive behaviour? What is it looking for? Couse noted that machines can be trained to recognize certain types of motions that signify violence or pre-cursors to violence. "As well, loud noises may set off certain patients, and some patients may be annoyed by the actions of certain people," said Couse. "This can all be built into the algorithms."

While the system currently makes use only of images, in future it may add autonomous audio analytics. As such, it will be able to detect when patients raise their voice in anger or when objects fall or are smashed.

Continuous learning and a lean methodology is being used, meaning a new iteration of the system is rapidly devised and tested to obtain feedback. It then goes into a new round of development, so that an increasingly effective solution is produced.

> **"We can develop the solution four times faster here than we could in a lab," says Jay Couse, CEO of Spxtrm AI.**

West Park's Manager, Research and Evaluation, Tim Pauley, noted they don't want the system generating too many alerts, which can create alert-fatigue and tend to be ignored. Neither should the system produce false alerts. "It has to be able to determine the difference between aggression and a handshake or a pat on the back," said Pauley.

It also has to know the difference between something that may look like a fall, but really isn't. For example, someone bending down to tie a shoelace, or picking something up off the floor. These actions shouldn't be confused with a fall.

As an added benefit, Pauley said the system could be trained to offer real-time advice to care-givers. For example, if it spots them trying to lift a patient out of bed, and they're using the wrong posture, it could offer advice via voice-technology – sort of like a GPS correcting your route when you make a wrong turn in your car.

The computer vision system could also detect when patients have spent too long in bed, and need to get up or be turned, to avoid bedsores.

Moreover, Spxtrm AI aims to make the solution available to other facilities. And it will expand the range of behaviours that it can detect.

At the top of list is falls detection – a major problem for the frail and elderly.

"Up to seventy-five percent of falls in facilities are un-witnessed in the patient's or resident's private room," commented Couse, whose co-founder at Spxtrm AI is an orthopedic surgeon. And in cases where the patient suffers a fracture, the faster you get him or her to surgery, the better the outcome.

So, it's a real benefit if you can detect falls and call for help as soon as possible.

Moreover, with enough learning, the computer vision system could be taught to predict falls, and not just detect them after the fact.

"As the datasets build up, we plan to start to provide predictive capabilities," said Couse.

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