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PHOTO: COLLEEN MACDONALD, ST. JOSEPH'S HEALTH CARE LONDON

Surgeons using VR to improve patient outcomes

Dr. George Athwal, an orthopedic surgeon at St. Joseph's Health Care London, has become a Canadian leader in the application of mixed reality surgical procedures. As part of a team that developed 3D hologram technology to enhance the precision of shoulder replacements, Dr. Athwal was the first surgeon in Canada to perform a mixed reality shoulder replacement and the second in the world. **SEE STORY ON PAGE 4.**

COVID-19 had a big impact on data management

BY JERRY ZEIDENBERG

Hospitals in Ontario – and the rest of Canada – became aware of the importance of accurate data like never before during the COVID-19 pandemic.

"What became really clear was the importance of data integrity," said Tara Coxon, vice president and CIO at St. Joseph's Healthcare, Hamilton.

She said that to check on data integrity, "We sometimes had to walk around the hospital to make sure our data was accurate, that beds were actually available in the ICU."

Coxon was one of a group of healthcare executives addressing the changes brought about by the COVID-19 pandemic. She was speaking at the UpOnDigital conference, an annual event organized by Digital Health Canada.

Coxon commented that because patients were being shuttled around the province, to

> During COVID, more patient data has been shared among facilities, making standards more important.

even out the patient load among hospitals, data and numbers became even more important. To quickly share information, the numbers had to be in formats that were understandable by a variety of I.T. systems used in different facilities.

"We all had to be speaking the same language," said Coxon, noting that standards became even more critical than before. "And when sharing data, interoperability is the holy grail to aspire to."

She noted that the healthcare system still hasn't arrived at true interoperability, and hospitals and other organizations continue to work at it.

Coxon observed that the COVID crisis ushered in other trends, such as remote monitoring of patients in their own homes.

"People didn't want to come into the brick-

COVID had a big impact on data management in Canadian hospitals

CONTINUED FROM PAGE 1

and-mortar hospitals, and some still don't," she said. That has led hospitals to treat them using various forms of telehealth.

St. Joseph's in Hamilton was a provincial leader in remote care of patients before the pandemic hit in 2020 and has since then increased the scope of its telehealth activities. "We're looking into remote management of these patients, not just remote monitoring," said Coxon.

Dr. Sarah Muttitt, vice president and CIO at The Hospital for Sick Children, said one of the biggest changes brought about by the COVID pandemic has been the shift to virtual.

"Virtual care is here to stay," she asserted. "It's now a standard of care."

As well, for many administrative staff, work can be performed from any location. As Dr. Muttitt said while speaking on webcam, "Welcome to my kitchen. I've been working here for a few years, and I'll probably be here a bit longer."

She noted that people now have more choices about where they work, and they don't need to commute every day to an office.

The acceleration of computerized work has led to other developments, she said. For example, Sick Kids is building a new tower on its campus that will contain no storage for paper documents. Instead, the idea is to become truly paperless.

Dave Brewin, CIO of the CARE4 Regional IT Partnership, observed that the traditional role of a CIO "used to be about the four walls of a hospital."

CARE4 is regional partnership between Collingwood General and Marine Hospital, Georgian Bay General Hospital (Midland), Headwaters Health Care Centre (Orangeville) and Royal Victoria Regional Health Centre (Barrie).

Now, however, there is more regional collaboration going on, meaning the focus for CIOs is much wider. For Brewin, that means sharing data with partners in the continuum of health, such as primary care, long-term care, and others.

In Ontario, these care providers are being organized into Ontario Health Teams (OHTs), which are now working to address data standards and interoperability to better share data.

As an example, Brewin noted that his organization has adopted e-Referral and e-Consult solutions that enable area GPs and specialists to communicate faster and more efficiently.

The hospital will soon launch a patient portal, moreover, that will give patients access to much of the data in their electronic health records.

Shiran Isaacksz, vice president of Altum Health & Connected Care at the University

> **As data access became critical during the pandemic, many observers noticed a lack of inclusiveness for some patients.**

Health Network, said that during the height of the pandemic, much of his time was dedicated to supporting the management of COVID patients.

He emphasized the importance of collaboration among various levels of the healthcare system – such as hospitals working with long-term care – and the coordination of patients moving from one jurisdiction to another.

While there were great successes in these areas, Isaacksz noted some gaps in the provision of care.

He observed that health equity is still a glaring problem; it's well and good to have patient portals to access information, and online registration for tests and treatment. However, if some patients don't have smartphones or access to computers, and if they don't have computer literacy, such assets won't help them at all.

Karen Macauley, director of eHealth and IT Services at CHEO, in Ottawa, noted the growing importance of data for decision-making. Like Tara Coxon, she put an emphasis on the need for clean and accurate data.

In addition, she said that data is being increasingly shared across the organization to help understand issues like wait times and patient flow. Many more people are making use of the data than ever before.

For this reason, the quality of the data must be high, and the origins and meaning of the data must also be clear, so that users "are comparing apples with apples," and not with oranges.

"We want to make sure that we're using our resources well, and we need good data for this," said Macauley.

Mari Teitelbaum, VP of Provincial Programs and chief innovation officer at CHEO noted some success stories for the organization during the pandemic. A major one has been the achievement of Stage 7 in the HIMSS EMRAM rankings, in conjunction with the Hospital for Sick Children.

Ron Riesenbach, vice president, Innovation and chief technology officer at Baycrest, in Toronto, focused on challenges that remain for healthcare providers. He observed that Ontario currently has 500,000 people with dementia, a number that's forecasted to reach 900,000 by 2030 – with two-thirds of them being women.

"We don't have enough long-term care beds for them," he lamented.

To help with this issue, and with others, Baycrest has launched a program called "Baycrest at Home."

"Rather than taking your mom to Baycrest, we're Baycresting your mom," said Reisenbach.

The program will bring a mixture of technologies and management right into the homes of patients. Moreover, it's designed to be a holistic strategy.

"It's not just a matter of pills, injections and therapies," said Reisenbach. "Things like poverty, loneliness and despair kill, too."

The Baycrest at Home program is designed to address all these issues.

As well, it's important to pay attention

CONTINUED ON PAGE 22

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3D holograms are a new and effective OR technology at St. Joseph's

LONDON, ONT. – At the Roth McFarlane Hand and Upper Limb Centre at St. Joseph's Hospital, Dr. George Athwal has become a Canadian pioneer in the development and use of digital 3D holograms to enhance surgical precision for shoulder replacement patients. The technology is expected to reduce complications and improve outcomes.

Digital holograms, a form of mixed reality technology, are emerging as an exciting new tool in operating rooms. As part of a team that developed the technology for shoulder replacement surgery, Dr. Athwal was the first surgeon in Canada to perform a mixed reality shoulder replacement, and the second in the world.

Mixed reality combines immersive computer-generated environments and the "real" physical environment.

Wearing a specially designed headset, Dr. Athwal uses verbal commands and hand movements to manipulate a digital 3D hologram of the patient's anatomy and the metallic implant, which is based on a CT scan of the patient's bones. The technology is used for preoperative planning and in the operating room during the actual surgery. Dr. Athwal has the hologram hovering within reach for reference as he operates.

"It is a ground-breaking tool that allows me to replicate the surgical plan very precisely," says Dr. Athwal. "I am able to see issues with impingement of the joint replacement and ensure the best fit for the implant, which will hopefully provide the best outcome for the patient."

Dr. Athwal worked with Stryker, a manufacturer of shoulder implants, and Microsoft, the producer of the HoloLens 2 – a holographic headset – to develop the mixed reality shoulder replacement technique. There are now surgeons in multiple countries using this tool, says Dr. Athwal, who has since performed several surgeries using the technology and is in demand to provide demonstrations world-wide.

Interest in mixed reality technology to enhance surgery is starting to take flight, adds Dr. Athwal. "It's really helping physicians do a precise and fine-tuned shoulder replacement, which will hopefully result in a lower complication rate and therefore an anticipated higher success rate and

Dr. George Athwal, orthopedic surgeon

longevity of the newly replaced joint."

At the Roth McFarlane Hand and Upper Limb Centre, a world-renowned centre of excellence in education, research, diagnosis and treatment of complex conditions of the hand, wrist, elbow and shoulder, the technology is only available for patients needing shoulder replacements (arthroplasty), such as total shoulder arthroplasty or reverse shoulder arthroplasty.

For its part, St. Joseph's Health Care London is a leading academic healthcare centre dedicated to helping people live to their fullest by minimizing the effects of injury, disease and disability through excellence in care, teaching and research. Through partnership with Lawson Health Research Institute and collaborative engagements with other healthcare and academic partners, St. Joseph's has become an international leader in the areas of chronic disease management, medical imaging, specialized mental health care, rehabilitation and specialized geriatrics, and surgery. St. Joseph's operates through a wide range of hospital, clinic and long-term and community-based settings, including St. Joseph's Hospital, Parkwood Institute, Mount Hope Centre for Long Term Care, and the Southwest Centre for Forensic Mental Health Care. For more information, visit www.sjhc.london.on.ca

How to manage Big Data: the Alberta experience

EDMONTON – At the University of Alberta, SAS Viya is being used to help researchers expand their capacity for big data analysis and to support the use of open-source software and other tools popular among students.

Conducting research is not a straightforward process, and the terabytes of data cascading into labs (both physical and virtual) require serious horsepower to analyze. Personal desktops and small servers are increasingly coming up short in meeting the demands of artificial intelligence and machine learning projects.

Data also comes in various shapes and sizes. Researchers often combine data related to diagnostic imaging, risk prediction, clinical trials and much more. The need to bring them all together under a single platform for analysis is top-of-mind across the research community. But so is platform affordability for the organization's finance leaders, particularly when budgets are tight.

Amid a global pandemic, the University of Alberta quietly launched a new health data management and analysis platform called the Data Analytics Research Core (DARC). DARC increases research capacity and provides high-performance computing and data storage in a secure environment.

Dr. Lawrence Richer, project lead and vice dean of Research (Clinical) and Alberta Health Services chair in Health Informatics Research, said the concept of a shared research platform came to him years ago.

"Open source wasn't a free option, it was another option," Richer said. "And when we looked at the standards that we would value in terms of training our students, we looked at the reputation that SAS has for meeting security and privacy standards. For the purposes we were trying to meet, we needed a supported platform. In our province, SAS is very much a standard in the health space. And there were no closed doors with SAS Viya. People who were pursuing other programming languages were not blocked out and could still benefit from a supported platform that met our needs."

DARC has also already helped accelerate research centered on children with sudden neurologic symptoms. Researchers are working to develop an algorithm that would help reduce CT scan X-ray dose by at least 30%. While CT scans are an effective way to diagnose sudden neurological symptoms, a single scan is the equivalent of approximately 200 chest X-rays. Most people are exposed to this amount of radiation through natural sources over seven years.

"For a young child, that's a lot," Richer stated. "I used the automated machine learning tools in SAS Viya, which helped fine-tune and choose the best model. Previously, I've also had a machine learning analyst hard code the analysis in Python. What I found was that the automated tuner in SAS Viya did just as well.

Bringing in the right partner: The University of Alberta was seeking a scalable multiuser environment that had the necessary processing power to accommodate huge amounts of data. It also needed a mix of statistical, visual analytics and predictive modeling capabilities.

Pinnacle Solutions was quick to respond to the university's needs. Well-versed in business intelligence, data management and predictive analytics – and highly engaged with healthcare organizations – the SAS partner helped the university design a platform that was anchored to a widely used programming language in Alberta's health system and played nicely with other open source research software such as Python.

"SAS Viya is a good way to converge business analysts and students coming out of university," explained DJ Penix, president and CEO of Pinnacle. "Open source has its benefits for rapid prototyping … but you can also proof things out and bring it all together with the SAS Viya platform. SAS, which invests a lot in R&D in its analytic tools, is thoroughly tested and meets regulatory requirements."

Approximately 40 researchers from the university are registered to the on-premises platform today. DARC also features machine learning tools including

> **Alberta's DARC increases research capacity and provides high-performance computing in a secure environment.**

TensorFlow, Keras, Caffe and CUDA, which are provided in the Lambda Labs GPU server.

Penix is confident that the university is set up for long-term success. A lot of that has to do with the platform's ability to enable people across the university's research teams, regardless of their role, background or job level, to be empowered and get actionable insights from their data.

"As your data grows, your solution should too," Penix says. "DARC brings together a variety of end users through a common interface, which is something that hasn't been available before. We're just scratching the surface."

With DARC up and running, Alberta Health Services was recently able to transfer terabytes of diagnostic imaging data to the platform for analysis.

"We've never been able to do that before," Richer says.

Another research project led by Dr. Daniel Baumgart, professor and director of the university's Division of Gastroenterology, aims to use DARC to deliver personalized therapies to Canadians living with inflammatory bowel disease (IBD). Researchers are currently analyzing health data from 60,000 Albertans who live with the disease to identify long-term patterns.

Building an analytics platform? Here are things to consider: Penix has some advice for other universities and institutions looking to develop an analytics platform.

"First, make sure you understand how vendors define their analytic capabilities," he says. "In addition to the maturity and sophistication of the analytic algorithms, many niche providers and open-source platforms offer only a small subset of tools to support the entire analytical life cycle.

"For example, good analytic platforms also include data management and data quality as part of their solution. Second, make sure the platform is scalable. Third, make sure the platform gives people throughout the organization access to analytics, regardless of their role, background or job level. This empowers the entire organization to get actionable insights from their data."

Richer concurred, adding students' needs must also be a top priority.

"My advice to other universities considering a research platform is to consider the types of tools that their students will be using in the real world," Richer says. "Also, the flexibility of tools, like SAS Viya, to meet the needs of people with varied skill levels is crucial."

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GE's new program to accelerate commercialization of AI innovations

BY NORM TOLLINSKY

GE Healthcare has announced the launch of an artificial intelligence (AI) accelerator program targeting mature Canadian start-ups with innovative solutions for the healthcare industry.

The program will help qualifying start-ups bring their solutions to market through GE's Edison Digital Health Platform, a marketplace like the iOS App Store or its Android equivalent that will put hundreds of clinical, workflow, analytics and AI tools at the fingertips of clinicians around the world.

Canada was selected because of this country's "impressive ecosystem of healthcare start-ups," said Heather Chalmers, president and CEO of GE Canada. "We're not lacking in talent. We're not lacking in passion. What we are lacking is the last mile scale-up and adoption in the Canadian healthcare system. The Edison Accelerator program will help bridge that gap so Canadians can benefit from the talent that we've incubated."

Similar accelerator programs have been launched by GE Healthcare in India, Europe and China.

Chalmers is confident that the Edison AI Accelerator and Digital Health Platform will help ease the pressure on our healthcare resources and elevate the performance of a healthcare system that has been under strain due to the COVID-19 pandemic.

GE Healthcare has engaged California-based Nex Cubed, an early-stage innovation and start-up acceleration company to recruit and work with six Canadian start-ups. Using their own expertise and through partnerships with venture capital companies, Nex Cubed innovates, invests in, accelerates and scales up emerging tech companies.

"We're looking for more mature start-ups," said Marlon Evans, CEO of Nex Cubed. "They have a product. They have traction. They're in the market and able to use this program to train their AI algorithms or get connected to potential customers. They have to be pretty far along to make the most of the program. They'll need more than an idea on a PowerPoint."

The coaching and mentorship will help groom the start-ups for working with a big corporation, said Evans, because "oftentimes, start-ups are left to their own devices to figure out how to connect with a company like GE. This program will help them refine their products, structure their teams and provide them with the support they need to go to market."

Additionally, "start-ups are in many cases technology-rich, but data poor, so this program will help them plug into GE resources to train their algorithms and show they are able to work at scale," he said.

During the program, start-ups will test their solutions on the Edison platform; they will conclude with a Demo Day event at which the start-ups will present to investors and potential commercial partners. If their applications qualify for inclusion in the Edison Digital Health Platform, GE will help them with any required regulatory approvals and guide them through an onboarding process.

Paritash Dhawale, senior vice-president and general manager of GE Healthcare's

Heather Chalmers, GE Canada president and CEO

Edison Digital Health Platform, said, "We realize that a good bit of healthcare innovation is going to come from smart minds outside of GE." So, like the iOS App Store or the Android application marketplace, the Edison Digital Health Platform will rely on a large third-party ecosystem to supplement GE's own applications.

AI apps could help radiologists glean insights into clinical data, zero in on suspicious breast lesions, identify and prioritize X-ray images of collapsed lungs or COVID-19 induced pneumonia. They may aid in the diagnosis of prostate cancer, contribute to digital pathology or maximize the asset utilization of a hospital's imaging devices.

Inclusion in the Edison platform will expose start-ups to a global market. "GE is in 160 countries. We have 10,000+ sales-people all over the world. We have 16,000 service professionals and access to thousands of hospitals," remarked Dhawale. "Technology is only one piece that start-ups think of, but just as important is how you reach a diverse set of customers. Once you're on the GE platform, you get access to all of that."

The Edison platform also offers several advantages for hospitals because acquiring, installing and managing applications from multiple third-party sources imposes a heavy burden on hospital administrators, clinicians and IT staff, noted Dhawale.

In the traditional procurement model, hospital staff might spend several months carrying out due diligence, checking references, attending presentations, assessing security and privacy and provisioning space on the hospital data centre, "but if they're on the Edison platform, GE does most of that work for you," he said.

For Heather Chalmers, it's the Edison Digital Health Platform that accounts for the uniqueness of the Edison AI accelerator program. "Other accelerators," she notes, "focus on helping to incubate ideas into something that can scale up. There's an element of that in what we're doing as well with the coaching and mentoring through Nex Cubed, but we go much further by also providing start-ups with a platform through which they're able to access a global market."

A call for expressions of interest in the GE Healthcare accelerator was issued in April and the coaching and mentorship engagement with Nex Cubed is scheduled to commence in July. Please visit https://wwwnex3.com/ge-healthcare-edison-accelerator to apply.

Unique homecare EMR is designed by clinicians for clinicians

BY NEIL ZEIDENBERG

VHA Home HealthCare (VHA) – a leading Ontario-based homecare organization – has partnered with Pixalere Healthcare Inc. (pixalere.com), pioneers in wound management clinical software, to successfully co-develop a comprehensive, clinically focused home & community-based EMR.

Building on a partnership that started in 2013, the two organizations have since collaborated on expanding the application beyond wound care. "We wanted to have the agility to create a system to suit their needs and modernize their workflow," said Ken Hendsbee, CEO, Pixalere.

Named EMRI (Electronic Medical Records Initiative) by VHA, it's a fully customizable cloud-based system designed by clinicians for clinicians. It contains a full suite of clinical forms, assessments, and digital reports allowing care providers to document effectively on the go.

EMRI is now being re-branded by Pixalere under the name HERO (Homecare Electronic Record Outcomes). Although designed initially for Ontario clinicians, HERO can be effectively used by homecare providers in any Canadian province.

The clinical data collected in the system can be securely shared with their partners and clients through standards-based APIs. Most recently VHA has become the first homecare provider to make their clinical data accessible through Sunnybrook's MyChart patient portal. "We're pleased to be at the digital forefront of health system integration for the benefit of our clients and families," said Alistair Forsyth, CIO, VHA Home HealthCare.

The "built-for-Ontario" solution can perform audits, track and electronically document everything that happened during a client-provider encounter. "We've gone from a paper-based system to documenting in real-time, and client files will never be lost or misplaced," Forsyth added.

When asked how the system is being used in the field, VHA's professional practice specialist – clinical informatics, and registered nurse, Kartini Mistry, said the Pixalere wound-care system's design was expanded to meet a broader range of complex client needs, which encompasses nursing and rehabilitation clients. "Clinically, it's being used to support VHA's holistic approach to care which may include head-to-toe assessments, medication management, acute and chronic diseases, wound care, home dialysis, children with complex medical needs, as well as rehabilitation clients requiring home exercise programs and assistive device planning."

She added, "With our remote workforce, this is a single solution that captures the full end-to-end documentation of client-provider interactions.

"Clinicians can access the right information whenever it's needed, and not

> **The system captures the full, end-to-end documentation that's required in client-provider interactions.**

just for client information, but also clinical decision support tools and education which promotes best practice and better outcomes." This includes access to a client's past documentation for better continuity of care. "It lets us see a client's full history in real-time, bridging the practice gap," said Mistry. HERO also provides point-of-care decision support, built-in clinical forms with real-time alerts, and it improves efficiency by streamlining documentation.

VHA says its EMR for homecare is being used by about 90 percent of its clinicians.

Pixalere and VHA have created peer-to-peer user groups that meet on a regular basis. They discuss what parts of the system are working well, and areas to improve as well as sharing new enhancements collected from their providers and other stakeholders. "We're constantly learning," said Kathy McKenna, manager of health information management at VHA. "The user-group meetings provide us with real-time feedback, allowing us to make changes quickly."

HERO is used by nurses, PSWs, physiotherapists and occupational therapists, and adapts to how each clinician works. It also integrates with other community based clinical information systems such as GoldCare and Procura.

Regarding their future plans, McKenna said they'll be expanding to include dietetics, social work and speech language pathology documentation, and data integration with client portals and analytics. "And we're just getting started."

To learn more about HERO, visit www.hero.pixalere.com

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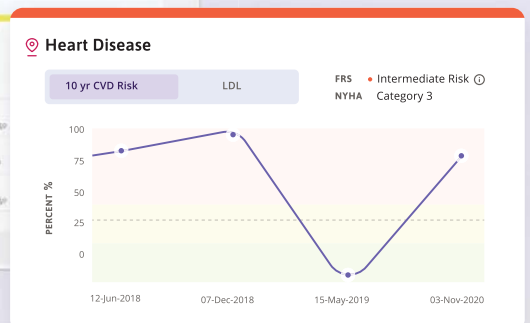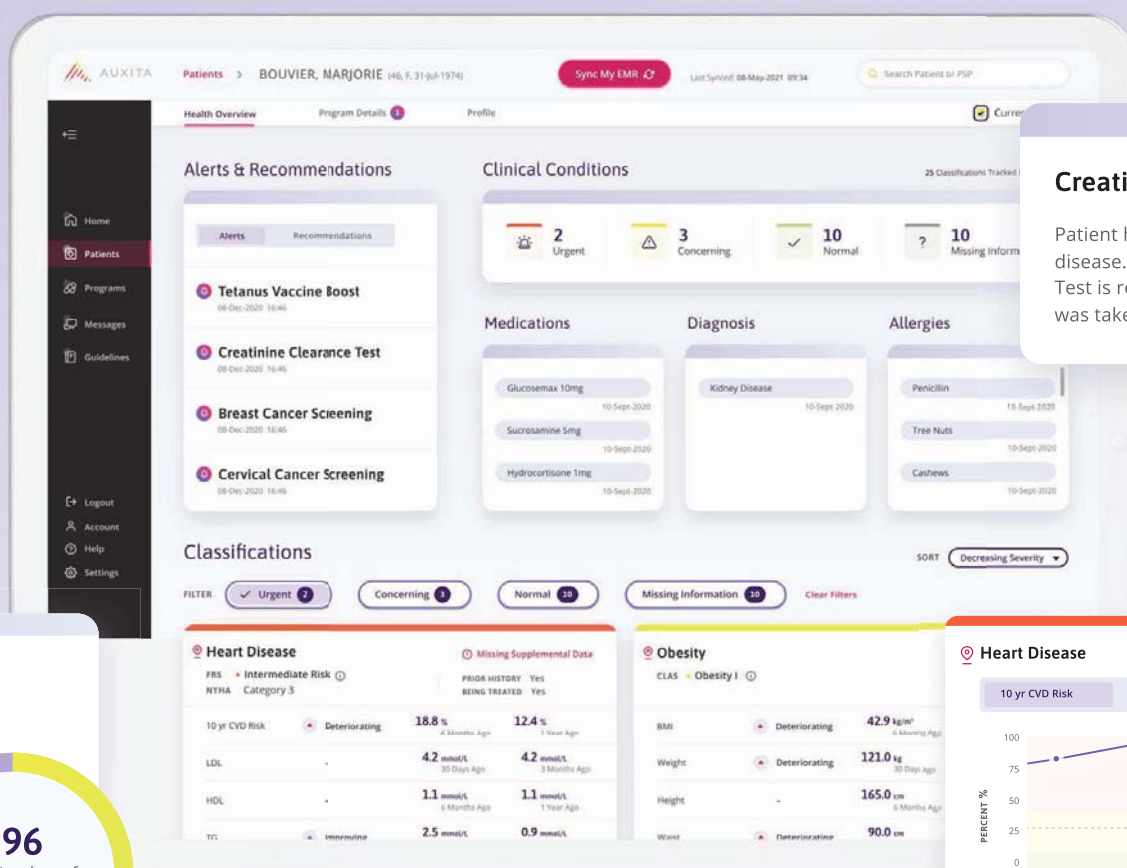
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How technology can be deployed to assist the aged and their families

TORONTO – The Centre for Aging + Brain Health Innovation (CABHI)'s fourth annual CABHI Summit took place virtually in March. It included more than 50 speakers, more than 60 exhibitors, 20 sponsors, and an audience of more than 800 that tuned in from around the world.

Presentations from Day One highlighted Agetech and the Human Connection, including a five-member panel with:
• Dr. Allison Sekuler, president and chief scientist at CABHI.
• David Lindeman, director, Health Care at the Center for Information Technology Research in the Interest of Society (CITRIS).
• Prof. Alex Mihailidis, scientific director of the AGE-WELL network.
• Sasha Spellman, startup collaboration director, AARP Innovation Labs; and
• Erica Lloyd, general manager, Healthcare and Education, Soul Machines.

Among the technologies that panelists were most excited to see was the concept of "digital people." This technology was highlighted for its ability to provide one-on-one support, and companionship with empathy. "Although they're not meant to replace people, they can certainly help people to live their best lives," said Erica Lloyd.

Sasha Spellman discussed "a telehealth application that provides remote patient monitoring, one that attaches to the wall and predicts and analyzes the health of an individual." The best technology blends in with its surrounding and works without being noticed by those who benefit from it.

Alex Mihailidis pointed to "innovations like AI, and machine learning. Years ago, these things were unheard of – deep learning and algorithms; but now we can predict complications with diabetes and other health challenges."

Regarding privacy, the question was asked, "Although many technologies mean well in their design, will people feel like they're being spied on?" It is an area, panelists agreed, that must be considered and treated with care.

When it comes to the use of technology, to create effective solutions, Sasha Spellman emphasized the concept of "test and validate – focus on everyday people, and don't lose sight of the end user (50+ demographic)."

Alex Mihailidis noted the cultural details that must be addressed, emphasizing that technology doesn't work the same way in every location. "In Northern cultures, for example, you can't just build the technology; you have to understand the users, the cultures and the [specific needs of the] aging population."

Erica Lloyd commented on the development of Digital People, adding to the cultural theme. "If the mechanism looks and sounds like the end-user (black, Asian, indigenous, Caucasian), they'll feel more comfortable in using it."

The panelists said that technology must not be used without providing empathy for people. When used effectively, technology can also give us time with loved ones. Alex Mihailidis said, "Technologies are adapting, allowing us to stay in control of our own health and how we want to age."

Regarding the future of aging and technology, panel members agreed that we need to be empathetic. "Treat patients like people; understand what is going to be needed and give older adults choice so they can live how they wish to live."

The Summit's second day was geared toward innovators, companies, and investors in the longevity sector, on the theme of The Longevity Economy: Investing in an Aging World.

The highlight of the day was the Summit's flagship event: the annual pitch competition. This year CABHI hosted the longevity sector's largest combined pitch competition, with a pool of more than $2 million up for grabs.

The event was made possible through a collaborative partnership funded by CABHI, the Ontario Brain Institute, Innovacorp, and Clearco.

The winners and finalists were:
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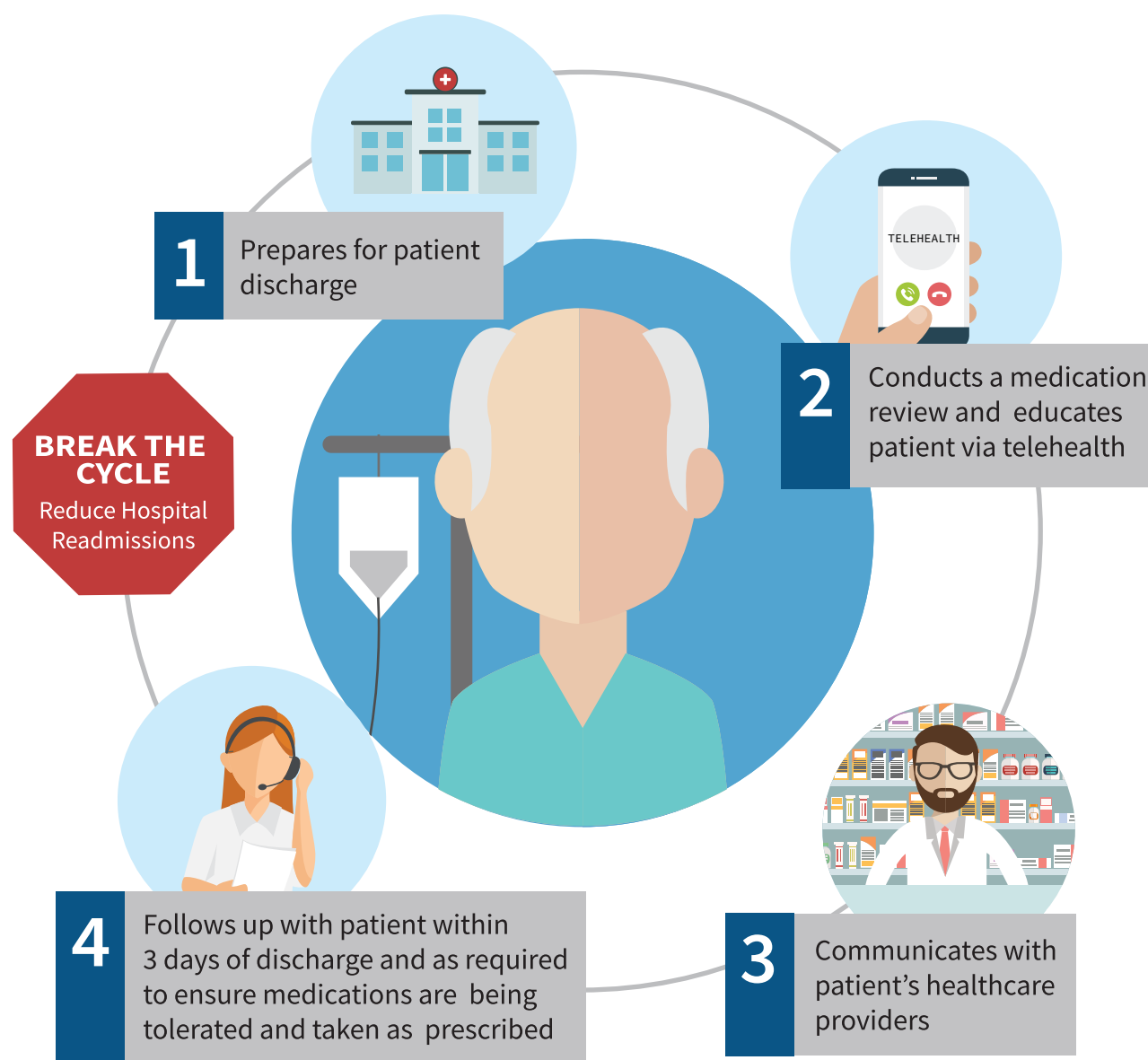
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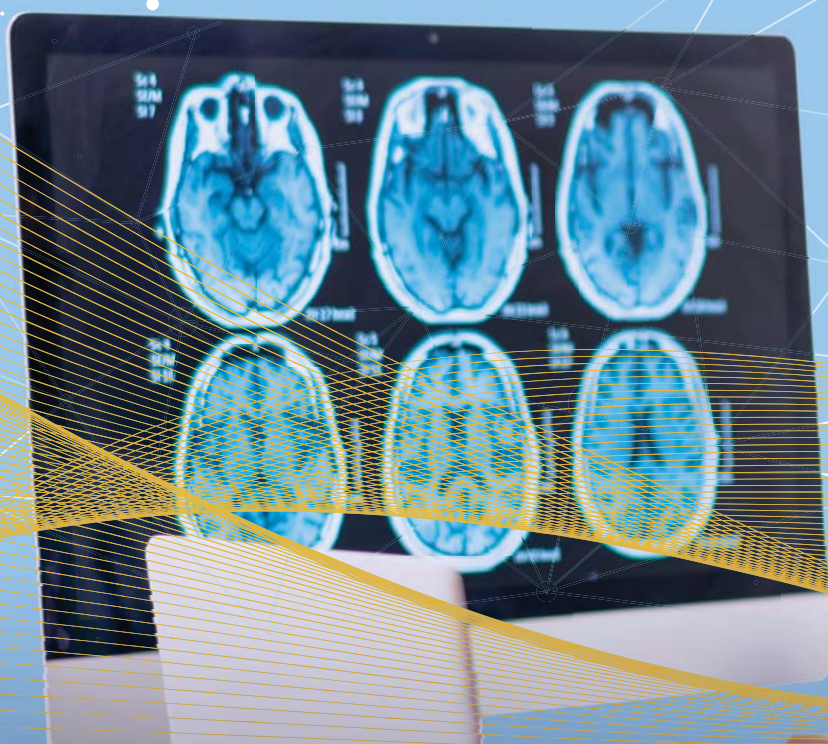
Penn Medicine's hospital-of-the-future has unique design and capabilities

Built at a cost of US$1.6 billion, it's designed to be a leading-edge facility for decades.

BY JERRY ZEIDENBERG

Penn Medicine, one of the top-ranked hospital systems in the United States, recently opened a new facility – a 17-floor tower in downtown Philadelphia that contains 504 beds and 47 operating rooms.

Built at a cost of US$1.6 billion, it's designed to be a leading-edge facility for decades. "We think this building will still be standing 100 years from now, and that it will still be delivering world-class patient care," said John Donohue, vice president of entity services at Penn Medicine.

He was speaking online as part of the HIMSS Digital conference, held simultaneously with the HIMSS 2022 conference in Orlando, Fla.

Donohue described some advanced features of this "hospital of the future", which is called the Hospital of the University of Pennsylvania (HUP) Pavilion, as it sits as a pavilion next to the legacy hospital.

The HUP Pavilion was developed over a seven-year period and opened at the end of October 2021. "The massive structure," said Donohue, "was the largest concrete pour in the history of Philadelphia."

During its development and construction, the facility used a unique planning and building process.

To ensure the large facility would operate as efficiently as possible, in 2015 Penn Medicine created a huge mock-up of a half-floor. "We rented warehouse space and built out one half of a mirror floor," said Donohue. "With 45,000 square feet, it emulated what a floor would look like, all built out of Styrofoam."

Hundreds of people were brought through, including doctors, nurses, other clinicians and administrators. "We pushed around gurneys, and we did time motion studies with elevators," said Donohue.

After analyzing the ideas of the visitors – which numbered in the hundreds – Penn Medicine started all over. "We tore down the Styrofoam and we built it all up again with those changes. We went through the whole process again."

Even the telecom closets were mocked up in Styrofoam, to demonstrate how much space would be needed when 50 such closets would be deployed around the actual hospital. "Anybody who has had to negotiate for space knows how hard it can be when others are arguing for more clinical space," said Donohue.

Because the closets were there in front of all to see, the I.T. staff and engineers could make their case for what they needed.

The full-scale mock-up was helpful across the board, showing what would be needed in actual practice, reducing the number of changes that would need to be made later. It also resulted in a more efficient build and in the end, a more efficient hospital.

The construction work was done in a different way, too. Typically, when any facility is being constructed, various trades come in, including plumbers, electricians, painters, and others. Often, they can get in each other's way. They can also make a mess – spewing dust and debris all over.

For many parts of the hospital, Penn Medicine used a modular approach and built whole rooms in a warehouse off-site. Bathrooms, for example, were built using this approach, along with the telecom closets.

Referring to the bathrooms, Donohue said: "We delivered them as units, and brought them up with cranes and just dropped them in."

Not only was it more environmentally friendly – eliminating the dust that would have wafted across to the existing hospital and a nearby museum – but it was less expensive, Donohue said.

It was far easier connecting the 50 telecom closets, he added, once they were delivered as ready-to-go units. "It was then fairly easy for even junior engineers to install the switches. They had pre-cut and labelled cables, and it was quick and efficient [to hook everything up]. It allowed us to deliver quickly at scale."

Before opening last year, the Pavilion conducted regular dress rehearsals – a process that turned out to be extremely useful.

"We had a lot of dashboards with red and yellow," said Donohue. "It was painful, but it was important to do the rehearsals and to spot problems." Corrections could then be made to get things back on track.

When the hospital did open, an acute care in-patient was rolled over to the new facility from the

older one every five minutes. "Each one was accompanied by a team of clinicians to make sure their travels were safe," said Donohue. "That worked out incredibly well for us."

The planners also wanted to make access to the hospital and to various partner facilities easy. Donohue said there are bridges and tunnels that connect the Pavilion to the legacy hospital, as well as to the University of Pennsylvania and the Perelman Center for Advanced Medicine, an outpatient facility that specializes in advanced diagnostics and therapies for cancer, heart disease and neurological problems.

"There's an awful lot of smart people on this campus – in the hospital, the university, the school of medicine," said Donohue. "We really wanted to facilitate innovation from all these bright minds."

A tunnel also links the Pavilion to the Penn Medicine transportation hub, which offers rail service from the airport and surrounding regions as well as bus services. "The objective was to create a connected campus, both physically and virtually."

On the virtual side, video and other technologies are built into every operating room and each patient room, so that both clinicians and patients can communicate with the outside world in real-time.

"We can do tele-consults, if needed, and we can access another hospital's resources," said Donohue.

Video in the surgical and interventional suites offers the ability to do continuing education and to collaborate with other clinicians who are off-site. The high-powered video and computer systems "give us the ability to do things that just weren't available in our legacy hospital," said Donohue.

Overall, the new pavilion has a tremendous amount of technology. Donohue mentioned the facility benefits from over 14 miles of fibre optic cable, 1,500 miles of copper cabling, 866 Wi-Fi access points (with some ruggedized technology outside the building, so that staff can make use of the wireless network while outside), 3,200 computer devices and 20,000 medical devices.

The patient rooms have been designed to look more like hotel suites than traditional hospital rooms, so that patients have a better experience. There are huge windows providing natural light and views of the outside environment, and each room has a 75-inch screen providing entertainment and clinical information.

When a caregiver enters the room, badges and sensors enable the name, title and photo of the caregiver to pop up on the side of the screen, showing patients and their families who the person is and explaining why he or she is there.

The patient can control the lighting and temperature of the room from a pillow speaker, which also offers nurse-call technology. The hospital's Pennchart electronic record can be called up on the 75-inch screen, which is called IRIS, as it acts as the patient's eye – providing sight into a variety of systems.

Importantly, each of the 504 patient rooms can be quickly converted into an ICU suite if needed – the importance of which was demonstrated by the current COVID pandemic.

Donohue said the planning team has tried to account for all possible emergencies that may come up in the future, including ransomware attacks and new pandemics. He noted, however, that nobody can foresee everything that may occur in the future. The key, is to be able to adapt to anything that happens.

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More effective technologies and enhanced design improving the EHR

The past two decades in health IT have been largely defined by increased adoption of electronic health records (EHRs). Digital health has made enormous leaps over the 20-year span, yet EHRs remain far from perfect.

While studies suggest they are not the top source of provider burnout, it is clear that EHRs must evolve to improve user experience while supporting broader innovation across the entire healthcare landscape.

It's time to rid EHRs of the administrative and usability burdens providers have tolerated for far too long. Combining rising technological advancements along with a unique design approach can make this reinvention possible. Here's how the health IT industry can ensure providers around the globe have the EHRs they need to drive better care delivery.

Bringing EHRs to the cloud: The cloud is not exactly new, but healthcare is just beginning to tap into its potential. Currently, the industry is not at the point where patients can show up for appointments and their longitudinal histories are available within a unified EHR.

However, cloud-based EHRs can connect to information exchanges and networks to pull patient data from disparate sources in real time, without adding extra clicks. As a result, providers can leverage more data to make better, faster care decisions.

Another key benefit is that data storage becomes less of an issue with cloud-based EHRs than with on-premises systems. This raises the possibility of exciting new avenues for all that clinical data.

For example, as vast volumes of data are collected via remote patient monitoring, predictive analytics can alert the provider if a diabetic patient at home is trending toward bad glucose level readings. Turning those insights into assets from the background extends providers' clinical reach without sacrificing ease of use.
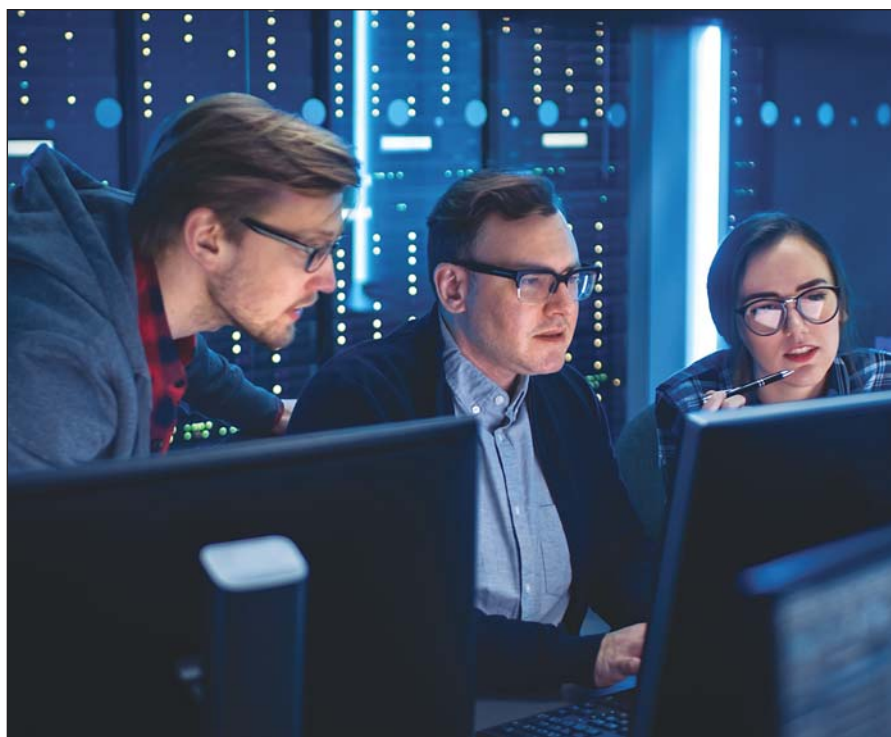
Also, cybersecurity is an ever-growing and ever-evolving threat to all industries. But in healthcare specifically, the risks aren't just financial. Patient well-being is on the line, too. Ransomware attacks have increased by at least 485% as hackers took advantage of the global pandemic in 2020 and into 2021.

Many healthcare IT teams are operating at more than 100% capacity, and they are being forced to do more with less. For this reason, healthcare organizations around the globe are choosing to host their EHRs in the Microsoft Azure cloud and modernizing their security operations through the combined expertise of Allscripts and Microsoft.

Designing with and for providers: The cloud is poised to transform healthcare, and design puts all the pieces together in service of the provider. Allscripts teams who are designing for the provider experience adopted the term: "Human Experience (HX)," instead of the more familiar "User Experience" or "User Interface (UX/UI)."

While some EHR suppliers remain focused on serving the technology to only the person using that technology, Allscripts focuses on the larger ecosystem of the Human Experience. We serve the human using the product, the organization employing the human and all of the patients and other people connected to the person using our product and service. We see this as the human experience.

Allscripts believes a provider should not have to adapt to the solution by way of personalization and education. We believe the technology should support and adapt to an exquisite human experience.

Our goal is to ensure every person using our products and services has a positive and delightful experience. To accomplish this, we use a process called Human-Centered Design (HCD).

Jenna Date, chief experience officer (CXO) for Healthcare Solutions at Allscripts, said, "While the rest of the technology fields have zoomed into the future with Human Experience, to no fault of its own, the healthcare industry has been caught in a series of loops. It is one of the most complicated industries on the planet; regulation, policy, privacy, technical constraints, clinical content constraints and, not to mention, human lives are at risk."

With HCD, designers work with real users throughout the entire design process to build experiences that delight providers and meet their needs. For too long, EHRs have essentially functioned as electronic versions of paper-based records. Rather than conforming to these outdated processes, it is time to conform EHRs to the workflows of everyday users: physicians, nurses and all others that will interact with the system.

A common refrain in medical training is, "You just need to listen to the patient, they'll tell you what's wrong." In the same spirit, it's time for health IT professionals to listen to clinicians and respond to their needs through technology that lets them take care of the patient, without unnecessary distraction. Allscripts is doing just that as we transition the Sunrise EHR to the Sunrise Platform of Health.

Through the combination of cloud computing and HCD, we're delivering solutions that put providers – not technology – in the driver's seat, which will ultimately help improve clinical outcomes.

"It's time for health IT professionals to listen to clinicians and respond to their needs through technology that lets them take care of the patient, without distractions," said Dr. Mark Pratt, CMO Allscripts – Hospital and Health Systems.

London hospitals offer virtual-visits with features designed for inclusiveness

As part of the vision to enable equitable access to virtual care, London Health Sciences Centre and St. Joseph's Health Care London have been enhancing their technology so that a wider-range of patients are able to benefit from virtual visits – including the disabled and those who find it difficult to use computer technology.

While virtual care for ambulatory patients at London Health Sciences and St. Joseph's Health Care, London made up only about 3% of all visits prior to the COVID-19 pandemic, at the height of the crisis, nearly 90% of outpatients were being seen in this way.

Right now, some 30% to 40% of outpatients are using virtual visits, commented Stephanie Johnston, manager of Virtual Care Operations at LHSC and St. Joseph's.

"It's likely to continue in this way," said Johnston. "It's a profound shift."

Johnston noted that virtual care consists of both telephone calls and video visits. For video, the hospitals have been making use of Webex Instant Connect by Cisco.

While telephone communication makes up the majority of the virtual calls, Johnston observed that use of video is growing and that patients who use it actually like it better.

A study conducted by the hospitals found that patients who used video are two times more likely to find the experience satisfactory than those who communicated by telephone with clinicians.

The effectiveness of video visits has led Johnston and her colleagues to put time and resources into improving the experience by integrating with the hospitals' electronic medical records. What once took over 40 clicks and about three-and-a-half minutes for administrative staff to connect to one virtual visit, is down to just 30 seconds.

Patients don't have to download any software either, but instead, they simply enter a web-based session in which no personal information is stored.

They also receive electronic reminders about their appointments, something that

> **The use of video for medical visits is growing, and patients who use it like it better than the telephone.**

benefits patients and caregivers and reduces the number of missed encounters.

While virtual care has enabled patients during the coronavirus pandemic to continue seeing their caregivers, many observers have noted that segments of the public haven't benefited. They include individuals with cognitive challenges or hearing impairments, others who may struggle with English as a second language, as well as those without computer literacy.

On this score, Cisco's Webex team has made dramatic improvements to virtual care in the past two years.

"We've brought equal access to the forefront," said Sarah Reuter, general manager of Webex Canada.

"We implemented screen-reader support for those with visual impairments, and we've created closed-captioning for the hearing impaired," said Reuter. "It's now baked into the product."

The single-click access to the Webex is also important, said Reuter, as it makes it easier for those without much computer experience to easily get into an online appointment with a doctor.

"If they had to do 10 clicks, it would-

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I.T. systems must acknowledge that one style doesn't fit all clinicians

DR. DAVID ZITNER AND DOMINIC COVVEY

Taking a test or a drug to "make you better" always involves trade-offs. The wager is that the benefits will outweigh the harms. After every treatment, comfort, function or life expectancy change for better or worse or remain the same.

Evaluating the benefits and risks of treatment requires measures of gain and loss. How different is each person's health after treatment? How many people improve or are worse after treatment?

Doctors must measure health at each visit to evaluate the effects of interventions and to decide if treatment must be modified, new treatment started, or new tests ordered to sort out how to proceed.

Health informaticians develop systems that capture clinical information to assist decision-making during care, and to develop predictive models to understand how best to treat patients and to inform them about the likelihood of benefit or harm.

To design and implement truly useful information systems, health informaticians and those using information systems should know how health is evaluated and measured. The book "Measuring Health: A Guide to Rating Scales and Questionnaires," by Ian McDowell, provides a more comprehensive overview.

The first dimension of health, COMFORT is almost self-evident. Clinicians record evaluations of comfort as statements about the patient's overall life satisfaction, feelings of anxiety, and feelings of elation or sadness. They also record specific elements of comfort, such as discomfort in a body part or organ, by asking about the level of pain or by having patients complete a scale describing their pain from one to 10, for example.

The second dimension, FUNCTION includes estimates of overall function (the ability to do activities of daily living), as well as assessments of the function of individual body parts, such as muscles,

Dr. David Zitner

Dominic Covvey

joints and internal organs like the liver and kidneys.

Laboratory results provide deeper information about how organs and glands are working. Some health information systems help by prompting doctors if a test result of organ function is outside normal limits. For example, an excessively high creatinine level might suggest kidney failure, just as high or low levels of thyroid hormone indicate the function of the thyroid.

Physical examination tells clinicians if there are limitations in the movement of muscles or joints. Orthopedic surgeons, for example, will indicate a range of motion for hips or knees and repeat those measures after an intervention to learn if it was helpful or harmful.

The third dimension, OVERALL HEALTH OR ILLNESS SEVERITY is based on an aggregate of all the information collected. Additional assessments include laboratory tests and medical images (CT, ultrasound, X-ray and other modalities), together with signs (what doctors see during examination), symptoms (what patients feel), and the patient's circumstances and environment, including the quality of the neighborhood they live in, the foods they eat, how they think and feel and their health behaviors.

All of this can be used and statistically analyzed – including the use of regression analysis and predictive models – to get an overall estimate of health.

We evaluate our own health all the time, as well. We know how we feel and what we can do. We can also get reasonably objective information about how some of our organs are functioning by noting our resting heart rate, blood pressure and waist circumference (an excellent predictor of health and disease). The record should capture the patient's assessment of health as well.

The technologists enter: The crucial role of health technology experts, including health informaticians, is to develop and implement systems that capture information and generate reports of a person's overall health and the detailed assessments doctors perform.

Proper utilization of well-designed and usable systems could go a long way toward enabling more effective healthcare and potentially alleviate concern that sometimes healthcare produces more harm than benefit.

To do their jobs effectively informaticians must understand the problems with capturing and using clinical information and realize that each physician practices somewhat uniquely; one size (or style) doesn't fit all.

Informaticians cannot address physicians' and health system needs unless their systems are flexible and interoperable. Only in this way will clinicians get systems that actually support their practices.

Systems cannot run against the grain of clinical practices and cannot demand inordinate adaptation of users to the technology. Effective and marketable information tools will satisfy the needs of the users; they will support clinical efficiency and will encourage efficient capture, collection and use of the valuable data produced by each clinical encounter.

David Zitner is a retired family doctor, a retired full professor at Dalhousie University and the founding director of the graduate program in Health Informatics. Dominic Covvey is the founder and President of NIHI Canada. David and Dominic are in the process of publishing a book exploring the essential ideas that all of us, including informaticians, must know to collaborate in health care.

How technology can be deployed to assist the aged

of $5,000 in product development services from OBI): NerveX Neurotechnologies

• CABHI MC2 Capital Pitch Competition People's Choice Award winner (prize of $1,000, sponsored by AGE-WELL): SenSights.AI

• CABHI MC2 Capital Pitch Competition finalists (currently going through a due diligence process to vie for placement in CABHI's MC2 Capital Program, in partnership with National Bank), include the following:

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CABHI alumni include digital physical therapy provider Sword Health, which recently attained unicorn status (valued at $2 billion); virtual care platform Akira Health, acquired by TELUS Health; and neurohealth technology company BrainFx, acquired by Highmark Innovations, Inc.

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Interoperability standards in healthcare context: The art of the possible

BY MICHAEL GREEN

We know Canada's health system is capable of rapid change in an emergency. When the COVID-19 pandemic struck two years ago, Canada Health Infoway and the federal, provincial and territorial governments collaborated with vendors, clinicians and other health system stakeholders to quickly develop, implement and enhance virtual care solutions across the country. It was an unprecedented collaborative effort that helped Canadians immensely in a time of great need.

As we emerge from the pandemic, how do we maintain that intensity so we can make other changes that will improve our health system and health outcomes for Canadians? Collaboration, consensus and commitment will be the keys to success in everything we do.

Let's use interoperability standards as a case study for the "art of the possible."

Interoperability refers to the ability of different IT systems with different infrastructures to share data, like patient health information, in the context in which it was collected. Interoperability could not happen without standards.

There are three types of interoperability standards in the healthcare context: content or data standards for clinical content and clinical guidelines; terminology standards, which are structured vocabularies or codes that represent clinical ideas or concepts; and exchange standards, which enable the formatting of messages exchanged between systems.

When used together, these standards set expectations about how and what data will be shared in a standardized manner, in the appropriate clinical context. And they give healthcare providers confidence that they will have a common understanding of the tests performed, the results, and the clinical assessments they are sharing, so they and their patients can make informed decisions about a patient's health and care.

Canada Health Infoway is the home of many pan-Canadian standards, including the Canadian edition of SNOMED CT (Systematized Nomenclature of Medicine – Clinical Terms), the pan-Canadian LOINC (Logical Observation Identifiers Names and Codes) database known as pCLOCD, HL7 (Health Level 7) Canada and IHE (Integrating the Healthcare Enterprise) Canada.

Michael Green

For many years, we have been connecting, convening and galvanizing stakeholders to work toward a standardized pan-Canadian approach. We share knowledge and lessons learned, and we provide access to various standards and tools, as well as opportunities for collaboration, through our InfoCentral website and communities (infocentral.infoway-inforoute.ca).

Our goal is to improve data quality, data use, and re-use of information to enable a better and more connected experience for everyone, especially patients. In partnership, we strive to support the accessibility of quality information to the right people, at the right place, at the right time.

So collaboration, consensus and commitment have been the cornerstones of success in the Canadian standards community for many years.

As a result, we were well positioned when the pandemic and the shift to virtual care heightened the need for interoperability standards that enable the secure and precise capture and sharing of heath information. We were able to act quickly during the early days of the pandemic.

We look forward to working with all health system stakeholders to continue to advance interoperability and to support other important digital health initiatives that will modernize our health system.

Michael Green is President and CEO of Canada Health Infoway.

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Electronic health record systems are expanding to include a wider range of data

Clinicians are eager to use genetic data to improve diagnoses and therapies.

BY DIANNE DANIEL

A pan-Canadian electronic health record (EHR) remains elusive for now, but that's not stopping healthcare providers from expanding the scope of the digital records they already use. From 'soft data' that paints a picture of a patient's home life and socioeconomic status and allows them to tell their story in their own words, to precise genomic data that sheds light on health implications related to specific genetic mutations, the type of information being collected in patient records is rapidly evolving and clinicians are eager to apply it.

"Canadians are ready for this and they are interested," said Dr. Marsha Fearing, referring to Meditech Expanse Genomics, an integrated EHR-based solution that allows users to receive, store and present complex genomic information to clinicians at the point of care.

A practicing physician with more than 20 years of clinical experience in pediatrics and medical and biochemical genetics, Dr. Fearing serves as a Meditech physician marketing consultant in Canada, working to educate clinical leaders about how genetic testing results can be easily accessed and interpreted in Expanse, enabling them to tailor care plans to individual genetic profiles. She says demand for easy-to-understand genomic data is high Canada-wide.

"Genetic reports can be up to five pages long and this is stuff I enjoy reading as a geneticist, but my colleagues in every other discipline in medicine do not – especially if they have 40 patients to see in a day," said Dr. Fearing. "By turning it into something that's easy to digest and built into the record, let me tell you, they're interested. There is a thirst like you wouldn't believe."

Up until now, the cost, time and resources required to provide clinically relevant analysis of genomic sequencing has proven a common barrier to access. In order to access genetic data, physicians would need to launch separate applications, search long PDF files, copy and paste data back into a patient record, and then consult with a genetic specialist.

A 2021 study by the Journal of the American Medical Informatics Association, in which researchers implemented a platform to gather and display genetic testing data in the EHR, found that only 13 of 30 clinicians opened at least one test result document, representing only one percent of all results available for viewing.

Meditech Expanse alleviates that cognitive burden by communicating genetic data directly from the testing lab using language that is easy to understand.

It includes actionable clinical-decision support with real-time updates to pharmacogenomics alerts (known drug-gene interactions) using embedded drug data from First Databank. Inbound genetic testing reports and discrete results are automatically filed in a patient's record, minimizing the risk of associating the wrong data with the wrong patient.

At the same time, the cost of genetic testing is decreasing, making it more feasible to start thinking strategically about how genetics can be used in patient records to support personalized medicine.

"I honestly think we've been confusing the lack of wanting to have the data and wanting to use the data with the fact that there was no easy way for it to be done," said Meditech Genomics product manager Jen Ford. "Now that there is easy accessibility, this is where we're going to start to see massive uptake of clinicians wanting to hop on board."

Since launching Expanse Genomics, Meditech has landed its first U.S. customer and anticipates its first Canadian user by the end of the year. One of the most immediate and obvious benefits of making genetic data accessible is the ability to screen for known drug interactions before prescribing or administering medications.

For example, Dr. Fearing estimates 30 percent of the population has an RYRI gene mutation that makes them susceptible to malignant hyperthermia, a severe and potentially fatal reaction to certain inhaled anesthetics.

"Wouldn't it be nice to know instead of having that bad effect during your surgery?" she said. "There are a million examples like that. Genetics is everywhere; it's a part of everything we do and it's naïve to say we don't need it. We do."

Ford credits several leading Canadian genetics labs with contributing to Meditech's product devel-
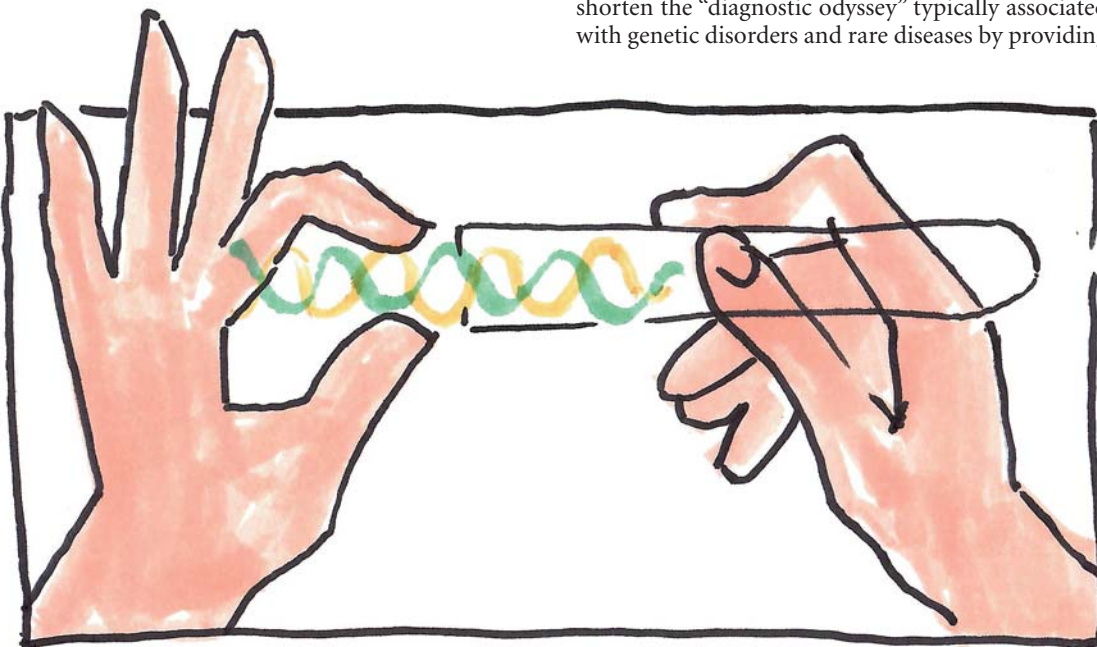

ILLUSTRATION: LINDA WEISS

opment effort and "unlocking the keys to making (genomics) accessible" by helping to build the direct interface to discrete lab data through messaging. Her team also worked with genetic counsellors globally to determine the best way to present genetic information so that clinicians know after a simple read what it means. The goal is to make genomic data as routine as bloodwork.

"We developed a system of attaching genetic results to the patient's entire medical record, so basically as these results come in from these labs, they're stored at a patient's medical record number and stay with them for their entire lifetime," Ford explained.

Toronto-based PhenoTips, a company that grew out of a 2012 research challenge between computer scientists at the University of Toronto and geneticists at SickKids Hospital, is also on a mission to make medical genetics integral to electronic health records. Last year, the company secured $2.5 million to double its team and expand its cloud-based product offerings as it prepares to "scale services to accommodate the integration of genetics into everyday care."

The PhenoTips system is designed to standardize and capture genetic data at the clinic level, while a patient is either with a geneticist or genetic counsellor. It started as a simple tool to efficiently code patient records using the standardized Human Phenotype Ontology (HPO) hierarchical language to describe phenotypes, and now functions as a complete medical genetic system, including pedigree drawing, symptom capture and diagnosis insights, to manage the complex information related to a patient's history and clinical presentation.

"As genome-based testing has been increasing and we've been rapidly moving away from single gene or panel testing towards whole genome approaches, the importance of having really well-curated information about the patient and their family has become more and more critical," said PhenoTips COO and vice-president, Scientific & Medical Affairs, Pawel Buczkowicz.

PhenoTips can be used as a standalone system or integrated into an existing EHR, clinical document management system or laboratory information system. One of the company's overarching goals is to shorten the "diagnostic odyssey" typically associated with genetic disorders and rare diseases by providing clinicians with resources and insights at the point-of-care, such as suggestions of potentially relevant genes, potentially relevant phenotypes or differential diagnosis, said Buczkowicz.

"Early diagnosis and early detection are the two main things we'd like to impact," he said. "Ultimately, most people want to know if they have a genetic condition, what it is, and if they can do something about it rather than living in ambiguity for many years, which unfortunately a lot of them do," he said.

The company's approach is different from others because instead of adding genomic data into an existing, generalist EHR system, it considers every feature and aspect as it applies to medical genetics in a separate system.

That said, some aspects of the system's design are intended to easily move genetic testing and genetic care into primary care and family medicine settings, including patient questionnaires that automatically generate a standardized pedigree chart (family genetic tree) for clinicians to review and edit.

"Genetics and genomics are going to become a

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Huron Perth's digital tools speed up clinicians' access to information

STRATFORD, ONT. – The Huron Perth Healthcare Alliance (HPHA) and the Alexandra Marine & General Hospital (AMGH) serve a region encompassing two counties in southwestern Ontario with a population of approximately 135,000. HPHA comprises four hospitals in Clinton, St. Marys, Seaforth and Stratford; AMGH is in Goderich. The five hospitals have a combined total of 250 beds and 150 physicians and share a common MEDITECH information technology infrastructure.

Ms. Annette Stelmachuk, IT clinical analyst at HPHA, and Dr. Robert Davis, lead physician, recently described their experience deploying electronic documentation as part of their PatientKeeper clinical workflow optimization system, now known as Commure Care, which complements HPHA's MEDITECH EHR system (commure.com/solutions/applications#commure-care).

Annette Stelmachuk: Physicians had a very difficult time finding information in MEDITECH, with all the arrows up and down. The feedback we were receiving from physicians was they wanted a system that was easier to view information in. We were looking for something that would be able to sit on top of MEDITECH, so that we didn't have to change our whole system, but that would provide physicians a mobile option, and a more point-and-click user environment that was easier to maneuver around.

Robert Davis: I was first introduced to PatientKeeper several years ago as part of a team tasked with evaluating software for providers at our hospital network. Previously I had looked at software for our family practice clinic, so I had some experience doing this. To me it was quite obvious that PatientKeeper stood out as being very user-friendly from a physician user's perspective.

One significant value-add of Patient-Keeper is mobility. It's a time saver. You can be anywhere and look up a patient's information or make a note on a patient or put an order in for a patient. As a physician, you never know when you're going to get a page or a call about a patient.

Rather than run to a computer to look up that patient's record, you can simply look on your mobile device and the patient's information is right there. It's much more efficient, and I think it adds to patient care. I know for a fact that physicians will log into PatientKeeper from home before they come to work, so they already have a head start when they get to the floor of the hospital.

AS: Before PatientKeeper, some providers were writing their daily notes on paper; for things like history, physicals, discharges, operative reports, consults, many would pick up the phone and dictate their notes into Nuance, and then a transcriptionist would type it for them.

The Nuance system that we were using at the time was way past end of life, so we had to decide: do we upgrade and continue on the same road that we've been going down with transcriptionists, or do we move forward with technology and have our physicians write and edit their own notes electronically.

Our solution was to integrate front-end dictation within NoteWriter, Patient-Keeper's clinical documentation applica-

Annette Stelmachuk   **Dr. Robert Davis**

tion, so a physician could speak into a microphone. Now, the notes still live within PatientKeeper, but providers have the flexibility to either type, if that's what they prefer, or to enter their notes by voice.

Our physicians were never forced to review their notes even with a transcriptionist. Notes were always left in a draft status in MEDITECH, and if there were errors or blanks and no one had reviewed them, that's how they stayed.

It was not ideal at all. So, looking back, before we switched to NoteWriter, an eas-

ier transition for the physicians would have been to start having them edit their notes that were being transcribed, and to sign those notes and send them back, to get used to that process. Because they never had to do that previously, one of the biggest complaints we heard from physicians was that they didn't have time to review their notes and correct them.

They found that very time consuming. It's a change. Also, it's taking time for the front-end speech-to-text system to learn and correct mistakes; if you don't correct them, it also learns bad habits.

Throughout this process, we had a lot of support from senior leadership, which was important. Having their backing to make this an organizational standard was very important. There were no other options, so providers had to put in the time and the work for this to be successful.

RD: Some of the metrics hospitals typically use to measure the success of a software deployment didn't apply to us because using the system was mandatory. Providers didn't have a choice, so we didn't have to measure what percentage of physicians are using it versus what percentage of physicians are not. We relied on physician surveys to find out what areas needed more support versus what areas were doing well and we could reduce support resources.

One of the things we did compare was the speed with which reports were ready. In the past with the Nuance dictation and

Digital identity solution eases patient access to health information

BY SALEEMEH ABDOLZAHRAEI

Making it easier for patients to securely verify their identity and access a wide range of online digital health services through a single sign-on experience, is at the core of a new solution in Ontario.

This is part of a rapidly growing trend across North America where, more than ever, patients are accessing healthcare services and their health information online.

"Increased patient activity in digital and virtual care has identified opportunities to create more positive digital and virtual healthcare experiences for patients," said Sonali Kohli, vice president, Diagnostics and chief information officer at Niagara Health.

"The feedback from our patients validated that we needed to streamline the many apps, patient portals and websites that we ask patients to use to access their health records and manage their care," Kohli added. "From a user design perspective, we know this could lead to a frustrating experience. We knew this meant that we needed to create better experiences for patients from the start."

Building on an investment from the Province of Ontario and a shared vision, the Ontario trusted account is a patient digital identity service that connects a variety of digital tools and online health-

care services into one seamless digital experience for patients.

"Niagara Health was one of a number of hospitals in Ontario looking for a solution to make it easier for patients to access online health information more conveniently and securely," said Kohli. "With the support of the Province of Ontario, we partnered with Southlake Regional Health Centre, St. Joseph's Healthcare Hamilton, North York General Hospital, IDENTOS, SecureKey Technologies (now part of Interac), and patients to build a fully connected, standards-based digital health solution. Together, we co-designed and built the Ontario trusted account."

The Ontario trusted account has a broad range of uses. Through just one single account, patients can access online healthcare services and – the best part – they can use that same account (or health credential) for a wide-range of integrated digital services like accessing their health records, managing hospital appointments, engaging in virtual care consults, and more.

Patients can create and use their Ontario trusted account via the web or through their local participating hospital's patient Navigator mobile app on any device (i.e., smartphone, tablet and laptop).

Niagara Health was the first hospital in Ontario to launch a Navigator mobile app as a means for patients to discover, navi-

gate, and access health information and services in the region. Since launching in 2019, more than 60,000 people have downloaded the app on their iOS or Android devices. The partnership to design and build the patient digital identity program was formed in 2020, and since then, the technology has been (and continues to be) scaled across more regions in Ontario.

"In Niagara, patients can use the Navigator app to see Emergency Department wait-time information, access COVID-

Sonali Kohli   **Justin Saindon**

19 visitor information and self-assessments, find mental health and addictions support, check-in for their diagnostic imaging appointments, view medical imaging records and more through this digital front door," said Justin Saindon, director of Digital Transformation at Niagara Health.

"We're just getting started. Together with our partners, we are building and

enhancing the services accessible with an Ontario trusted account. Our goal is to create one seamless experience for patients using this technology as the digital front door to the hospital and other health services in our region."

This collaboration demonstrates how Ontario's healthcare providers are working toward a more integrated health system with more options for virtual and accessible care. These technology solutions were designed and developed in partnership with patients, clinicians, health system leaders, the Province of Ontario, and Ontario-based health technology companies.

"For modern access to care, patients are seeking out online services that are convenient, connected to the care they receive in-person, and that they trust is protecting their privacy and personal health information no matter which website or online tool they are using," said Mike Cook, CEO of IDENTOS and lead technology partner for the Ontario trusted account. The Ontario trusted account builds on existing technology and takes a novel, standards-based approach to integrate services and build a better and more seamless patient experience."

The Ontario trusted account is expanding its services and will soon be available to more patients across the province. To learn about this service, go to https://mytrustedaccount.ca/

EHRs are expanding

greater part of all patient care, starting in primary care," said Buczkowicz. "While we're not there yet, we're going to get there and it's going to have a massive impact on how medicine is practiced all over the world."

Another area where EHRs are evolving to include new types of patient information is in health and human services, including mental health and addiction, and community and social services. That's where Toronto-based VitalHub Corp. is filling a gap by capturing "the soft information that is so vital to treating clients in that group," said VitalHub vice-president, EHR Products & Solutions, Ruby Lederman.

The company's TREAT system allows multiple authorized users across multiple care delivery settings to access each client's secure, longitudinal record. Provided as a software-as-a-service based on an annual subscription fee, TREAT is focused on supporting a client-centric care model that starts by capturing additional context not always considered in a typical patient record.

Lederman refers to it as soft data: In addition to codified information about employment and education status, household income and number of dependents, clients are provided an opportunity to tell their story, information that isn't necessarily standardized but is still important to the client's care.

"Understanding a more holistic view of what allows a person to be successful starts at home, starts at understanding their activities of daily living," said Lederman, stressing that anyone who may not have the ability to fill out outline forms at home is supported in the community. "… This is where you need to hear the person's story: 'I went into the Emergency department, this happened and this is the outcome. I want to tell my story and this is my goal for this service.'"

The information is captured by assessment, form or note, and presented in client profiles that can easily be accessed and updated as services are delivered. Not only is it easy for service providers to capture information in client records, it's also easy to

> **The TREAT system captures additional context that is not always considered in a typical patient record.**

find what they need once it's there and share it so everyone involved in a client's care plan is on the same page.

"You can put together algorithms to determine broader care plans to address issues, but when you're missing context, it can make a really big difference," said Jonathan Steljes, VitalHub director of Solutions Architecture. "One of our goals is to provide as much context and contain as much context as possible."

The Muskoka-Parry Sound branch of the Canadian Mental Health Association in Huntsville, Ont., implemented TREAT nine years ago as part of its journey towards a paperless record.

All the client information collected by the agency's service providers is collected within TREAT, including demographics, diagnostics, communications, risk management, privacy, consent management, external referrals, case notes, wait list histories and admission and discharge histories. Client appointments are also scheduled and integrated care plans are documented.

The branch is currently working with VitalHub to implement a client portal to allow clients to interact with their health information in a more dynamic way, and to work much more collaboratively with clinical services around the collection, use and disclosure of their personal health information.

"Where we're seen really big gains is in the accessibility of information," said Mike Varieur, director of Clinical Services and Operations, Muskoka. "… It makes service delivery much more client centred. Clinicians have information when they need it, in the form that's useful to them. We're not making assumptions about a client and we're not missing key pieces of information."

Prior to moving to TREAT, he added, it was common for the branch to have multiple health records for a single client, located on paper in separate offices.

The initial implementation involved combining and migrating data from two separate health records, a "big work project" that has since paid off, said Kat Johnson, coordinator of Health Information and Technology for the branch.

Huron Perth's digital tools speed up access to information

transcription workflow, it could take two or three days for a history to be on a patient's chart, or for a discharge to be on the chart. We found that with front-end speech-to-text or typing using Patient-Keeper NoteWriter, information was

> **While the team started with just five templates, there are now about 50 being used by a variety of clinicians.**

available much, much faster, pretty much in real-time.

This proved to be very beneficial and was noticed and appreciated by our physicians over time. It was definitely considered a benefit of using NoteWriter, because timely and accurate documentation on the chart can impact quality of care and patient safety.

AS: I think all our providers do appreciate the benefits of having notes readily available. Now when they do a note, it's there automatically for viewing, and at the same time we send it out electronically. As soon as it's signed, it's sent out to family physicians and anyone else that they have copied it to. They like that the information is readily available whereas it wasn't before.

If you are deciding to move forward with something like this, it's important to know that within PatientKeeper the notes are very flexible. This is about the physicians and their workflow, so another thing that Bob and I have done to make this easier and the transition smoother for the physicians is listening to what they want. So, while we started with five generic templates, now we probably have 50 templates customized to various specialties and workflows. Some have tabs and boxes and sections, but we also have what we call speech-friendly ones, which are open text boxes for those who just want to speak into it. We've given multiple ways for physicians to do their notes so that they can decide what works best with their workflow.

RD: When I joined this wonderful technology team, I was told that the software would be adapted to the physician's workflow, not the other way around, and that's what we've done. Another key is support, support, support. As a physician, it's nice to have somebody at my elbow to whom I can say, "I can't get this to work," and there's someone there to help me. Support has been huge for making this successful.

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London hospitals

n't be accepted," she asserted. "We wanted to shorten the whole process, so with one click, they're in."

Reiter emphasized that Webex sessions are held over secure networks, and that patient information never leaves the system.

Johnston said the team is also creating "store and forward" solutions for those working hours during which clinicians may be unavailable. This will give patients the ability, 24-hours a day, to leave messages and information for their caregivers using the virtual care solutions.

When they are free, the clinicians can pick up the messages and set up virtual care meetings, if needed.

"Patients are looking for flexibility," commented Johnston, noting the rise of virtual care has provided several major benefits.

"Patients can call during a break at work or from home," she said. Importantly, the technology is saving many patients long commutes to the hospitals.

Families with children have been among the prime users of virtual care, adds Johnston. Patients with mental health needs have also made substantial use of the technology, as have people with chronic conditions and those with

> **As development of virtual care goes forward, including patients in the ongoing design will be crucial.**

physical disabilities who find it difficult to make the trip to a hospital.

Johnston said that LHSC and St. Joseph's will continue to expand their use of virtual care. Key to the work, she said, will be including patients in the design of new features and programs. "Patients will help us to drive change," she said. "They will show us how care needs to be delivered."

COVID's impact on data management

to the care givers, too, including family members.

"As soon as the adult daughter – and adult daughters are usually the ones providing the most care – gets exhausted, she stops taking care of her parent with dementia. And when that happens, the parent ends up in the ER."

Rachel Solomon, chief data officer at SickKids, put a spotlight on the issue of health equality. "COVID has exposed disparities," she said.

To truly care for patients, she said, we need to be collecting more information about sociodemographics, including income, education levels, and race.

"The onus is on us to collect this information and to use it," she said. "We need to push it out to clinicians."

However, she noted that it must be collected in a way so that patients feel safe in disclosing it.

By collecting and using the data, Solomon said, caregivers will be able to provide more personalized care. "So, we're not just planning for the average patient," she observed. With sociodemographic data, "we're able to look at who the system has not been designed for."

Because of the growing need for data, Solomon asserted that "the pandemic has made us all statisticians."

For her part, Cindy Fedell, regional chief information officer at Northwestern Ontario Hospitals, also emphasized the data

that has been traditionally missing from the healthcare system when treating patients. She accentuated the needs of patients in her region, where half of the population lives in rural settings outside of cities.

Typically, there's not a lot of data on these patients to begin with. "They often don't participate in Statistics Canada surveys," she said. "They often don't trust government surveys."

As a result, there is a lack of data on

> **Sociodemographic information about patients must be collected in a way that makes patients feel safe.**

things like housing, she said, as well as other indicators associated with health.

However, these data could be collected by the healthcare system. Said Fedell: "We're transitioning now to put in the right data infrastructure."

In closing remarks, Mark Casselman, CEO of Digital Health Canada, noted the power of the professional community as a key to success in navigating an accelerated digital world together.

"It was great to see the many parts of our health ecosystems coming together as collaborators today," said Casselman. "These healthcare leaders are partnering across care settings, using digital tools and data, to deliver quality outcomes and an improved experience for patients."

Integration of XERO® with Teams enables clinicians and specialists to share images

New solution streamlines communication among radiologists and other providers, improving clinical collaboration

The integration of Agfa HealthCare's XERO® diagnostic imaging viewer with Microsoft Teams allows for easy sharing of images among groups of healthcare professionals. Save time tracking down colleagues in the hospital when a review of images is needed—instead, images can be sent quickly and securely in a way that is already used by many physicians and allied professionals.

Physicians requesting a consult can tag specific members of the channel to review an image. If they fail to respond, the request can be escalated via email and repeated notifications.

Physicians participating in a consult can view the images and communicate with each other using audio, video and chat. Also available is a markup tool allowing clinicians to interact with the images using their cursor and to share the markups in real-time.

The solution can be customized to meet the needs of specific hospitals or clinicians. For example, a COVID button can be added to the navigation bar in the XERO viewer and programmed to transmit images to a 'channel' of predetermined specialists, including pulmonologists and infectious disease experts. Channels can be added for critical care and cardiology specialists, ophthalmology, dermatology, and others.

The XERO/Microsoft Teams app can save valuable time over the course of a week, month or year. Agfa HealthCare estimates that with a time saving of 10 minutes per consult, an average hospital could save 75

days of productive time per year. The app can also be life-saving, if a patient has COVID-19 and needs to be placed in quarantine before infecting someone else.

Installation is via a simple plug-in with no downtime or interruption to viewer use. Following successful implementations in the UK, the companies are now offering the solution to North American customers.

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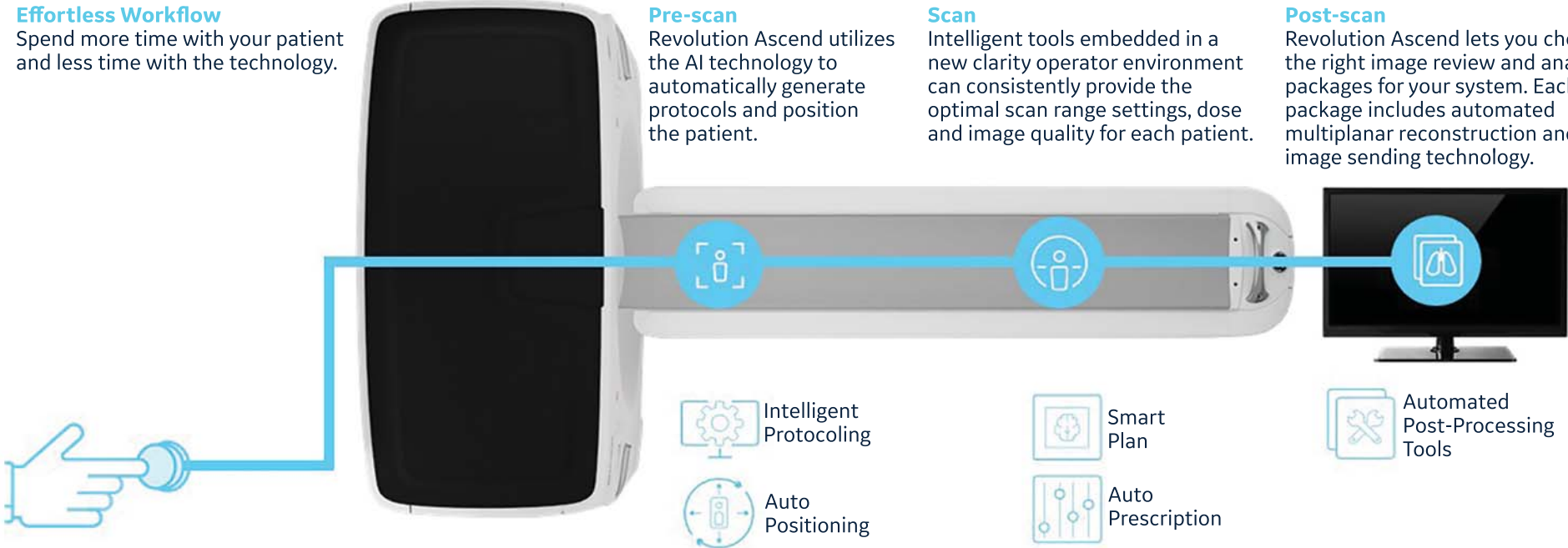
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