

CANADIAN Healthcare Technology

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DIAGNOSTIC IMAGING

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Aiming for HIMSS Level 7

Toronto's Casey House, which completed building a new hospital this year, also implemented an EMR that is making the delivery of care paperless. That may earn the facility a Level 7 EMRAM standing from HIMSS Analytics.

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AI chatbot eases the mind

Saint Elizabeth Health Care, the national provider of home care services, has finished testing a chat-



bot that assists employees who have their own family caregiving duties to perform. The AI-powered system helps reduce pressures and anxieties.

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Degree in healthtech mgt

Durham College, in Oshawa, Ont., has launched Canada's first degree in health technology management. The school will train students to implement new solutions with an eye to better patient outcomes and financial success.

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New procurement practices

SCAN Health, based in Windsor, Ont., is building links to organizations in Canada and around the



world to help improve procurement and patient safety in the healthcare sector.

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PHOTO: COURTESY UHN

A \$100 million gift from philanthropists Peter and Melanie Munk to the UHN's Peter Munk Cardiac Centre will be used to transform the management of heart failure patients, both in the hospital and at home. The leading-edge centre will use the investment to further develop the technological tools needed to improve care in the 21st century. Pictured are Toronto mayor John Tory, Peter Munk, and Dr. Barry Rubin.

Heart centre will pump \$100 million into new solutions

BY JERRY ZEIDENBERG

TORONTO – The Peter Munk Cardiac Centre will use a \$100 million gift to create new technologies to treat heart disease— helping it to reinvent the future of cardiac care and simultaneously turn it into one of the top heart hospitals in the world.

The aim is to provide care on par with or better than the Cleveland Clinic, which is consistently rated as the number one cardiovascular hospital.

“We’re aspiring to that level and beyond,” commented Dr. Barry Rubin, medical director of the PMCC, which is part of the University Health Network in downtown Toronto. “We’re trying to do things that have never been done before.”

The landmark \$100 million investment was announced on September 19, 2017. It’s being provided over a 10-year period by Canadian philanthropists Peter and Melanie Munk, and will be used to fuel the

creation of advanced technologies at the centre.

With computer and clinical experts inside the hospital and through alliances, the cardiac centre will marry new solutions in artificial intelligence, machine learning, wearables and remote monitoring with patient care and research.

The goal is to both reduce the costs and pressures on a healthcare system that’s burst-

Over 1 million Canadians are now living with heart failure, and the numbers are increasing.

ing at the seams, and to simultaneously improve medical outcomes for heart patients.

Already, the PMCC has formed an alliance with the Vector Institute in Toronto, which is building a centre of excellence in artificial intelligence, and draws on the expertise of Google and the University of Toronto.

“We’re the first healthcare partner for Vector,” noted Dr. Rubin.

According to the University Health Network, over 1 million Canadians are currently living with heart failure, and the numbers are increasing by 50,000 each year.

“Our hospitals are full now” said Dr. Rubin. “The only way of managing will be to take care of patients outside of hospitals.”

To that end, he explained, the PMCC is creating an electronic platform that will use AI to mine the data of heart patients at the centre, as well as those who have been discharged. It will use the results to identify patients at risk of sudden, catastrophic cardiac events.

“We have 163,000 outpatient visits a year, and we perform 9,000 cardiac and vascular procedures a year,” said Dr. Rubin. There’s a lot of data collected about these patients.

“That could be used to predict who needs to stay longer and who could be safely dis-

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Peter Munk Cardiac Centre will pump \$100 million into new solutions

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charged. And it can help us increase the efficiency of bed utilization.”

And by combining analytics with real-time monitoring, patients in the community could be actively monitored. “With remote monitoring and artificial intelligence, you can identify the precursors to potentially serious or fatal heart arrhythmias that no human could detect,” said Dr. Rubin.

As a result, heart failure patients at home can live with a better safety net – if they are developing problems, they will be identified before real trouble occurs. “We’re aiming to detect events that may precede a catastrophic event,” commented Dr. Rubin.

This means the patient can immediately get advice from his or her doctor – medications could be adjusted, or other steps could be taken to avert a heart attack or hospitalization.

The brainpower and software to conduct this kind of real-time monitoring is considerable. But already, the Peter Munk Cardiac Centre has started to create the smart platform that’s needed. It

currently has 48 different databases of patient information.

Those are the databases that will be mined to create new algorithms for predicting heart problems. But first, they must be consolidated, to create a super databank of information that includes lab and imaging test results, surgical and medication outcomes, imaging studies like X-rays, CT and MRI scans and ultrasounds, and genomic data.

In a proof of concept, a project led by Dr. Heather Ross at the PMCC has successfully combined six of the databases, work supported by the Ted Rogers Centre for Heart Research. Funds from the \$100 million gift will be used to continue the work, to join the remaining databases to create what Dr. Rubin calls a “data lake”.

That lake will only get bigger, as thousands of patients at the PMCC start feeding data from their computerized wearables into the system, while maintaining data security and privacy. The amount of data collected from real-time devices is mind-boggling – it will include blood pressure, temperature, body weight, blood oxygen saturation, and even the



Peter Munk speaks at the announcement of his landmark \$100 million gift to the University Health Network.

signals from pacemakers. “The only way of processing that volume of information is to employ AI and machine learning,” said Dr. Rubin.

In partnership with the Vector Institute and other organizations, work will be done on predictive analytics – the smart systems that will actually digest all of the data and make sense of it.

Smart systems will instantly spot patients in danger – including those on the verge of catastrophe and those facing dangers down the road. “We’ll look, for example, at whether there are any particular findings to predict which patients will get narrowing of the aortic valves,” said Dr. Rubin.

Not only will systems be devised to identify these patients and alert them and their physicians. The data will also be used to develop therapies.

Indeed, using the genomic data, personalized medications and procedures can be created.

“We could develop cures,” said Dr. Rubin. “This is bedside-to-bench and back to bedside research-and-development. It’s unbelievably powerful.”

In another part of the project, PMCC will be ramping up clinical trials to test its therapies. Not only is there funding for the trials, there is also space allotted for conducting the work.

Dr. Rubin observed that the transformational project has been mapped out in a 135-page document, with ‘deliverables’ to be presented to a board at regular stages throughout the 10-year lifespan of the investment.

He foresees real results by the end of the 10-year period – which is still what he calls “an aggressive schedule,” based on the magnitude of the work to be done.

There is also a plan to commercialize the technologies and products that are generated. This will be done in partnership with the UHN’s Techna Institute, which has expertise in spinning technologies and businesses into the marketplace.

The profits from any sales of this sort will be plowed back into the PMCC, to fund ongoing work, said Dr. Rubin. “Even \$100 million will run out,” he noted. “We’re thinking of how to fund our work after that.”

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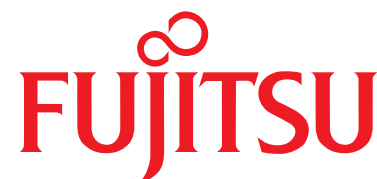


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Casey House goes from paper-based care to paperless EHR in 18 months

BY JERRY ZEIDENBERG

TORONTO – Casey House, a specialty hospital caring for people living with HIV/AIDS, has opened a new facility on a leafy side-street in downtown Toronto. The high-tech structure, which can house 14 inpatients and has extensive facilities for a day program, is adjacent to a heritage house constructed in 1865.

This spacious family house has been refurbished – preserving features like its original stained-glass and wooden staircase balustrades. Connected with the high-tech hospital, it is being used for both administrative and clinical purposes.

The mixture of new and old symbolizes the cutting-edge care that Casey House seeks to deliver, while maintaining the comfort and warmth of a traditional family home.

On the high-tech side, Casey House has gone live with a new electronic health record system, which is helping the hospital modernize its patient safety and clinical communications practices. The new EHR, called B Care, from Toronto-based developer B Sharp Technologies, enables clinicians and care-givers of all types to have a real-time picture of the services clients receive.

“We’ve gone from paper-based to being paperless for clinical documentation in just 18 months,” said Adil Ali, IT manager at Casey House. “And we did it with very little infrastructure.” In terms of human resources, Ali was the only new hire – all other work was completed with internal resources.

Ali noted that because Casey House made maximum use of the functionality of the B Care solution, the resulting transformation in care processes and outcomes at Casey House may very well qualify it as a



Casey House's EHR super-users: (Left to right) Kathryn van der Horden, Liz Creal, Lorraine Rhoden, Andra Cardow, Karen de Prinse, Glenna Fraumeni, Sara Lamoureux, Adil Ali. Missing: Diane Murray and Amelia MacKinnon.

Stage 7 hospital in the HIMSS Analytics EMRAM program. “We’ve submitted the HIMSS Analytics survey and are waiting to hear back,” he said.

A key part of the B Care solution is its closed-loop medication management, which is needed for the EMRAM Stage 6 and 7 standing, as it can boost patient safety dramatically.

Casey House is now bar-coding all its medications; they’re scanned at the point of care by clinicians when administered to clients to ensure the right medication is administered to the right person, in the correct dose, at the right time. It also allows them to trace medications from pharmacy to client.

And while the hospital doesn’t have an in-house pharmacy, it works closely with a nearby community pharmacy, which sends personalized, packaged medications each day. “If there’s a stat order, it can be done right away and they’ll walk it over,” commented Ali. This required a formal integration between Casey House and the ex-

ternal provider, which has access to B Care.

Medication management is essential at Casey House, noted Lisa McDonald, communications manager. “In addition to HIV/AIDS, our clients have other diagnoses and illnesses,” she said. “These are complex care patients.” They are on complicated regimes, taking up to 25 different meds each day, so any tools you can provide to manage complexity is helpful.

Clients of Casey House face high levels of social isolation because of their diagnoses. They often feel shunned by society, and have a limited social network, need help with physical needs including nutrition, and live with substance and mental health issues.

In addition, many Casey House clients are under-housed – in certain instances, they’re living on the street or under bridges. Casey House has installed a bank of lockers, where day health program clients can keep their medications. “Some of them are couch surfing, and they don’t have a place to keep their medications,”

said McDonald. “We can keep them here, and they can come each day to take them.”

She added that it’s also a way of ensuring that clients are taking their meds. “If a locker hasn’t been opened in a while, someone will notice,” said McDonald. “It allows us to reach out with early intervention if someone is pulling back from services or programming.”

To further meet the needs of their clients, Casey House has launched an extensive day health program. It aims to bring 100 clients in each day for services like nursing care, substance use and mental health counselling, harm reduction, nutrition counselling and planning, cooking classes, and massage and recreation therapy.

Importantly, all of these activities are logged into the EHR, enabling care-givers to see which services have been provided to clients. “In real time clinicians have access to information that impacts client care, information sharing that paper could never do – such as a photo of a wound from the day before,” said McDonald, “regardless of where care was provided.” This leads to better coordination among all clinicians, as they have access to the clinical information they need to deliver care.

In addition to physicians and nurses, users of the EHR include massage therapists, recreation therapists, a nutritionist and physiotherapist, social workers and case managers, healthcare aides, and administrative staff.

[JN1]In a parallel project, Casey House tied B-Care to eHealth Ontario’s ConnectingOntario system, which serves as a repository of patient data from hospitals and other healthcare facilities across the province. This will allow users to see, in some instances, whether a client has visited another facility and what services were provided.

Ali said the B Care implementation has

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Telus Health tests doctor-to-doctor communication through EMRs

Canada’s physicians, nurses and pharmacists are among the best in the world. And yet, our country’s health system consistently receives poor ratings in comparison to other developed nations.

This begs the question: how can we have such poor system performance when we have world-class clinical teams?

While there are a variety of contributing factors, one is indisputable: the tools and systems we use to support clinical care are substandard. Even the very best people will not achieve solid results and outcomes if they have to use tools that are second rate.

A recent survey of 150 Canadian physicians conducted by TELUS Health revealed that phone (85 percent) and fax (65 percent) are the top two means physicians use to share patient information and critical medical data with other healthcare professionals.

This continued reliance on outdated tools makes for unnecessary inefficien-

cies and stress for clinicians who are already overwhelmed by demand.

For patients, the impacts are more immediate. These include long wait times to see a specialist, gaps in continuity of care when consulting with other healthcare providers and delays in clarity on how to treat relatively minor ailments.

Efficient communications: Canadian healthcare professionals polled for the Future Health Index study identified access to secure information-sharing platforms between practitioners as having the most potential for positive impact on Canadians taking care of their health.

Furthermore, poor provider-to-provider communication is consistently identified as a leading challenge and cause of avoidable, adverse events.

In Canada, in a survey of healthcare facilities, colleges and associations, 25 percent cited communication and documentation errors as the main issues impacting patient safety or healthcare errors.

Efficient communication between healthcare providers is a basic, funda-

mental requirement if we are to achieve the much-needed improvements to the way Canadians receive – and should expect to receive – care.

Patient-centered care: According to the Canadian Medical Association’s (CMA) Workforce Survey, released in August 2017, EMR adoption and use among primary care physicians in

A survey found that 25% of patient safety errors are linked to poor communication and documentation.

Canada has reached 85 percent. This number continues to grow.

When an efficient way to connect and communicate with other physicians is enabled, EMRs can act as more than the digitized silos of patient information that they are today.

Launched in July 2017, TELUS Health’s MedDialog is a national clinical solution

that allows physicians to communicate electronically with other physicians regarding the care of their patients directly from their EMR.

These digital exchanges allow for a seamless flow of communication among the patient’s care team (including primary care providers and specialists), by eliminating the inconvenience of updating a patient’s chart by making a phone call, or by sending an email through a separate system, or printing hard-copy documents and transmitting via fax machines.

Since the launch of a pilot project in the Ottawa region in July 2017, MedDialog has started to digitally connect physicians using TELUS Health’s PS Suite and Med Access EMRs. The solution will evolve to connect all 20,000 physicians using TELUS EMRs and will be integrated with other software vendors to enable communication with physicians using other EMR platforms.

For further information on MedDialog, visit <http://page.telushealth.com/meddialoginfo>



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Saint Elizabeth Health Care tests AI chatbot that supports caregivers

BY JERRY ZEIDENBERG

MARKHAM, ONT. – More than 30 staff members at Saint Elizabeth Health Care who also care for sick or frail members of their own families have finished a pilot project using Tess, a chatbot powered by artificial intelligence.

Tess offers personalized, mental health-care in the form of education, coping mechanisms and supports for self-care. The computerized solution gives employees a powerful tool for managing their own stress, grief and anxiety.

Tess can be accessed anytime, and uses text messaging or instant messaging applications to coach people dealing with emotional and physical challenges. The chatbot quickly provides feedback and advice that normally comes from a trained therapist.

Tess, however, is remote software that is taught to act like a counsellor, and ‘she’ can actually learn about the person she is coaching over time.

“Thirty-four people started [the month-long trial] and all 34 were still using it at the end of the 30 days,” said Mary Lou Ackerman, vice president of innovation at Saint Elizabeth Health Care, noting they were all very positive about the technology.

They gave Tess a good workout, too – Ackerman observed that over 12,000 text messages went back and forth between Tess and the employees over the test period. Tess helped employee caregivers to build self awareness, set goals, manage emotions such as grief, ask for help and avoid caregiver burnout.

She said that Tess really did learn – while responses were fairly general at the beginning of the pilot, they were very specific and personalized by the end of the 30 days.

Tess often answered messages from employees about exhaustion, acknowledging the strains on them and also reminding them about self-care – urging them not to forget to take care of their own physical and emotional needs, as well

as those of the people they were caring for.

As well, Tess would make suggestions, like building a network of helpers, and not trying to accomplish everything on their own.

If a person is in a serious state of anxiety or depression, Tess will advise speaking with a professional. It will even connect the person to a hotline, to make the appointment.

While it may seem odd to discuss personal matters with what is essentially a machine, Tess responds very much like a person and soon enough, people forget that Tess is an AI program and they treat her like a real person.

And the benefit is that Tess is available anytime – unlike many therapists, who must be booked well in advance for discussions.

Allyson Kinsley, senior vice president of corporate strategy at Saint Elizabeth, commented, “It’s easy to reach Tess, whenever it’s needed. If you’re stressing out in the middle of the night, you can reach Tess right away.”

She added that Tess also provides a “safe environment to vent,” something that’s an emotional relief to many caregivers. “Many of them didn’t want to be a burden to anyone else,” said Kinsley, so they kept their feelings bottled up inside.

With Tess, they could get their feelings out into the open.

Ackerman observed that Tess is also proactive – it will reach out on its own to a user, asking how the person is feeling. “The users really like this about Tess,” she said. “They felt like Tess had their backs.”

Saint Elizabeth is the first organization in Canada to use Tess, which was created by a company in Mountain View, Calif., called X2 AI. The Silicon Valley-based company developed Tess to act like a therapist for a variety of psychological situations, but the caregiver support role was a first for the system.

To ‘educate’ Tess about the needs and issues of caregivers, X2 worked with Saint Elizabeth Health Care’s staff to customize the system, something that only took about two hours. Once set up in this way, Tess then learns on its own, developing



Allyson Kinsley and Mary Lou Ackerman have been leading the test and rollout of the Tess chatbot at Saint Elizabeth.

further expertise about the problems of working people who are also caring for frail parents, children or other relatives.

Because of the overwhelmingly positive reception to Tess, Saint Elizabeth is hoping to include access to the chatbot as a part of its Elizz caregivers in the workplace program, which Saint Elizabeth offers to its own staff as well as to companies across Canada, and internationally.

This newly launched employee support program gives access to online resources, as

well as in-person coaching, and helps working people cope with the pressures of caring for aging parents, ill spouses and disabled children while holding down a job and in some cases, raising a family, as well.

Care-giving can be a huge employee retention issue for corporations, noted Kinsley. “Twenty-six percent of employees take a leave of absence for family care, and 10 percent quit,” she said. Elizz is designed to help them manage the stress of caregiving while simultaneously keeping their jobs.

Casey House goes from paper to EHR

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gone well at Casey House because it has been clinician and user-driven. In fact, the original impetus for the system came from clinicians. “The push came from our chief nursing executive, Karen de Prinse,” he said. “She had been advocating to implement an EHR and the time was right when we started planning a new building.”

Once B Sharp was chosen following an RFP process, de Prinse was closely involved in the planning and configuration of the system, as was Kathryn van der Horden, the inpatient clinical manager. As project committees leads, de Prinse and van der Horden themselves became well-versed in the technology and are now able to assist other users when problems arise.

The committee also included super-users who provided valuable input into how the system was configured. This small group of super-users was involved in every aspect from planning to implementation. When it was time for rollout, the super-users could in turn teach other clinicians and care-givers to use the system and continue to provide support.

Given Casey House’s small size, super-users were also asked to extensively test B Care in a staging environment which gave them an intimacy with the system when it went live. “We asked them to give it a really good workout, to even see if they could break it,” quipped Ali.

This worked well, he said, as quirks or problems in the application could be reported to B Sharp, who then worked on a fix.

Moreover, he said that B Sharp was a good partner. “B Care is designed for inpatient, outpatient and community-based care settings, so they were able to configure and customize it to promote optimal functionality in our diverse clinical settings.

B Sharp staff communicated in many ways; they participated in steering and project committees, prepared status reports, and brought champions and users together.

“Casey House and B Sharp both understand what it means to be a smaller enterprise in a market filled with much bigger players,” said Ali. “Relationships were really important.” B Sharp CEO Robert Lazar noted not only was the implementation done quickly, but it was also cost effective. The investment for Casey House was more reasonable due to the cloud-based nature of the application, which also safeguards security and facilitates upgrades. It also makes it easy to access the solution from any device or location.

B-Care, in addition to its capabilities in charting, eMAR and closed loop medication management, also offers quick access to data. This enables continuous quality improvement – including program evaluation, risk management, and research projects. Clinicians and academics at Casey House are always working to advance treatments and practices for people living with HIV/AIDS, whether it’s the creation or adjustment of a community program, or outcomes measurement of a therapy.

“Our goal is to be a world-class hub for HIV/AIDS care, treatment and knowledge translation,” said McDonald.



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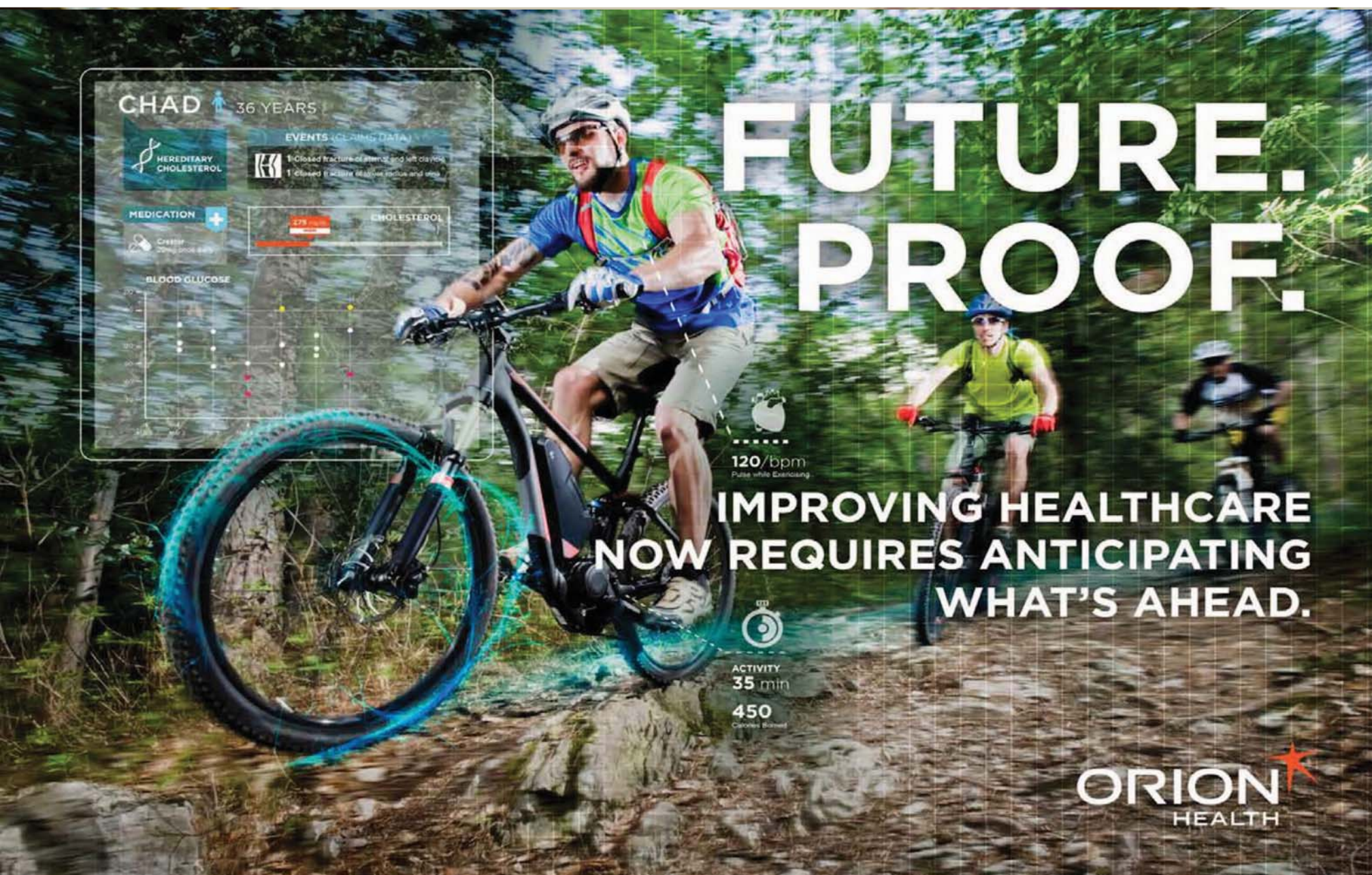
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Computer-aided coding project at Ottawa Hospital reports successes

BY AKEELA JAMAL

At a time of fiscal constraints, coder shortages and demands for more accurate and timely information, hospitals continue to search for ways to leverage technology to maintain and im-

prove the quality of their data. One effective solution consists of automating the coding process.

Cynthia Penner, now Director of Health Records at The Ottawa Hospital (TOH), accepted an offer for her hospital to be a pilot site for 3M's new computer-assisted coding

(CAC) software. At the time, Penner was the Manager of Coding and Data Quality and she was excited about the software's potential, both for her staff and the hospital.

CAC software frees coders from the non-coding tasks of organizing documents and searching for relevant information. It

allows the coder to determine a clinical picture by analyzing text from multiple documentation sources – including the Discharge Summary, History & Physical, Emergency Department Report and Operating Room Report – and conveniently accesses them from a single screen.

As Penner explains, coding takes a lot of time; however, most of the time is not spent coding, but instead, reading reports to find the information to be coded. She felt that the tool would streamline and improve the job of coding and reduce the possibility of human error and omission.

The working partnership between TOH and 3M began in earnest in 2014, starting with document scoping – deciding which documents needed to be included in the tool. TOH has a hybrid patient record – a combination of electronic and scanned paper documentation. A number of documents are not used for coding and can be excluded from being interfaced into the system.

After the document scoping, the implementation team worked to bring the key documents into the software using HL7 interface messages. Once the documents were brought into the system, there was a training session for interested coders. In particular, the day surgery coders were brought on board, as the majority of these documents were electronic.

Penner's first concern was what her team of coders would think. Would they be open to trying new software? Would they think it could lead to job losses?

She says they were reassured by the answers – there would be no job cuts and this tool would make the coders' work less clerical and more analytical. She adds that from the beginning, the support from the Canadian 3M team was continuous and was further enhanced by their U.S. colleagues with extensive experience in implementing CAC.

With tight timelines, the number of documents to review and the complexity of the coding process, it's easy to miss certain codes or not capture conditions at the highest level of specificity.

This can affect the quality of the data, which is used for a number of purposes, including health system planning, funding, research and patient outcome metrics. Penner says that the CAC software assists the coders to get everything they need out of the documentation, "bringing relevant information to the forefront to help them make coding decisions."

The software does not replace the coder's expertise, but builds on it, by recognizing key words and phrases that lead to coding suggestions. The system annotates each document for possible diagnoses and procedures and prompts them to move as far as possible through the software's clinical pathways.

This is accomplished through the use of natural language processing (NLP) – also referred to as computational linguistics or, most evocatively, text mining – to assist coders do their jobs more efficiently, accurately and thoroughly.

The NLP engine in the software can identify and annotate diagnoses and procedures in the documentation, and ensure that con-

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It's 8:30 AM and Victor Olivera isn't feeling well. What started as a slight irritation in the back of his mouth five days ago has evolved into something more ferocious- a runny nose, a sweaty forehead, and a cough that has left his throat raw.

Although usually one to tough it out, Olivera decides to contact his doctor's office to seek advice. He needs to talk to someone who understands Spanish, so he's connected to a Spanish-speaking nurse who asks for details. When did his symptoms begin? Does he have a temperature? What is the temperature, and how long has he had it? Is he coughing up mucous or phlegm?

After several questions, the nurse suggests that Olivera see one of the doctors on call and helps him make an appointment. At the appointed time, 9:30 AM, Olivera arrives in the doctor's lobby. A Spanish-speaking receptionist greets him. "Welcome," she says. "We have a questionnaire for you to fill out before your appointment begins."

Olivera receives a customized form that already lists the medications he is taking and the date of his last physical exam. Is the list of medications current? Has he had a flu shot this season? How much does he currently weigh? The form lists a series of symptoms and asks whether Olivera is experiencing any of them.

Has he experienced any sudden weight gain or loss recently? Any dizziness? Any trouble sleeping? Once he's returned his questionnaire, Olivera waits in the lobby, tapping his foot to the music playing in the background.

A few minutes later he sits facing Dr. Montoya, who begins the exam by quickly reviewing Olivera's most recent medical history: the results of his last bloodwork tests, notes on his last physical, and the just-updated list of medications and supplements. She peers closely into Olivera's face, into the whites of his eyes, and asks him to open his mouth, then cough.

"It sounds like bronchitis," she says. "But to be sure, I need to listen to your lungs. And I might need to take an x-ray to be sure we're not looking at

pneumonia. Can you come by in person this afternoon?"

Olivera's interaction with his doctor is like many routine visits, with one major exception-it takes place virtually

Olivera contacted his doctor's office by signing into his health web portal and clicking on a button labeled "I don't feel well" in Spanish, the language Olivera set as his account preference.

The "nurse" who popped up in a window to ask questions via instant messaging was actually a bot



following an automated script. Based on Olivera's answers, the bot's algorithm determined that he should speak with a doctor.

After validating Olivera's insurance, the web portal displayed available Spanish-speaking doctors in his network, along with their available timeslots and the co-pay amount. When Olivera selected "9:30 AM" on Dr. Montoya's schedule, the appointment appeared on his Outlook calendar, with a reminder set for 9:25 AM.

When he heard the calendar reminder chime go off on his iPhone, Olivera sat in front of his laptop and once again signed into the portal, which displayed the appointment information next to a button labeled "I'm here for my appointment."

After he clicked on the button, the portal ran a test on his equipment. As soon as the test confirmed

that Olivera's video camera was functional, a receptionist bot appeared to welcome him. Olivera's screen then displayed the questionnaire, which he filled in. After he pressed the "Submit" button, he found himself in a virtual lobby. He explored a live news feed that appeared on his screen as "doctor's office lobby" music emanated from his speakers.

Just as Dr. Montoya completed her 9:00 AM appointment, another virtual consultation, a notification appeared on the dashboard of the web app that serves as her daily taskmaster. Her next patient had arrived. Dr. Montoya reviewed Olivera's electronic medical records, along with a transcript of his first chat session with the bot and his answers to the questionnaire.

She then clicked on a button labeled "Start appointment" to launch a video session with the patient. The technology that makes this scenario possible is one that millions of consumers and professionals use every day: Skype.

"When we talk to health providers, they are both startled and amazed to learn about all the ways they can use Skype for Business that they didn't know about," said Paul Smolke, Senior Director of Productivity for Worldwide

Health at Microsoft. "What blows their minds is that you can't even tell it's Skype. It's just part of the workflow." Microsoft customers and partners are already using Skype for Business to enable virtual health scenarios that promise to increase access to care, increase care team efficiencies, and lower costs.

Virtual health solutions can help health organizations reach more patients, particularly underserved populations. "Imagine people in rural areas, where the closest hospital or clinic might be hours away," said Smolke. "Through virtual visits, people can consult with doctors from home. They don't even need a computer or internet access. They can just use their mobile phones."

Find out more about Skype and virtual visits by downloading the free eBook at the link below.

Durham College offers degree to bridge medical technology and leadership

BY RICHARD TIDMAN

The new medical technologies responsible for the ongoing transformation of healthcare systems are often credited, alongside incredible clinical breakthroughs, for extending both the

quality of patient care and lifespans. It is also within this framework that society has come to expect financial accountability, unrestricted access to modern medical technology and continuously improving levels of patient care.

This raises a question: in the presence of

these fantastic technologies, why are quality gains often diminutive for such extraordinary costs? At the core of this query is a fundamental disconnect between the user and the technology.

As healthcare continues to surge ahead in its rapid transition to a technology-dri-

ven industry, it leaves in its wake an ever-widening gap between new and innovative medical technology and those tasked with integrating such technology into their organizations.

This has left healthcare, by and large, calling out for new professionals who can close this gap. At Durham College, where I am a program coordinator and professor with the School of Science & Engineering Technology, we're not only heeding this call, we are answering it.

Based in Oshawa, Ontario, Durham College is the first institution in Canada to offer a degree developed in specific response to the need for a new kind of healthcare professional. The Honours Bachelor of Healthcare Technology Management (BHCTM) is designed to address the evolving crisis that sees existing medical professionals as unequipped to manage the ongoing changes demanded by technology-intensive organizations.

In fact, similar stresses can be felt across the entire supply chain, ranging from the group purchasing organization to the point of care. There is a struggle with the complexity of decisions at every stage of a technology's lifecycle that is compounded by the fact that there is virtually no comprehensive means available to medical



Durham College's Rick Tidman

professionals to help them acquire the necessary cross-disciplinary skills.

In addition, promoting from within might no longer be a viable option as evidenced in the preference for management degrees, in addition to the skills of the functional specialist.

Already an established academic leader in Biomedical Engineering Technology, with graduates who are continually sought after by healthcare industry leaders, DC is well-positioned to lead this innovative new program of study.

Recent discussion with a group of registered practical nurses (RPNs) has also revealed an increased desire to offer RPNs the opportunity to move beyond the point of care to the management level. The college is working diligently to map entryways into the program for them and others already working in the field.

Graduates of the BHCTM program will fill an identified industry gap and deliver solutions to a genuine and expanding problem. The transition of healthcare to a technology-dependent industry requires new leadership with the appropriate cross-disciplinary skills to succeed. The time for a degree in healthcare technology management has arrived.

Richard Tidman is a professor and program co-ordinator with the School of Science & Engineering Technology at Durham College.

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SCAN Health positions Canada as leader in supply chain innovation

BY KATHRYN COX

In September, SCAN Health organized and delivered the inaugural SCAN Health Annual Global Networking Event, in St. Louis, Missouri. The conference was hosted by the Healthcare Transformation Group (HTG), whose members include Mercy Health System, Kaiser Permanente, Intermountain Health, Mayo Clinic and Geisinger Healthcare.

For its part, the Supply Chain Advancement Network in Health (SCAN Health) was created to accelerate the transformation of the health system supply chain into a strategic asset. It is working to optimize value and achieve safer healthcare for Canadians and global populations.

Headquartered at the University of Windsor's Odette School of Business, SCAN Health is an international knowledge translation organization funded by the Government of Canada, Networks of Centres of Excellence (NCE).

At the event in St. Louis, over 70 leaders in healthcare, policy, industry and academia from four countries – Canada, the United States, the United Kingdom and Australia – exchanged insights about the adoption and transformation of the health sector supply chain.

Following a presentation of how the HTG members collaborate to create supply chain standards across the United States, Dr. Snowdon moderated a global panel of



Dr. Anne Snowdon, Scientific Director and CEO of SCAN Health, with health system leaders, Dr. Charles Alessi (UK) and Mr. Paul Broadbridge (Australia). They are pictured at the annual conference, in St. Louis, Mo.

speakers as they described their respective country's journey and the motivation towards supply chain transformation.

The NHS Scan4Safety program by the UK's Department of Health was outlined by Dr. Charles Alessi, strategic advisor to Public Health England. The promising initiative has reported improvements in patient safety, operational productivity, cost-savings and supply chain efficiency.

Dr. Alessi was joined by Brent Diverty, vice president of programs with the Canadian Institute for Health Informatics, who brought a Canadian perspective on using

data in an efficient, actionable way to support the measurement of health systems and accelerate the adoption of global standards.

Dr. Stan Huff, chief medical information officer at Intermountain Healthcare, focused the discussion on patient safety and medical error, bringing light to the staggering 400,000 patients that die every year in the United States due to medical errors.

Finally, Dr. Peter Vaughan, board chair of Canada Health Infoway and Nova Scotia's former deputy minister of health, discussed the current opportunity to break down silos between industry and healthcare to accel-

ate supply chain transformation. Dr. Vaughan identified SCAN Health as the bridge to optimizing efficiency and safety in the global health sector supply chain.

The SCAN Health Global Networking Event also brought together a panel of world-renowned leaders in industry to share their knowledge of supply chain processes and identify how this expertise could be mobilized.

The industry panel of senior executives included Dennis Black of BD, Peter Brereton of Tecsyst, Karen Conway of GHX, Darrell Johnson of Medtronic and David Reed of Cook Medical.

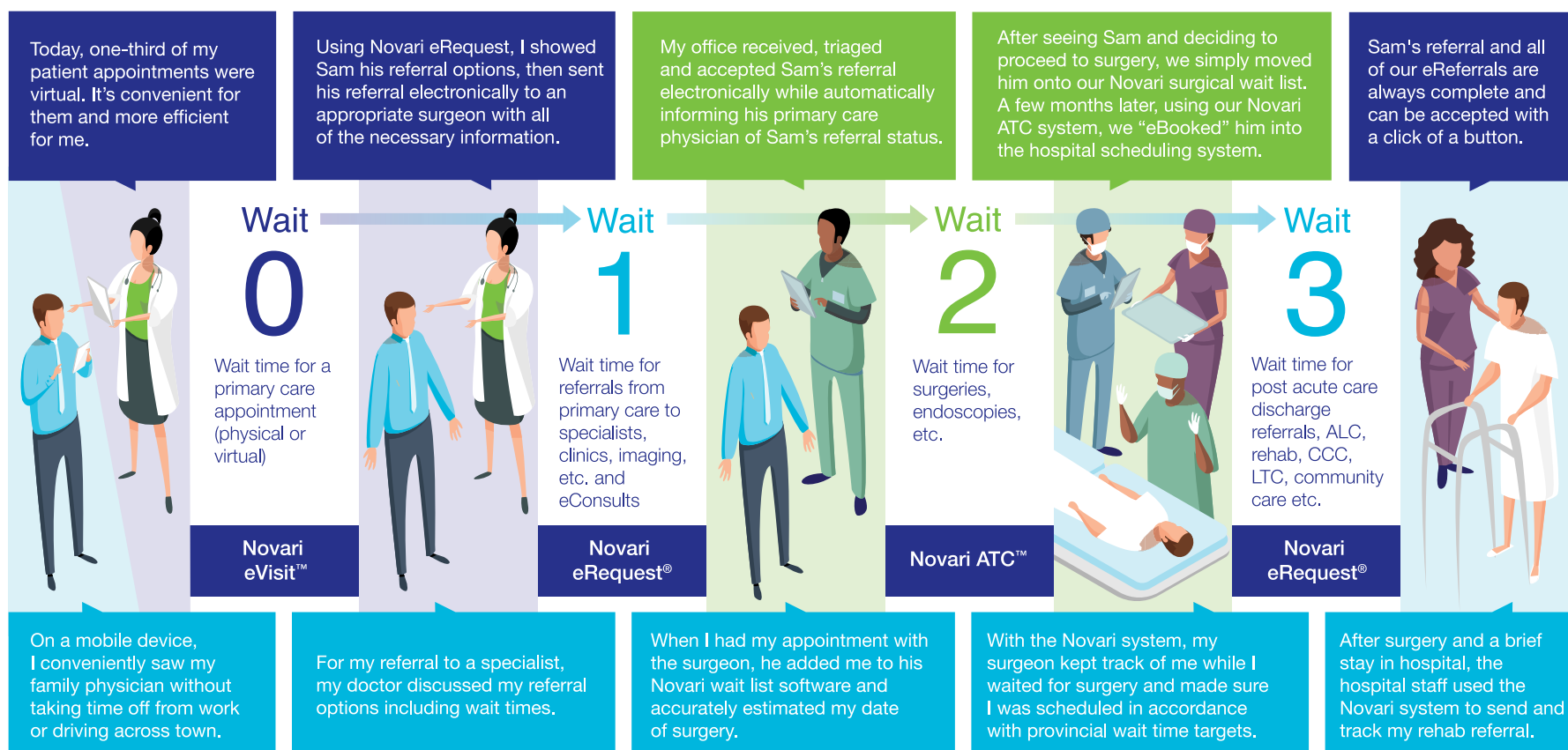
To learn more about SCAN Health and to discover the findings and knowledge from the SCAN Health Annual Global Networking Event 2017, please visit www.SCANHealth.ca.

On a separate note, SCAN Health recently launched its first SCAN Health Design Competition: Supply Chain Solutions for Global Health Systems. A call for Expressions of Interest has been released and applications will be accepted until November 17, 2017.

Registration information and challenge details can be found at www.SCANHealth.ca.

The SCAN Health Business Case Competition, a competition involving over 35 business schools from across the SCAN Health Network, will be launched in the New Year.

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RPM project in Quebec dramatically improves lives of diabetic patients

BY ANDY SHAW

RPM, an acronym more associated with what gives your car its zoom-zoom than with revolutionizing home healthcare. But Remote Patient Management promises to do just that. And

nowhere more so in Canada than in Quebec, where RPM is piloting a quiet revolution in lower cost healthcare and happier patients via Orion Health's telehealth technology and know-how.

Orion Health developed an internet-based RPM solution for the Quebec Min-

istry of Health and Social Services, which launched it in November 2015. The Orion Health RPM has demonstrated that it can substantially reduce emergency department visits and at the same time decrease patient hospital stays.

In its simplest form, RPM collects pa-

tient medical data in one location and transmits this information electronically to clinicians elsewhere for analysis and recommended treatment.

Orion Health has integrated its RPM technology into its Population Health Management stack and has made that data exchange more sophisticated, says Orion Health's executive VP for Canada, Gary Folker. "We've proven, for example, that RPM provides more efficient treatment of the chronically ill cohort, the 5 percent of the population who account for 60 percent of healthcare costs. The return on investment in RPM is high for them."

Proof of the Quebec RPM pudding is in the very human hands of Dr. Ariane Godbout, an endocrinologist and researcher at the Hôpital St-Luc, part of the Centre hospitalier de l'Université de Montréal (CHUM), where Dr. Godbout is an associate professor.

She also specializes in the care of pregnant women who have gestational diabetes, a disease on the rise everywhere, and who form one of the targeted groups in the Quebec RPM deployment. Another targeted group is also in the hands of an endocrinologist, a colleague of Dr. Godbout, and targets the larger population of chronic diabetics. There are other deployments in the province targeting other chronic diseases like COPD, heart failure and others. As of today, just shy of 3,000 patients have gone through the Quebec RPM program.

Dr. Godbout's group of over 300 gestational diabetic women have used either an electronic tablet given to them or their own computer to reach the RPM portal. There they register their daily health activities, in compliance or not, with their care plans.

What the RPM team is looking for in that data are signs of deteriorating health. What the patients can look for is reliable information about their condition and how to live better with it. In effect, the RPM is a sidekick to the patient, available to them anytime and making it easier to adhere to treatment plans and medication regimes.

By checking in regularly, patients remind themselves when to take their medications and which symptoms to watch out for, as well as receiving tips on lifestyle habits to keep them out of hospital.

At the caregiver end, an RPM algorithm will alert a monitoring nurse with a red flag if, for instance, a patient's sugar levels suddenly jump out of normal range.

The nurse can then contact the patient immediately with remedial action. Patients can also reach out to that nurse with questions about their care in an email. This interactive nature allows Dr. Godbout and her staff to adjust each patient's care regularly and judge how well patients are learning to live healthier lives on their own.

As a result, almost all patients involved in the Orion Health RPM deployments have complied with their care plans. The early conclusion is that when an RPM empowers patients with the right tools to take control of their own health, they do so willingly.



Dr. Ariane Godbout



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Live 3D guidance from Siemens Healthineers improves EVAR accuracy

BY DIANNE DANIEL

MONTREAL – A new technology developed by Siemens Healthineers in collaboration with researchers at the University of Montreal Hospital Centre (CHUM) and Dalhousie University in Halifax is adding a third dimension to life-saving endovascular aneurysm repair (EVAR), giving vascular surgeons and interventional radiologists a more realistic picture of the anatomy they're working on.

EVAR now accounts for more than half of all abdominal aortic aneurysm repairs performed in Canada each year, and 78 percent of repairs in the U.S.

Not only are endovascular procedures outpacing open aortic surgeries, but patient cases are increasingly complex, giving rise to the need for better three-dimensional (3D) images to help guide surgeons as they position endografts (stent-graft or covered stent), in the aorta. The better they know the exact anatomy of the aneurysm and its surroundings, the better the outcome.

"If you don't have a good fit, you may have a leak," said Dr. Gilles Soulez, radiologist and professor at the University of Montreal, noting that good imaging is critical.

According to the Canadian Society for Vascular Surgery, abdominal aortic aneurysm is a significant cause of death in Canada, most common in men over 65. Approximately 20,000 people are diagnosed each year, 10 percent of them with a life-threatening case from a rupture if not treated.

Once an aneurysm reaches a threshold of five centimetres, it is usually considered necessary to treat. Surgeons start with 3D

computed tomography (CT) scans to ascertain the size and location of the aneurysm, and to ensure patients meet EVAR eligibility criteria.

In particular, they examine the anatomical details and measurements of the aneurysm, the aorta and the iliac arteries in order to define a good landing zone for the stent, typically below the renal arteries in a healthy part of the aorta.

During the actual endovascular procedure, however, surgeons rely on two-dimensional (2D) imaging to guide them, using fluoroscopy and conventional digital subtraction angiography (DSA) to position the stent, and injecting iodine contrast to see the lumen or inside space of the aneurysm and arteries.

The challenge, noted Dr. Soulez, is that on the fluoroscopy image the aneurysm is not visible. Only the lumen of the aneurysm can be opacified following injection of iodine contrast agent, which can be potentially nephrotoxic through a catheter.

In addition, the delivery catheters inserted through the femoral artery during EVAR are stiff and often deform the iliac arteries and the aorta as they are advanced. Even though surgeons use the CT images from the planning stage to help navigate the guide wire, those images may not be an accurate representation because they won't show the deformation of the vasculature induced by these catheters, explained Dr. Soulez.

The product developed by Siemens Healthineers, called *syngo* EVAR-Guidance, alleviates both drawbacks.

Essentially, it overlays 3D images on top of live fluoroscopy, using image segmenta-



Dr. Gilles Soulez, radiologist at the CHUM and professor, Université de Montréal.

tion software to provide a more detailed rendering of an aneurysm and its surrounding anatomy in colour as seen on the pre-operative CT.

The 3D model can be fused with the live fluoroscopy using either Siemens Healthineers' 3D *syngo* DynaCT to obtain soft tissue information or two orthogonal fluoroscopy acquisitions.

A new three-dimensional plan is then prepared at the computer workstation and is overlaid on top of the fluoroscopy images. The new model is also synchronized with the C-arm fluoroscope.

"If I move the C-arm, the model moves at the same time," explained Dr. Soulez. "There's complete synchronization between the literal model from the *syngo* DynaCT and the actual intervention you are doing." The overlay can be corrected if

necessary after each fluoroscopy acquisition with contrast injection.

The result is an optimal view of the anatomy that ultimately improves the accuracy of the repair, resulting in a good stent fit and reducing the likelihood of a leak or rupture in the future. Patients also benefit from reduced contrast load and less exposure to iodizing radiation, said Dr. Soulez.

"You will still inject some contrast when you do the procedure, but it has been shown in several applications that when you use this technology, you minimize the fluoroscopy time and iodizing radiation exposure because we use less contrast," he said.

What sets Siemens Healthineers' approach apart from others, he added, is that the segmentation software developed is able to provide accurate information pertaining to the surface of the aneurysm, including the walls and the lumen (inside channel). The result is the ability to create a 3D mesh that accurately depicts the different component of the aneurysm, providing a better representation of what is actually going on inside a patient.

Over the past seven years, Dr. Soulez estimates the Centre Hospitalier de l'Université de Montréal (CHUM) has performed about 80 abdominal aortic aneurysm repairs using a *syngo* EVAR-Guidance prototype.

Now the research team is working to improve the procedure further by, first, developing a prototype that will correct the deformation of the vascular structure induced by the catheters. And, second, developing a 3D simulation of the biomechanics of vascular structures, catheter and stent-graft to further improve accuracy.

"The next step is to develop a completely virtual EVAR procedure for rehearsal," added Dr. Soulez.

Computer-aided coding project at Ottawa Hospital

CONTINUED FROM PAGE 8

ditions are not overlooked by the coder when reading through the patient's chart.

It links many diagnosis and intervention codes together. Algorithms and models allow the software to start with existing sources of knowledge, analyze new data, and improve its own capabilities; in short, the more an NLP platform is used, the smarter it gets. It all leads to improved productivity and accuracy in the coders' output.

Penner notes that TOH is still in the early stages of adopting the 3M CAC software. The day surgery coders are using it; the inpatient coders are using the software as a quality check. She said that it doesn't change the way the coders code – it enhances their efficiency by streamlining their workflow.

It also increases coder satisfaction, because it enables them to put their analytical skills to better use. At the same time, it's aiding accurate, complete and compliant coding, which helps improve the quality and timeliness of the data. She looks forward to the future – in this case, in the next three years – as TOH's health records become fully electronic.

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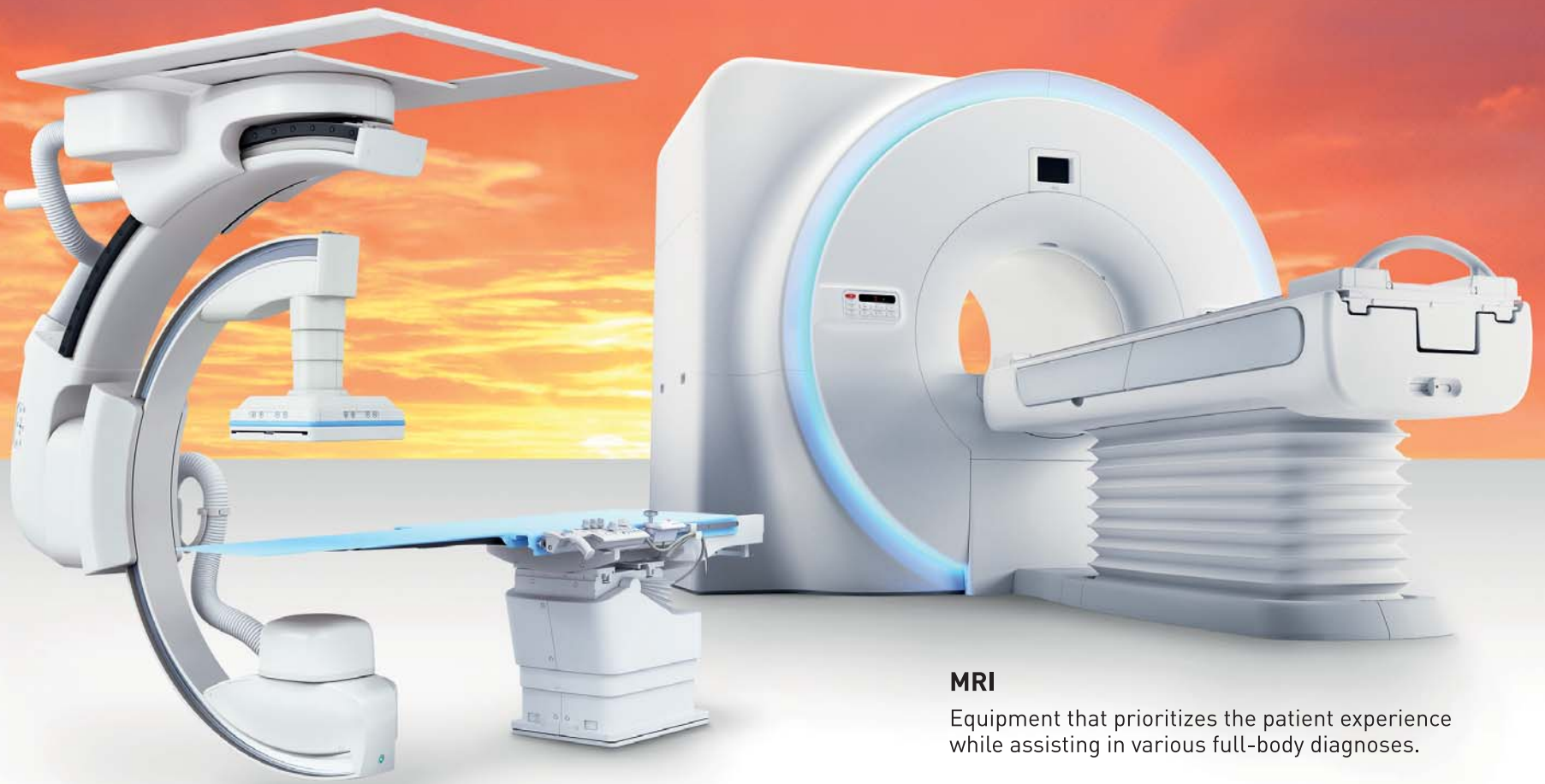
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Apps of the future will be prescribed to patients by their care-givers

BY JOSEPH CAFAZZO
AND JESSICA FIFIELD

TORONTO – More apps than ever are not only being recommended by healthcare providers, they are actually prescribed as part of their care.

This means more than it might seem. These apps are connected to the clinic, and information will flow both ways. Care decisions are made collectively, with the patient far more engaged and active than ever before.

It wasn't that long ago that physicians really didn't see a need for patients to have easy electronic access to their personal health information. That has certainly changed in recent years, with patient portals emerging across the country.

Much remains to be done to improve the content and context of patient portals, and their role is likely to be more important in the near future than it is today.

Prescribed mobile health apps can take the utility of patient portals to an entirely new level. Targeted to a specific chronic illness, the apps will be used as personalized digital companions that offer access to contextualized, actionable information. They will also provide tactics to manage their conditions, and links to their care teams.

In this way, patients are care-givers and can become more proactive.

Clinicians are recognizing this and embracing mobile applications as an extension of treatment. So much so, that the latest generation of our apps are designed with the intent that they will be prescribed.

Currently, the clinic provides the patient an orientation to the app, but training shouldn't be necessary if the app is well designed with human-centered principles. Eventually, enrolment can be achieved by the patient alone through access to the patient portal.

For patients who require more assistance, a digital pharmacy could provide fulfillment and assist with providing access to



Ned provides continuity of care for prostate cancer survivors. Separate patient and clinician apps provides convenience to connect on symptoms and wellness. For the first time, lab results are retrieved from OLIS, enabling access for patients from across the province.

digital health peripherals, such as a blood pressure monitor, a weight scale, or a Fitbit.

Our team at UHN, consisting of designers, developers, human factors engineers, and researchers, have been working on realizing this vision by translating a decade of clinical trial learnings into a suite of apps for the self-care of chronic illness.

Medly, our app platform for those with multiple chronic conditions, is currently being prescribed by the Heart Function Clinic at University Health Network. Patients have been prescribed the mobile app which monitors patient vital signs and symptoms.

An algorithm determines the status of the patient and alerts the patient and clinic as needed. The system is able to detect problems before they become serious, creating peace-of-mind for patients, their families, and their care providers alike.

Ned, our prostate cancer survivorship application, will soon be prescribed by a number of oncologists in Ontario. Keeping these patients engaged and regularly reporting their symptoms is a challenge. Ned addresses this by prompting the patient regularly for status through widely used symptom surveys and also receives their PSA lab results with trends and interpretation.

In a first for patient access in the

province, these lab results are fed directly from the Ontario Lab Information System (OLIS), and not through community lab systems or the hospital. The prospect of access to systems such as OLIS opens up the possibility of province-wide deployments. Stay tuned for more announcements of OLIS-enabled apps in the future.

Another app that will benefit from this improved access to clinical data is bant, our diabetes management platform, with its ability to track physical activity, meals, and record blood glucose levels via Bluetooth integration.

By creating a complete dashboard about their care, and by providing access

to their data from a seamless, secure provincial database, patients will be given opportunities for self-care that would not have been possible before. bant, will launch with this new functionality on both iOS and Android in the New Year.

Like any next generation of technology, barriers to integrate data from multiple sources are numerous. What is needed is the creation of a pathway, where applications can access and merge healthcare data, and eliminate the blind spots of privacy and security policy of personal health information.

In turn, such a pathway will lead to an ecosystem of prescribed apps, giving clinicians, patients and their families a completely new way to interact with one another outside of the traditional provision of care.

There are times when we need to reinvent the way we work. In healthcare, we are facing those times. There is no moment better to create technologies that let people live well despite serious chronic illness, and to have them achieve a level of independence that has never been possible before, when we thought of patients as simply passive participants in their own care.

Joseph Cafazzo is Lead, at eHealth Innovation, an organization previously known as the Centre for Global eHealth Innovation; Jessica Fifield is Communications Coordinator.

Joule, CloudDX aim to bring VR to hospitals

OTTAWA – Joule, the Canadian Medical Association's accelerator company, has announced a new partnership with Cloud DX, the award-winning Kitchener, Ont.-based digital healthcare and artificial intelligence (AI) innovator. The goal is to bring advanced technologies, such as virtual reality, into the hospital sector.

"In today's exponential age of digital and mobile health, AI platforms and new technologies like the Cloud DX Vitaliti monitor are becoming indispensable tools for improving patient outcomes. There is a worldwide shift in medicine to include sensor technologies, as physicians and patients focus on preventative treatments and actionable information," said Dr. Brian Brodie, Chair, Canadian Medical Association.

"Technology is changing the way Canadians will receive healthcare tomorrow and the development of the Cloud DX Vitaliti platform is bringing us one step closer to experiencing a futuristic clinical user experience, today."

Developed by Dr. Sonny Kohli and the Cloud DX team as Canada's entry in the recently-completed Qualcomm Tricorder XPRIZE competition, the Vitaliti is a wearable medical device that continuously records a patient's vital signs, collects data on symptoms, and uses artificial intelligence to autonomously diagnose 19 separate health conditions.

At the recent Singularity University Canada Summit, Cloud DX revealed a new mixed reality (virtual and augmented) application for clinical triage and decision support. By connecting Vitaliti to Microsoft's HoloLens, doctors will be able to

see a live 3D holographic display of the patient's vital signs in the HoloLens headset.

"In the not-so-distant future, we believe that automated, hands-free, mixed reality displays like the Microsoft HoloLens will enable doctors to quickly triage patients and decide on treatment options faster," said Dr. Sonny Kohli, Chief Medical Officer and Co-Founder, Cloud DX. "Vitaliti is meant to address capacity problems within our healthcare ecosystem by solving them through non-face-to-face innovation."

"This technology can also be used in remote and rural communities or from

Automated, hands-free, mixed reality displays like the HoloLens will enable doctors to quickly triage patients.

someone's home when access to care is more challenging. In a country as vast as Canada, these resources can have a life-saving impact on Canadians."

The Vitaliti vital sign monitor is in clinical testing prior to approval by Health Canada, and the first commercial version of the technology will become accessible in 2018. Meanwhile, Cloud DX provides patients with at-home Connected Health diagnostic kits and subscription-based services that are medical quality, Health Canada licensed and already in-market.

Data from these kits can act as an early-warning system for patients going into crisis, assist in keeping immune-compromised patients out of hospitals.


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Big data can be used to help understand the impact of genes on disease

Genetics are becoming increasingly useful when diagnosing diseases. But the science is complicated.

BY JOEL DIAMOND, M.D.

There is myth about genetic destiny: If you have a gene associated with a disease, you will get that disease; If you don't have it, you're safe. It turns out that simply isn't true. This limited view doesn't account for genetic cause and effect.

Other genetic information contributes to your likelihood to develop inherited conditions. For example, studies have shown that there are regulator genes and proteins that "turn on" or "turn off" other genes.

Other studies show that having a gene may not mean anything unless it is transcribed. Research is also identifying variants of all kinds, but we don't yet know what they mean or how they might be expressed in individuals or future generations.

Following genetic expression across generations: Tucked away in an isolated area of northern Sweden, there is a collection of small villages known as Överkalix. The region is home to people who can trace their ancestors back to the 15th century, when the area was first settled.

One descendent is Lars Olov Bygren, a researcher at Sweden's Karolinska Institute. His interest in the lifelong effects of nutrition led to some fascinating research that followed Överkalix residents across generations, proving environmental conditions can permanently change gene expression.

The research joins a growing body of work in a field known as epigenetics. This is the study of inherited changes to gene expression, while the underlying DNA sequence remains unchanged. It means that individual lifestyle and environment can "turn on" or "turn off" genes in later years, or even in later generations. Or as Bygren has described it, "early influences that give late replies."

Överkalix villagers depended on a good harvest every summer to make it through the long, dark Scandinavian winters. Some years were better than

others, and Bygren's team of researchers wanted to analyze the effects of feast or famine over time.

Given the abundance of community records, and the relatively genetically isolated nature of the region, Överkalix was a perfect subject for research.

They tracked about 100 males born in 1905 across generations, and found a startling correlation with the participants' grandfathers. Bygren's research found that grandsons of men who experienced a famine season just before puberty had a longer life

What we inherit from our parents and grandparents is not a simple one-plus-one-equals-two formula. Genomic information is complex and nuanced.

expectancy than the grandsons of men who lived in times of plenty just before puberty. The difference in the grandsons' average lifespan was an astonishing 32 years.

The findings show that the nutritional environment doesn't just affect the current generation, but can in fact be handed down. It begs the question: Are there other life choices we're making that will affect the genetic expressions of future generations? Early epigenetic research would suggest it does.

Dr. Joel Diamond, 2bPrecise's Chief Medical Officer, formerly served as CMIO and Chairman of the Physician Advisory Board at the University of Pittsburgh Medical Center, St. Margaret Memorial Hospital. He helped develop dbMotion, a solution for data exchange, and later became CMO for Population Health at Allscripts Healthcare.



It's yet another reason we cannot fall for the myth of genetic destiny. What we inherit from our parents, grandparents – and even ancestors – is not a simple one-plus-one-equals-two formula. Genomic information is complex and science continues to discover new layers and nuances every year.

How a beaver will help unravel the mystery of autism: In celebration of Canada's 150th birthday, researchers mapped the genome of one of the country's most iconic animals, the beaver. The team at The Centre for Applied Genomics at The Hospital for Sick Children (SickKids) in Toronto was testing a new de novo sequencing method, which assembles a gene map from scratch instead of using a reference genome.

The project was more than symbolic. The technique used to map the beaver's genome can offer scientists a new vantage point from which to view genetic variations. The insights of looking at a new species may hold the key to discovering complex variations in human diseases.

The human genome still holds many mysteries.

While we've made huge strides in mapping and sequencing, it can be frustrating when we don't have a reference genome for certain combinations of variants. Solving these mysteries will take diligence, creative thinking and new discoveries – de novo sequencing may be an important tool.

Autism spectrum disorders represent a continuum of diseases that are complex and enigmatic, in part because they do not follow a monogenetic pattern. Research has found that 83 percent of autism is inherited. However, researchers have not identified one genetic trait or variance that leads to autism, but rather a multitude of environmental and genetic factors. Understanding autism will re-

CONTINUED ON PAGE 30

REBOOTING eHEALTH

New sayings laden with unexpected meaning

BY DOMINIC COVVEY

Spoonerisms! Pretty much everybody has heard about William Archibald Spooner and his strange dyslexia, more properly called a dysgraphia. He seemed to have difficulty making a clear distinction among words or the sounds that make up words.

He is famous for saying things like "I am a bird watcher", while meaning to say "I am a word botcher".

He even carried out actions that were mixed up in similar ways. One example was that he remarked how dark it was on the stairs, before turning out all the lights and leading someone down in the dark. I also read that he once asked someone,

"Was it you or your brother who was killed in the war?" Utterly amazing!

Among my many other impairments, I have poor hearing, very frustrating to others and even to me, so that I soon will need to begin wearing Dolby Surround Sound speakers arranged over my ears. Well, maybe I'll just get hearing aids.

Meanwhile, between this impairment and my somewhat twizzled brain, I have unintentionally invented a bunch of phrases that made me chuckle and seemed to have the same effect on others. I will share them with you, along with a few messages relevant to our field.

My first is "go over to the dork side". Of course, many technically-oriented folks in our field do this and

it can be cute, but also frustrating for normal human beings. Technically sophisticated people often drive others crazy with their infinitely detailed knowledge and concert-level fingering on the computer keyboard.



Dominic Covvey

I have witnessed a number of these sophisticates showing physicians new technology or applications they developed. Their performance is Rachmaninoff-level, but sometimes disconcerting to observers.

I'm not saying that cyborg-level integration with technology is intrinsically bad. However, it might be good to 'dumb down' a little for ordinary human beings. The objective is to elicit their participation, not convince them of their lack of talent.

Let's consider another distorted phrase: "a satisfying textual experience". This came to me one day while watching a group of youths sitting together. All of them – despite being side-by-side – were texting on their e-phones, sometimes to each other!

In fact, I have two friends (economics profs) who do that at breakfast and emit unanticipated guffaws about whatever electronically passed between them. I think we tend to

CONTINUED ON PAGE 30

Data and documentation standards – more is not necessarily better

BY LYNN NAGLE AND PEGGY WHITE

Nursing care is vital to improving clinical outcomes for people across the healthcare system, yet nursing documentation using electronic health records today is often burdensome and does little to support evidence-informed practice.

Many clinical information systems have been built by digitizing existing paper documentation without a review and reassessment of what nurses and other clinicians are documenting.

In many organizations, historical clinical documentation practices have endured and reappeared in electronic health records with little consideration of the overall usefulness of some data elements, forms and/or tools.

While information that supports the evaluation of interventions and provides direction to improve clinical outcomes is essential to providers and patients alike, much extraneous data of questionable value is gathered and documented in every setting across the country.

And as external organizations have mandated additional data reporting, healthcare organizations have been inclined to simply add on to existing documentation – often leading to duplicative work for clinicians, usually nurses.

This current approach to nursing documentation, where ‘more is better’, does not always add value to clinical practice and can take valuable time away from direct patient care.

If clinicians have multiple screens to click through to complete an assessment, they tend to become frustrated, and often fail to take a holistic approach to patient care.

While clinicians are frequently required to complete several risk assessments (e.g., falls, skin breakdown), they often lack the time to follow up on specific issues through care plan development and practice interventions and evaluations.

It is time to move away from task-oriented “documentation for the sake of documentation” to a model predicated on the use of information to inform practice improvements. To date, the potential of electronic health records to achieve this goal has been largely unrealized.

A well-designed information system can facilitate the efficiency of clinical documentation through the integration of interprofessional assessments, interventions, and evaluations, and elimination of duplicative efforts.

At the present time, the documentation of nursing practice: assessments, interventions and outcomes are not easily compared or analyzed within and between care settings because of differences in approaches to documentation, measurement and reporting.

Clinical data standards are essential to optimizing documentation for nursing and other members of the healthcare team. Clinical data standards provide valuable information to support the evaluation of patient progress from admission to discharge and transitions from one sector to another.

Clinical data standards will allow for in-

dividual, unit, departmental and organizational level reports that can support all clinicians to evaluate the impact of their practice on clinical outcomes.

The National Nursing Data Standards initiative Clinical Working Group is focusing on the development of a toolkit for the

standardization of nursing documentation in Canada. The principles of the toolkit will focus on:

- Identifying essential information for inclusion in admission and discharge assessments
- Reducing duplication of data collection

- Collecting information to facilitate discharge and care transitions.

Lynn Nagle, PhD, RN, and Peggy White, RN, MN, are the co-leads for the National Nursing Data Standards initiative. See: <https://cna-aiic.ca/en/on-the-issues/best-nursing/nursing-informatics>



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The ROI of infection prevention and control: How to assess the impact of new solutions

Insightful work has been done to assess the cost of hospital-acquired infections, but more is needed.

BY NIAL WALLACE AND FRANK NAUS

A wise colleague, Dr. Michael Gardam, who works at the University Health Network in Toronto, taught us a very valuable lesson about infection prevention and control. In a public forum, he asked people to take a contrarian view and to describe the ideal environment that could be built to spread infections.

The audience answered with insights such as: putting a significant number of sick people in one building, not ensuring a clean/hygienic environment, moving patients around, using a judicious amount of antibiotics for a significant period, complying poorly with best practices, breaking the skin with incisions, frequently touching others with our hands, allowing visitors to come inside without rigorous cleaning/disinfecting, or even putting a coffee shop in the lobby to encourage more outside traffic in for lunch ... the list goes on and on.

And as you go through that exercise, you start to realize that we have just built a very typical Canadian hospital!

It is a simple, yet incredible teaching moment that never fails to open eyes. We have created a great environment to spread infections, and our best defense comes down to rigorous compliance with established infection prevention and control best practices – which in many cases we don't do very well.

Given that we have created this ideal environment for the spread of infections, and are generally poor at addressing the risks, what is the path forward?

Investment in new healthcare technologies that target infection control is one area that can quickly and positively contribute to much better infection prevention, safety, and quality. Amazing solutions continue to be developed in Canada (one of the legacies from the SARS epidemic), and to be introduced from other countries where they have very successful track records.

However, despite a strong evidence base of effective outcomes from many of these technologies, adoption in Canada continues to be weak. For many reasons, the ability of Canadian healthcare institutions to become early adopters of infection prevention and control solutions is extremely limited.

So, let's examine the financial impact of nosocomial infections on healthcare systems, and identify a path forward when making the case for the adoption of infection prevention and control technology.

The challenge of ROI: While there is an administrative, policy-driven and moral responsibility to ensure that patient and workplace safety related to nosocomial infections is improved – the economic incentive is unclear. There remains a lack of clarity regarding the financial return on investment in infection prevention and control among Canadian hospitals.

If we accept that the financial realities of the Canadian healthcare system discourage adoption of innovations that will make a significant difference in the quality of care and safety of patients and healthcare workers, what are the steps that can be taken that will better make the case for these investments by the healthcare system?

The current Canadian healthcare fiscal environment involves providing care with limited resources. Lack of financial clarity – and who benefits from these investments – contributes to the slow pace of infection prevention and control technology adoption.

While nosocomial infections can place additional financial and operational burdens on a hospital or healthcare institution, these are not well-accepted or quantified. Additionally, many of the healthcare costs associated with infections impact provincial healthcare systems post-discharge – in many cases, over a number of years.

As an example, Levy et al.¹ (2015) looked carefully at the incidence and cost of *Clostridium Difficile* Infections (CDI or *C. difficile*) in Canada and concluded that extra days of hospitalization accounted for the largest proportion of costs (estimated to be \$281 million in 2012). The authors believed that the largest absolute effect on medical costs resulted from interventions that reduced the severity of infection, and/or relapses leading to re-hospitalizations. Part of the challenge results from decentralized budgets and

with attributable costs per episode between \$3,427 and \$9,960 (Kwon, Olsen, & Dubberke).

As a comparison, starting in 2008 the US healthcare system developed a number of financial penalties associated with infection rates – essentially reducing or eliminating reimbursement for conditions they consider a hospital 'mistake', such as certain nosocomial infections.

In 2015, a compelling US study by Dick et al.³ examined the cost-effectiveness of ongoing investments in preventing hospital acquired infections (HAI) in intensive care units (ICU). Using five years of Medicare data combined with HAI rates and cost and quality of life estimates, they saw gains per ICU of 15.55 Life Years (LY) and 9.61 Quality Adjusted Life Years (QALY) for ventilator associated pneumonia (Dick et al.).

The authors noted a reduction in index admission ICU costs of US\$174,713 for central-line associated bloodstream infections (CLABSI) and US\$163,091 for ventilator-associated pneumonia (VAP). In addition, their modeling of incremental cost effectiveness ratios (ICERS) of multifaceted HAI prevention programs suggested costs of US\$14,251 per LY gained and US\$23,278 per QALY gained (Dick et al.). The authors concluded that multifaceted HAI prevention programs are cost effective and require ongoing investment.

Who benefits from increased investment? This is more difficult to answer than you might immediately think.

The obvious beneficiary is, first and foremost, patients and their families. The shock and health impacts of a nosocomial infection can linger far longer than an extended stay period in a hospital – should the patient survive. Infections that are acquired in hospitals or healthcare facilities can result in patients with significant post-discharge special care requirements related to medications, primary care follow-up, lab work, rehabilitation and home care.

In some cases, this is drawn out over the course of years – depending on the infection, severity and patient health status.

About half of all healthcare worker (HCW) absences can be attributed to gastrointestinal and/or respiratory illness, two sets of conditions that could be caught from patients. HCWs likely experience infection-related illness one and a half more times than comparable non-HCWs.

The overall burden of short-term, infection-related absence is difficult to assess because of the possibility that having sick HCWs attend work could be more expensive if infections are then passed on to the patient – and of course, their families.

Health systems can lower direct costs through infection reduction, and avoid 'extraordinary events' that are unplanned and the response that can eat away at budgets (terminal cleaning/lawsuits etc.). Better service to the community can also be seen as administration self-preservation. There are few instances that will cause senior management to be placed under review – or be replaced – but losing the trust of the community they serve is one.

It is paramount for healthcare systems and provincial governments to properly understand their financial burden from HAIs, so they are better prepared to understand their baseline costs and the po-



responsibilities that create silos of care, which are exacerbated by uncertainty over the benefits of infection control.

As well, the Canadian healthcare system is continually challenged by inadequate staffing levels, low standards of hygiene in healthcare facilities, privatization of some clinical services, as well as pervasive overcrowding in hospitals (Levy et al.).

The cost of infections: Using the example of *C. difficile*, Levy et al. concluded that 64% of all cases are hospital associated. In 2012, they found 37,900 episodes of which 7,980 (21%) were relapses and 10,900 (27%) were recurrences. The total cost of *C. difficile* alone was approximately C\$281 million, including C\$260 million in direct hospital costs, C\$12 million in direct community medical costs, and \$10 million in costs due to lost productivity.

From these and other studies, we know that the annual burden is increasing, due to an aging North American demographic that significantly increases the number of potential patients at higher risk. North American studies reviewed by Kwon, Olsen, and Dubberke² (2015), confirmed that *C. difficile* mortality before 2000 was 1.5% or less. From 2000 onward, the mortality rate rose between 4.5%-5.7%,

tential impacts of the interventions and innovations they alone can drive.

Patient cohorts can be isolated and compared (i.e. comparing those who acquired an infection while in a healthcare/hospital setting – HAI cohort – versus the general population – regular cohort.) By comparing the cost using financial metrics that are more common in the US (i.e. dollar per member per month) between the two cohorts for a period of three years post-discharge, the increased cost to governments can be established.

Evaluation of infection prevention: While there are many considerations that must be given when evaluating new technologies that offer the promise of better and more efficient infection prevention and control, there are common themes that healthcare systems typically consider and that vendors must address.

An evaluation framework designed to address the main questions and concerns of health administrators and quality and safety managers – with input from clinical leadership, surgeons, and critical care nurses – allows for a common review of new infection prevention and control innovations.

Too often purchasers are presented with innovation opportunities that promise a considerable cost saving that is calculated by assuming a reduction in infection cases. The challenge is that these are sometimes fanciful and wildly optimistic, or do not consider the complexity of, and processes that lead to, acquiring an infection.

The following considerations can assist when presenting comparative analysis to a hospital's value-based purchasing committees, or other internal groups that review new clinical innovations.

- Does the proposed innovation provide a sufficient evidence base for improvement of clinical outcomes that are recognized challenges? Does it apply to an increased eligible patient population, reduce clinical complications, and/or reduce risk to patients and HCWs?

- Does the solution align with current strategies and initiatives to improve patient safety, and reduce infection transmission risks to patients, their families, and HCWs? After all, healthcare systems are not able to address all pressing issues and are guided by priorities from government, strategic plans, and their local initiatives.

- What is the financial impact for the innovation and is it able to provide a cost-saving or cost-neutral outcome to the health system? ROI can be measured in: Cost comparison with existing devices or services; reduction of staff time – while increasing quality and safety; and potential reduced direct costs associated with a reduction in infection cases. This final point is usually discounted using a value-analysis approach – but can be helpful as a separately calculated financial outcome and setting targets.

- Following a service assessment, does the innovation represent a solution that will be adopted as the preferred clinical choice? Note that without the support of clinicians for adoption, the initiative is likely to fail.

- Is there the benefit of improvement in population health, reduction in longer-term costs, and improved healthcare system stewardship to ensure ongoing viability? This point is key for provincial governments and other payers.

Conclusion: Even though the threat of disease, infections and antibiotic resistance is a very real and present danger, Canadian healthcare system uptake and adoption of innovation and new solutions are poor and slow. Unfortunately, the system favors the status quo. The case for innovation adoption has to start with financial reasons, given the current fiscal environment that involves providing care

with limited resources. We know that infection avoidance in healthcare has a very significant return on investment – it is just that the various stakeholders, systems, and silos are not yet aligned to these potential savings.

Realizing the financial benefit is a final step in the process of evaluating and adopting new infection prevention and control technologies – innovations and so-

lutions that will result in a safer and higher quality of healthcare, and help save lives.

Niall Wallace is the co-founder of Infonaut, author and an international speaker on topics focused on infection prevention and control innovation. Frank Naus is a consultant and leader in the pharmaceutical, clinical research, and healthcare sectors. He holds a Doctorate in Business Administration, along with an MBA and MSc.

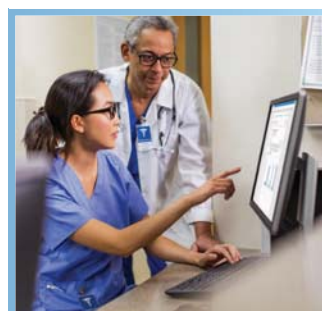
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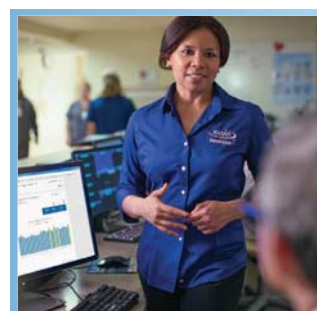
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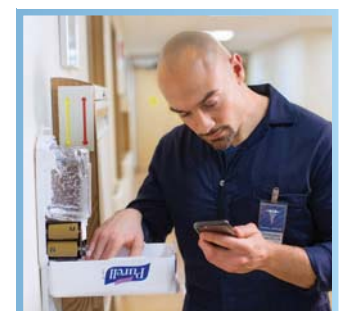
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1. Anne Bialachowski et al, "Electronic Hand Hygiene Monitoring in the Emergency Department: Charting New Territory," <http://www.gojo.com/en-CA/Markets/Acute-Care/Hand-Hygiene-Education/Technical-Publications>

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#21924 (9/2017)

Systems, software, a need for speed: An hour in the life of an influenza case

BY EMILY HOLTON

St. Michael's Hospital infection preventionist Shara Junaid is at her desk when the phone rings. It's the hospital lab; a patient in the Emergency Department has tested positive for Influenza A.

In the past, Junaid's next step would have been to create a case profile by opening the patient's electronic medical record and cutting and pasting details into a new Excel spreadsheet.

Today, thanks to RL6:Infection software, provided by the Canadian company RL Solutions, the lab results have already popped up on her computer in an alert, and the patient's details are already on her desktop when the lab calls.

Junaid is part of a dedicated group of infection control professionals who provide 24/7 coverage for infection prevention emergencies at St. Michael's, as well as education, surveillance and policy development. While the patient's care team is responsible for isolating and treating the patient, the Infection Prevention and Control Team helps track and prevent an infection's spread.

Everyone involved must move quickly. First, Junaid needs to know the patient's basic clinical details.

"This software can pull info right away from the patient's electronic medical record, info that we would otherwise have to find manually," said Junaid. "We can create new profile in just a few clicks, with much less room for error."

The patient's history shows that he was discharged from St. Michael's Orthopedics



Infection preventionist Shara Junaid discusses a new influenza case with an Emergency Department nurse. Photo by Yuri Markarov, St. Michael's Hospital.

Ward the previous day. This means that Junaid must quickly trace the patient's contact history, to identify other patients in the ward who may have been exposed to the virus.

"We used to have to print out and manually review hospital censuses for every day the patient was in hospital and considered infectious," said Junaid. "But now that

our software is integrated with our Admission, Discharge and Transfer System, I can generate a list of previous roommates within minutes – who they were, how long they were in contact with the patient and their current location."

About 15 minutes later, Junaid is ready to notify units about the patients who may have been exposed to the influenza

virus. At minimum, they'll be isolated and closely observed for the next few days.

"We've always had access to the lab system, the medical records system and the admission, discharge and transfer system," said Junaid. "We had our own documentation as well, but the process of manually integrating and documenting all the data was time consuming. To be able to use a single program to access, pull from and generate reports from all these sources means we can investigate and act much faster."

Each potentially exposed patient now has his or her own profile in RL6:Infection. This means that if a patient is discharged and then readmitted a few days later, the software will notify the Infection Prevention and Control Team with an alert. They can then follow up to find out if the new admission is related to the in-hospital influenza exposure – an early warning sign of a hospital outbreak.

These profiles not only help the team keep track of current cases and potential exposures, but also draw attention to patients who may need special precautions due to a positive test at another facility, or a recent stay in a facility that's experiencing an outbreak.

"Transitioning to the new software has been smooth," said Junaid. "We are continuing to learn how we can optimize the system for our needs, and it's a simple, user-friendly interface. The developers also have an infection preventionist on their team who helped us with implementation – it saved us a lot of time because she understood our work."

Active monitoring dramatically improves hand hygiene at St. Joe's

St. Joseph's Healthcare Hamilton (SJHH) has been working on improving hand hygiene of its healthcare workers since 2008. Substantial progress was made throughout the hospital; however, management recognized that it was hard to collect enough data in the Emergency Department (ED) because of its physical layout and dynamic workflows.

The Manager of Infection Prevention and Control in the Outpatient Department, Anne Bialachowski, RN, has been at St. Joseph's Hamilton since 2010 and brings 20 years of infection prevention experience to her position.

Anne teamed up with the ED nurse manager to champion a pilot project testing the effectiveness of the GOJO SMARTLINK Activity Monitoring System (AMS) as a solution.

Along with her colleagues, Anne was tasked with the overall strategic goal of reducing infections throughout St. Joseph's hospital.

Anne knew that hand hygiene plays a large part in reducing infections, especially in the ED where hand hygiene compliance rates were consistently lower than those of the rest of the hospital.

When identifying methods of increasing hand hygiene compliance, Anne quickly recognized that their current method of direct observation in the ED wasn't enough to help change behavior.

Prior to implementing SMARTLINK AMS, her staff was collecting only 60 hand hygiene observations in the ED per month, and she was not able to provide timely feedback on these observations.

"We could not report out until we had a month's worth of data, just to make sure we had enough observations to make the feedback valid. By then, it is too late to make an impact, which further justifies why direct observation should no longer be considered the gold standard for hand hygiene monitoring," said Bialachowski.

Once Anne and her team implemented AMS, it didn't take long to see that the system provided much more robust data than they could get with direct observation. AMS captured over 300,000 hand hygiene opportunities per month in the ED – a 5,000 percent increase in opportunity capture.

As well, the data were available immediately within the SMARTLINK software, making it much easier to analyze

and provide feedback to the staff.

With hand hygiene rates ranging anywhere from 30 – 80 percent with direct observation, the overarching goal for the St. Joseph's ED was to improve on these rates by obtaining more data and giving ED staff ongoing feedback in real-time.

Choosing to continue with



Anne Bialachowski, St. Joseph's Healthcare, Hamilton

SMARTLINK AMS was an easy decision, even in a time of budgetary cuts in the hospital. The attention to hand hygiene that the system provides helped to demonstrate St. Joseph's commitment to quality of care and patient safety.

The public, too, is becoming more aware of hand hygiene due to legislation and news coverage. "AMS has helped increase everyone's exposure to hand hy-

giene, including patients and visitors," Bialachowski said.

For the future, Bialachowski and her team are forming a plan to install AMS in other areas of the hospital to help expand the culture they built in the ED. They are also planning to make the data visible to staff to provide immediate feedback on their hand hygiene performance.

"The most important thing to understand with electronic monitoring is that it is not the end all be all for increasing hand hygiene. The system can provide you with data, but you still need to work with the staff on changing their behaviors," Bialachowski said. "It's the beginning to developing a culture focused on hand hygiene compliance and patient safety."

Advice for infection preventionists

- Engage leadership early on. Having a champion at the senior level can help you gain the support you need to move forward.

- Pilot systems using a positive deviant (i.e. a clinical unit with a strong hand hygiene culture and baseline compliance data). Test the system to see what outcomes you can drive.

- Be a leader. Be an early adopter. Demand better, more robust data.

How technology is changing the way we clean our hands in hospitals

BY SYBIL MILLAR

TORONTO – Cleaning your hands is recognized as one of the best ways to keep patients safe and prevent the spread of infections. But what's the best way to actually measure hand hygiene rates?

For years, hospitals have been sending auditors from unit to unit to monitor how often staff members are cleaning their hands. Now, a new study is trying to show that using technology to measure hand hygiene rates can provide much more accurate results.

"In-person audits can actually overestimate hand hygiene rates by three to five times. Electronic monitoring, on the other hand, provides more accurate, real-time measurement of hand hygiene in a specific clinical area," says Dr. Jerome Leis, medical director, Infection Prevention and Control at Sunnybrook Health Sciences Centre.

Sunnybrook is leading a five-hospital improvement study aimed at detecting a reduction in healthcare-associated infections by improving hand hygiene compliance.

The organizations will measure how often staff use alcohol-based hand sanitizer to clean their hands when moving between rooms or delivering patient care.

To do this, electronically monitored, or e-monitored, hand hygiene pumps have been installed on 18 inpatient units in Greater Toronto Area hospitals. That number will soon expand to 25, and depending on what the results show, e-monitored pumps could become the new standard practice in Ontario.

How e-monitoring works: E-monitored hand hygiene pumps are equipped with a sensor that counts hand hygiene events, standardized by the number of hand hygiene opportunities.

One of the biggest surprises was realizing just how many hand hygiene opportunities actually exist. "In a two month period alone, one of our units had 170,000 hand hygiene opportunities," says Dr. Leis.

He adds that the system is accurate and has been validated in different care settings worldwide. "No matter how hard you try, you can't outsmart it," says Dr. Leis.

The limitations of observational audits: Hand hygiene compliance rates have plateaued at around the 85-90 percent range across most hospitals in Ontario. While those numbers seem high, multiple covert studies have shown that actual compliance is less than 50 percent.

The reason for such a large discrepancy? "People change their behavior when they know they're being watched, which is something known as the Hawthorne Effect," says Dr. Leis.

Under the current observational, in-person auditing system, units only receive feedback on their hand hygiene rates each quarter. E-monitored systems allow participating units to get weekly feedback on their performance. Units will also be able to track their improvement using technology that provides accurate measurement of hand hygiene compliance.

Preliminary results: The first e-monitored hand hygiene pumps were installed on an inpatient unit at Sunnybrook in July

2017. The improvement in hand hygiene rates was immediate.

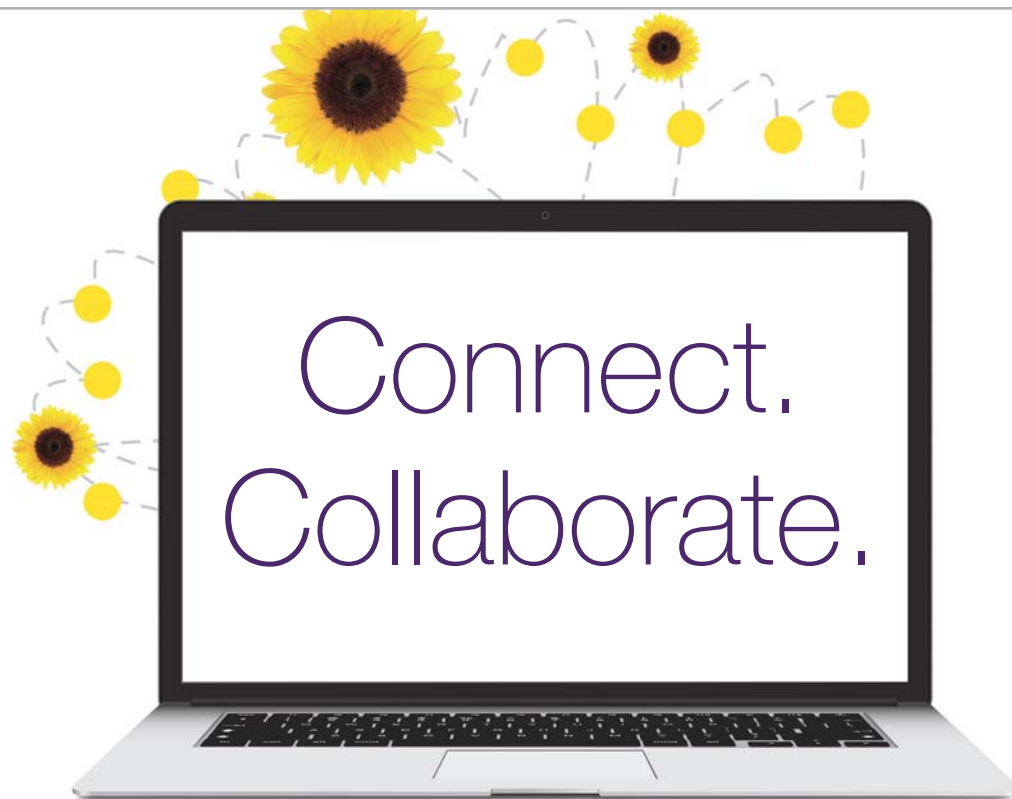
"On that unit, we started with a baseline hand hygiene rate of 35 percent. By August, the compliance rate had already gone up to 58 percent, surpassing our original three-month goal of 55 percent, so we're

very pleased to see that happen so quickly," says Dr. Leis.

Dr. Leis is hopeful that hand hygiene e-monitoring will become the norm in the near future. "Our study involves multiple hospitals and a large number of patients, which we expect will allow us to determine

the benefit of this technology in preventing hospital-acquired infections. This data will help us determine whether to install these pumps in as many units as possible."

Sybil Millar is a Communications Advisor at Sunnybrook Health Sciences Centre.



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Innovations for infection control are making their way into facilities

BY NIALL WALLACE, ADAM DAKRI
AND MICHAEL ACKERMAN

New technologies that are being widely adopted in other countries and sectors (i.e. food production) are now becoming more available to Canadian healthcare providers. Here we outline new technologies that have been proven to help address the challenge of infection prevention and control.

Hand hygiene compliance: Hand hygiene compliance remains the #1 focus of infection prevention and control strategies in healthcare institutions. In 2007 the World Health Organization (WHO) introduced its “Five Moments for Hand Hygiene” framework, which outlined the key moments healthcare personnel should be cleaning their hands. Since 2009, the WHO campaign to have hospitals and healthcare facilities around the world adopt this best practice has been very successful.

However, a lack of hand hygiene compliance by healthcare staff continues to be a significant contributor to the spread of pathogens, resulting in HAIs. Those involved in conducting hospital hand hygiene compliance auditing, and the front-line healthcare workers being audited, share an open secret: the manual tracking of compliance just doesn't work.

The use of manual hand hygiene auditors, using paper-based or electronic systems to manually track compliance, are flawed due to the fact that people realize they are being observed and radically alter their behavior for this short period of time.

Electronic hand hygiene monitoring systems started to gain traction around 2010 as a persistent way to measure and track compliance, and allow for evidence-based interventions to improve hand hygiene. These systems use a variety of methods to calculate the frequency of hand hygiene among healthcare workers – against the prescribed ‘moments’.

Automated hand hygiene compliance systems work by having ‘smart’ dispensers register each use or hand hygiene event, through RFID, Bluetooth or other technologies. There is great variation among the systems in capturing the ‘denominator’ and thereby calculating compliance – including badges worn by the HCWs as they enter or leave a patient's room or proximity detectors.

Barriers to adoption continue to be the relative cost of these systems – especially for enterprise deployment. As well, many of these technologies require healthcare workers to wear a tracking device – which is a tough sell to staff as it records their movement throughout the day.

The most successful (and we believe ef-

fective) of these systems tend to be invisible to staff on a day to day basis – and employ a consistent approach to using the information that stresses quality improvement and safety over arbitrary and unachievable targets (i.e. 95% ‘compliance’). Major suppliers include:

- www.debmed.com
- www.gojo.com
- www.swipesense.com
- www.versustech.com

Hand hygiene quality: Emerging technologies are focusing on gaps in the current approach to improving hand hygiene – namely the quality of hand-washing performed by staff (and others). Any improvements in ‘compliance’ with the WHO moments of hand hygiene tend to be severely undermined by a lack of quality – which includes complete coverage of the hands and the duration of the hand hygiene activity.

Electronic systems developed in Europe, where there has been a longer history on hand hygiene for preventing HAI transmission, have provided remarkable insights.

Studies as recent as 2017, when these systems have been introduced to the United States, demonstrated that only 7% of subjects can pass a quality test where the coverage of their hands is measured above 90%.

The most frequently missed areas of the hands include the fingers, and the majority of the dorsal side of the hands. With poor hand hygiene quality, a likely outcome is the contaminated hands of a clinician coming in direct contact with another patient, or with an inanimate object that will then come into direct contact with the patient.

The systems to measure hand hygiene quality add a small amount of UV dye to the alcohol-based hand rub (ABHR). During hand hygiene training the healthcare worker inserts their hands into a device that measures coverage and displays the image on a screen with green showing areas of sufficient coverage and red to indicate those areas missed – and assigning a pass or fail. The data is uploaded into a cloud environment where there is ongoing monitoring and reporting of hand hygiene at an individual or unit level. Other systems use video monitoring to analyze technique on an individual basis.

- www.handinscan.com
- www.surewash.com

UV systems for surfaces decontamination: UV surface disinfection is proving to be one of the most promising and widely adopted of the new technologies focused on infection prevention and control. It is seen as a complementary technology to environmental cleaning that can help ensure the patient and workplace environment is decontaminated at that moment-in-time.

Many health systems are incorporating the technology with the added benefit of a more responsible or reduced use of harsh chemical cleaners – as part of a more comprehensive antimicrobial stewardship strategy.

Used for disinfection of surfaces, water

and air for over 100 years, UV has found a new application in hospitals and health-care, providing surface disinfection of patient rooms, operating rooms (ORs) and bathrooms.

Frequently referred to as ‘UV Robots’ for their large, Dr. Who-type appearance, these devices are manually operated to position them in the room, with the operators leaving the room empty as the devices cycle UV light. Other examples are designed to be permanent units installed within bathrooms, ORs and high-risk environments – switching on automatically when the room is empty.

One drawback to UV systems is the potential for ‘shadowing’, where light does not penetrate an area within the room (light won't go around corners). To address this, manufacturers may recommend multiple devices per room, or moving the robot around the room and conducting multiple UV cycles.

UV room disinfection/decontamination has over 30 manufacturers worldwide – with some Canadian companies at the forefront. The primary competition to mobile UV systems is a continued focus on the elimination of bio-film with better environmental cleaning, or the use of electro-static sprayers. These sprayers charge disinfectant particles, which are then at-

One weak spot of UV systems is the occurrence of shadowing, where light does not reach an area of the room.

tracted to an oppositely charged target – the various surfaces inside a patient room or other area. The result is an even application of disinfectant on all targeted surfaces.

- www.xenex.com
- www.surfacide.com
- www.tru-d.com
- www.clorox.com

UV systems for mobile equipment: While UV has previously been used to help provide sterilization of surgical instruments, the proliferation of mobile devices, digital health solutions and medical equipment that are shared among patients has led to the need for UV decontamination units that are strictly focused on smaller items for regular decontamination at multiple times throughout the day.

Evidence has shown that 79% of mobile devices used in ICU and OR environments tested positive for pathogenic bacteria.

In the past when we have conducted ATP testing in hospitals, we have looked at the bioburden on clinician's own phones, usually with alarming results. It wasn't uncommon to hear stories like, “I know it is dirty, my kid plays with it at home and sucks on it”.

When we looked at cleaning practices of phones and other small pieces of medical equipment, these were usually overlooked. The result can be a significant increase in the risk of infection transmission as these devices move from room to room and patient to patient. Effective use of UV decon-

CONTINUED ON PAGE 30



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Infection prevention and control technology empowers caregivers, patients

BY MOLLY BLAKE AND MYRNA DYCK

With powerful new technologies now available – such as cloud computing and processing, group software solutions, analytics and real-time monitoring, the accuracy, speed and impact of infection control activities can be significantly improved.

Improved staff hand hygiene, as well as infection surveillance, can effectively decrease HAIs. New methods for measuring hand hygiene compliance of staff continue to emerge, beyond simple entry of data into a device.

This can include monitoring product dispensed, electronic/video monitoring of staff, or both. Initial results of electronic/video hand hygiene surveillance have been positive, showing increased compliance.

Some systems provide reminders; others do not. All have the benefit of timely feedback to staff, thus potentially impact-

Analysis of the financial costs associated with implementation of an electronic infection surveillance system has shown reductions in HAIs and significant overall cost savings.

The use of technology can increase the engagement of staff and patients, particu-

larly if results are promptly and publicly displayed. By increasing the accuracy of results by reducing observer bias, one can improve staff acceptance of results.

Molly Blake, BN MHS CIC, has been an Infection Control Professional for almost 17

years, and is currently the Program Director, Infection Prevention and Control, Winnipeg Regional Health Authority. Myrna Dyck, MSc, BN, RN, BSc, has been the epidemiologist for the Winnipeg Regional Health Authority Infection Prevention and Control Program for the past eight years.



Molly Blake



Myrna Dyck

ing behaviour in a meaningful way.

These technologies have other benefits, such as significantly reducing the Hawthorne Effect; however some staff may not feel comfortable with constant surveillance, especially if electronic devices are worn and tracked, or video monitoring is used. These new technologies are just beginning to adjust to issues of perception and methods of hand hygiene surveillance.

Electronic HAI surveillance has been shown to be far superior to manual surveillance; its consistency and accuracy assisted in finding up to twice as many infections accurately with an 85 percent reduction in workload. Moreover, sensitivity, specificity, and positive predictive values are more accurate with electronic surveillance systems than manual methods.

IPAC surveillance is a time-consuming process, reportedly taking 45-50 percent of an ICP's time. Freeing time to handle the growing list of infection prevention tasks is critical to the successful operation of any healthcare organization: education and consultation, outbreak and epidemiologic investigations, prevention measures, and disaster planning.

Electronic surveillance will notify IPAC of potential clusters and outbreaks before they would be picked up through manual surveillance and can reduce errors that are a part of manual methods. This reduces days spent in isolation and expenses to the person and facility.

Technological support provides improved proficiency in analysis. It allows results to be completed and conclusions determined, promptly allowing decision-makers the luxury of additional time to collaborate in response to the situation.

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Leading change from manual to automated infection control programs

BY JEAN WHITE AND LORI LAMOTHE

Antibiotic Resistant Organisms (AROs), Hospital Acquired Infections (HAIs), outbreaks, surveillance and isolation are all words entrenched in the normal lexicon of both healthcare providers and the public over the past decade. International healthcare bodies have responded to increases in infection rates with an intensified focus on infection surveillance in facilities providing healthcare services (hospitals, long term care, physician and dental offices and jails). The financial cost of hospital acquired infections to organizations are clearly documented in journals, white papers and government websites.

Leading the change from a manual to automated Infection Control approach involves an intimate understanding of the problem, identification of the current processes and visualization of the desired goal.

Understanding that HAIs have a tremendous impact on Canadian healthcare organizations is the initial step in this change process. Once an understanding of the problem compels action, the most important task for the leader is analyzing where time is being spent and then determining a more efficient way to perform the same or similar task while focusing on the desired result. The table identifies three key daily infection control activities and compares manual workflow with an automated option.

The three processes outlined represent only a partial list of all tasks facing in ICP when identifying, flagging, monitoring and reporting hospital acquired infections. The prevalence of manual processes in our healthcare institutions impacts the ability of ICPs to:

- Perform regular surveillance activities;
- Conduct interventions known to have a

positive impact on infection rates, namely staff education and auditing (e.g., hand hygiene, personal protective equipment, care protocols etc.); and

- Monitor patients proactively for infectious risk factors on admission.

Manual processes have a profound impact on the ability of Infection Control departments to complete all requisite components of a comprehensive Infection Control program. Thus, an important step in leading change is visualization of the future.

If manual processes were automated, how would this impact delivery of the program? What are the essential elements required to fully inform ICPs? What information needs to be readily available so accurate decisions can be made and infectious precautions put in place when necessary?

There are three key considerations in identifying the most appropriate software to enable more effective work for ICPs, namely the ability to access available electronic data, integrate and organize data into ICP friendly formats, and aggregate data to support the creation of analytics for internal and external stakeholders in a variety of formats.

The first requirement is accessing the available electronic data. Hospital Information Systems (HISs) usually contain all the requisite data for ICPs:

- Admission/Discharge/Transfer (ADT): e.g., demographic and visit data;
- Microbiology: e.g., culture and sensitivity data;
- Diagnostic Imaging: e.g., radiology results;
- Pharmacy: e.g., antibiotics/medications; and
- Operating Room: e.g., procedures and surgical case data.

The typical problem is that data is often found in different modules of the HIS or different software programs, leaving the ICP to be a sleuth in finding all of the data.

The second requirement is integrating

and organizing the data into a usable format targeted for ICPs. This includes:

- Real-time line lists of patients with potential hospital acquired infections, central line infections, potential surgical site infection and others
- Statistical Trend Reporting: e.g., Actual AROs, ventilator associated pneumonia cases, and risk stratified SSIs etc.
- Computerized calculation of reportable measures e.g., ARO infections
- Targeted and standardized surveillance case definitions
- Interactive means to classify infections as hospital acquired, community acquired, infection or colonization
- Electronic communication with other professionals – both general communication about patient status and status of the

The typical problem is that important data is found in different parts of the HIS, requiring the ICP to be a sleuth.

infection review and targeted communications via alerts or text message when data is out-of-bounds or specific events have occurred; and

- Data entry of audit information which can be linked to changes in infection rates: e.g., Hand hygiene, use of personal protective equipment, environmental audits, etc.

The last requirement highlights the need for flexible reporting capabilities of the software to meet current and future needs of the ICPs.

When data is gathered at the patient detailed level (as it is in HISs), the reporting tool used in the software should provide standard reports required by the organization and allow the user (the ICP or decision support analyst) to “drag and drop” key data fields for the creation of focused reports.

The user should not have to understand

the construct of the underlying database or how to create report queries. The reporting tool should support the creation of both real-time and historical information and organize the information into dashboards and scorecards that show trending over time e.g., antibiogram, antimicrobial resistance, ARO rates etc.

Leading the change from manual to automated processes in infection control is a significant investment in time and money. However, acquisition of state-of-the-art software has the capacity to refocus the work in Infection Control Departments on those processes with cost savings benefits to the organization and improvements in delivery of health care to patients.

Highly qualified ICP professionals are able to utilize their analytical skills in managing infectious cases rather than spending a disproportionate amount of time tracking cases by gathering/reviewing data entered into spreadsheets or paper-based binders.

There will be no need to spend time manually calculating and recalculating data to meet a variety of reporting requirements. Software can integrate the necessary data and push information to ICPs in an efficient manner, freeing up time for staff education and promotion of infection prevention awareness to reduce harm to patients.

Purpose-designed Infection Control software is a fundamental tool necessary for the future evolution of Infection Control programs.

Jean White is the Director, Decision Support and Implementation for Emerald Health Information Systems Ltd. (a division of MediSolution) and Lori Lamothe is the Manager, Decision Support. Emerald Health Information Systems Ltd., a software company based in Ottawa, Ontario, implements its Surveillance Manager™ infection control system in healthcare organizations. The authors can be reached at jwhite@emeraldhis.com and llamothe@emeraldhis.com.

Common daily activities: Comparing Manual vs. Automated Workflow		
Daily Activities	Manual Workflow	Automated Workflow
Case finding of potential HAIs	Infection Control Professional (ICP) must: <ul style="list-style-type: none">• Review paper lab reports, identifying those cases that require follow-up• Search the clinical record (sometimes electronic / paper hybrid) for supporting documentation of the case in clinical notes, flow sheets and orders• Classify the case and enter the relevant data in log books / Excel spreadsheet• Search the HIS to find the patients who have shared space with the case	Dashboards that display: <ul style="list-style-type: none">• Real-time automated results reporting lab reports; highlighting cases requiring follow-up• Key clinical indicators to inform the ICP about the origin of the infection• List of other patients with whom there has been contact Functionality that allows the ICP to: <ul style="list-style-type: none">• Classify cases for reporting• Enter case notes
Preparation of reports for internal groups and regulatory bodies	ICP must: <ul style="list-style-type: none">• Manipulate the data entered into Excel for various formats required for submission• Re-manipulate data for program / unit reporting• Prepare graphical illustrations of formatted data	Reporting tools provide: <ul style="list-style-type: none">• Data in the requisite formats• Graphical illustrations (defined once and provided on an ongoing basis) Reporting tools support: <ul style="list-style-type: none">• Real-time and historical data (no need to recalculate to view past data)• Drill-down to detailed reporting e.g., program / unit / patient / physician• Standard data requirements and reporting on demand
Conduct audits	ICP must: <ul style="list-style-type: none">• Complete the audit• Manually note the results of the audit• Enter the audit results in a log book / Excel spreadsheet• Manually calculate results of findings and recalculate each time a different time period / functional area view is requested	Software that supports: <ul style="list-style-type: none">• The entry of the audit onto a tablet or smartphone with a form configured to meet the audit requirements• Real-time results reporting• Historical results reporting of audits which also allows for overlays with other data e.g., infection rates

Maceration in the modern soiled utility room minimizes risk of infection

BY ADAM ROACH

Minimizing the risk of Hospital Acquired Infections (HAIs) such as Methicillin-resistant Staphylococcus aureus (MRSA) and Clostridium difficile (C. difficile), will directly reduce costs due to significant decreases in nursing time and the use of antibiotics.

It will also avoid a total ward shutdown when an infection cycle needs to be broken.

By disposing of all human waste in a single area, infection can easily be contained and isolated before it can spread. Within a soiled utility room effective decontamination is key to delivering good hygiene, and thus sound infection control.

Pulp macerators: There has been growing popularity of pulp macerators and 'single use' pulp items, which has been driven by the need for higher standards of infection prevention in all healthcare facilities.



Adam Roach

Due to the increasing number of outbreaks of infection caused by high-risk microorganisms, such as C.difficile, and the inability of washer-disinfectors to completely eliminate the risk of cross-infection, many healthcare establishments are now moving away

from the use of reusable human waste containers. They are switching instead to single-use 'pulp' containers, with subsequent pulp maceration and disposal as an alternative, and extremely reliable, means of total infection control.

One of the key advantages of using single-use pulp items and pulp macerators is that all of the human waste, including the receptacle, are disposed of directly into the machine, and there is no further interaction with the bedpan, urinal, or other pulp receptacles.

The entire waste and bedpan is macerated and flushed into the existing drainage system in one simple procedure. This function alone removes the risk of utensils not being correctly sanitized and returned to the ward, thereby eliminating the danger of re-infection.

Macerator design advances: The growing use of maceration as a method of human waste disposal has heralded huge advancements in both the technology itself, and manufacturers' understanding of the importance of ever-changing healthcare sector requirements.

Recent designs incorporate features such as hands-free automatic operation and the incorporation of antibacterial materials in clinician contact areas to create a 'microbe-safe' surface.

An increasing variety of machines are available to fit all requirements – large capacity machines able to cope with four to six pulp items, and suitable for busy soiled utility rooms, and smaller, compact machines, designed for low-demand areas or single-bed wards and en-suite facilities.

Wall-recessed machines: Wall-recessed pulp macerators are specifically designed to be incorporated into architects' plans during

the build and design stage of a project. They are built into the walls, thereby fully concealing the mechanics and plumbing of the machines, improving the look of the room, and allowing them to be used in soiled utility rooms, isolation rooms, and en-suite facilities in individual patients' rooms.

This new generation of built-in macerator has the increased benefits of reduced noise levels, making it suitable for isolation and individual patient rooms, with antimicrobial nanotechnology and wipe-clean, crevice-free surfaces for easy cleaning. Operation is totally hands-free, with an audio

prompt system which can be programmed into any language, thus helping to reduce the number of unfortunate user errors.

Adam Roach is Engineering Director for DDC Dolphin. For more information, contact: canada@ddcdolphin.com



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Infection control

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tamination units can result in zero bacterial growth on these devices.

A number of these systems have become available over the past three years. The most common type is a box, about the size of a large microwave, that sits at nursing stations or entrances to high risk units. You put your device in a drawer, close the lid and hit a button that cycles UV for up to 30 seconds. Some of the fancier systems allow you to leave your device charging in the unit and they can track asset use and cleaning frequency compliance through RFID tags attached to the devices.

UV device decontamination is seen as a viable alternative to the use of chemical wipes and solutions that may damage the devices over prolonged use. Since many of the portable medical devices are actually the healthcare worker's own phone or another shared device, adoption of the UV cleaning units has become a preferred option. As part of a comprehensive infection prevention strategy, these units have been offered to patients and within visitor areas to help prevent new pathogen transmission or cross-contamination into high-risk environments.

- <https://cleanslateuv.com/>
- www.readydock.net
- www.sealshield.com
- www.phonesoap.com

Air purification and sterilization: Droplet and airborne transmission of infections are terms that are still poorly understood. Some multidrug resistant organisms, such as MRSA and *Clostridium difficile*, are known to spread through direct contact, but many others travel through health facilities by internal airstreams, depositing out onto surfaces meters away from the primary infection source.

Additionally, indoor air pollution (VOC's, toxic gases, chemicals, etc.) create an unhealthy indoor environment and the

right clean air technology can provide much better working and recovery conditions for staff, patients and visitors.

Hospital airflow patterns are beholden to our weather conditions and (poorly functioning) ventilation systems. Recently, computer simulations at the University of Leeds, in the UK, have predicted the movement of pathogens through the air, how long it will take them to deposit on surfaces and what rate of ventilation would help balance the cost of airborne infection transmission with energy usage.

As a result, effective IPAC strategies that target droplet and airborne pathogen transmission are becoming more prominent.

- www.RADIC8.com
- www.AEROBIOTIX.com
- www.VIDASHIELD.com

Antibiotic stewardship program (ASP) platforms: Antibiotics have transformed the practice of medicine, making once lethal infections readily treatable. However, patients who are unnecessarily exposed to antibiotics are sometimes placed at risk for serious adverse events with no clinical benefit.

The misuse of antibiotics has also con-

tributed to the growing problem of antibiotic resistance, which has become one of the most serious and growing threats to public health. Improving the use of antibiotics is an important patient safety and public health issue, as well as a national priority.

Despite a focus on antibiotic/antimicrobial stewardship (AMS) since the mid-

Since many of the portable devices used are the healthcare workers' own, UV cleaning has become a preferred option.

2000s, common IT-based approaches to support AMS typically include Excel-based or 'home-grown' internal solutions that provide a minimum amount of information to clinicians and offer after-the-fact reports, if these reports are available at all.

Major challenges with these approaches is a lack of alignment and standards between sites or systems, the absence of real-time alerts that would help protect patients, and only basic level information that can be used for internal reporting or submission to authorities.

Big data used to help understand impact of genes on disease

CONTINUED FROM PAGE 20

quire collecting rich information, including detailed family history, psycho-social factors, medications and other information. We should start in utero and follow those children as they grow up, putting the information into a single database to identify gene variations. That's when we can begin to advance discovery and make genomic associations.

Hospitals must prepare to infuse genomics into care delivery: We're entering a new era of precision medicine where genetic testing has become the standard of

care. Its prevalence in oncology and pharmacogenomics is spreading to other areas of medicine. Consider how rapidly neonatal medicine is adopting genetic testing to help diagnose infants and avoid more invasive forms of testing, such as amniocentesis.

With its genetically diverse population, Canada will no doubt be a leader in understanding the expression of disease. But it is going to need technology to support the incredible work that's going on with genetic sampling and understanding populations.

Genomic information is only half of

The ideal antibiotic stewardship IT platforms are systems that can pull data from EMRs, as well as lab and pharmacy systems, to automatically and systematically monitor prescribing, clinical conditions and patient outcomes, in order to help stem antibiotic overuse, and address antimicrobial resistance.

These systems accelerate early recognition of best practices, can suggest appropriate interventions, and ensure clinical staff have real-time information on hand to help adhere to evidence-based clinical treatment pathways. They do this by delivering notifications into multiple clinical workflows for better coordination of care.

- www.ilumhealthsolutions.com
- www.rlsolutions.com
- www.bd.com
- www.theradoc.com
- www.icnetplc.com

Niall Wallace is the co-founder of Infonaut, an infection-control innovation company; Adam Dakri is founder of Knowlex, a global organization dedicated to infection prevention and control. Michael Ackerman, PhD, is the Director of the Masters in Healthcare Innovation Program at Ohio State University College of Nursing.

Dominic Covvey

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forget the power of human-to-human interaction without the insulation of electronic media.

I know this may not be blindingly relevant to e-health professionals, but the power of communication is amazingly greater in person than it is through keystrokes ...with or without emoticons. While I wish everyone a satisfying textual experience, perhaps there is more to life than text, even though text is great!

"Delusion is the solution!" In the field of public health, particularly when dealing with coliform contamination, it is often stated that 'dilution is the solution' (more water means fewer bacteria per milliliter).

It seems to me that 'delusion' is also often used as a kind of solution. Consider, for example, people who believe they are fantastic, full of knowledge and blessed with marvelous personalities, who are none of the above.

We do tend to not recognize our limitations, whether knowledge-related or psychosocially-related. We, not infrequently, take on a problem, ill-equipped from an objective viewpoint to deal with

the problem. What I'm selling here is a degree of humility, to offset the natural hubris that comes with being immersed in a somewhat esoteric field. For example, we need to reflect about how many have been talked down to by a professor and hated the experience.

A favorite of my weird creations is "she was stood before the hiring squad". There's a related saying, "Trials by Hire", but they arise from the same situation.

Almost everyone has to appear before one or more individuals to answer questions and do a 'soft shoe' in order to get a job. A friend told me of being asked, "If you were an insect, which insect would you be?"

Just hearing about this made me furious and I suggested that a mosquito or a giant water bug (they have a terrible bite) would be a good answer.

Hiring can be a demeaning process! One of the major problems is that many employers don't really know the kinds of skills they need. I suppose it's a bit worse that some of us don't know the kinds of skills that are needed by them. What's the answer? Perhaps you can think of some. An answer I have is to refuse to answer dumb questions, but to provide an explanation of one's capabilities and what one

has seen as the typical needs of an organization like the potential employer. At least that would be educational! And, there are always other job opportunities.

"Discretion is the greater part of valor". This is the actual phrase, not one distorted by my mind. I've included it because it always stimulates me to think that valor comprises discretion and something not nearly as good. I've often wondered what that other part is. I just

The power of communication is amazingly greater in person than it is through keystrokes and emoticons.

share that with you as a flight of fancy and challenge you to make an appropriate diagnosis.

We've all heard that nuclear weapons are 'weapons of mass destruction'. As I review proposals or examine claims about the effectiveness of e-health systems, another phrase comes to mind: "weapons of mass distraction".

We all seem to have the ability to lead with and highlight facts that support what we believe, thereby distracting peo-

ple from potentially unpleasant other aspects. Pharmaceutical companies may do this by citing the power of a new drug, while ignoring side effects.

But we sometimes do this by overclaiming the capabilities of systems, not recognizing their limitations, or by what amounts to hyperbole. Perhaps, another phrase should rule here: "honesty is the best policy". However, we really need to define 'honesty' to include all of the facts, including the fact that a certain medication may be a one-way ticket to the River Styx.

I will close this with the following phrase: "all writers kern for more space". As "kerning" is not a commonly-used word, I'll point out that it means altering the spacing between characters in a word – you can get the idea by looking at Times New Roman typeface versus Courier. Kerning allows one to get more words on a line and more lines in an article. So, although I yearn for more space, only the Editor can kern and, in consequence,

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If you are employed by a hospital, which of the following categories would best apply to you?

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