



CANADIAN Healthcare Technology

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PRECISION MEDICINE

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Virtual nursing in Nunavut

The use of virtual visits by nurse practitioners was stepped up in Nunavut during the pandemic. Not only did patients like the virtual system, they also felt their diseases were better managed.

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Axing the fax in BC

As part of its digital strategy, the Provincial Health Services Authority in BC is reducing the use of faxing in favour of more reliable digital communication, such as e-referrals.

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Elitist precision medicine?

CADTH and a panel of experts agree that precision medicine is set to explode in the next five years, with profound implications for patients. The technology can be extremely effective, but questions remain about whether all can access it.

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PHOTO: MACKENZIE HEALTH

Smart hospital uses data to improve patient care

Mackenzie Health's new Cortellucci Vaughan Hospital, and its older Richmond Hill site, are among the most computerized facilities in the country. The management team stresses that effective use of new technologies has been key to achieving a high level of performance and improving the safety of patients. Pictured are: (l to r) Dr. Aviv Gladman; Sharon MacSween; Altaf Stationwala; Purvi Desai; and Felix Zhang. **SEE STORY ON PAGE 8**

New wave of generative AI is appearing in healthcare

BY JERRY ZEIDENBERG

Why all the fuss about ChatGPT and other forms of 'generative AI', which are said to be a new wave of artificial intelligence?

"It's an amazing evolution of AI," commented Dr. David Rhew, chief medical officer and VP of Healthcare for Microsoft, in an interview with CHT. "Previously, with AI, really only data scientists could work with it. But ChatGPT offers an interface that everyday people can understand. Anyone can use ChatGPT to manipulate large data sets to obtain answers. It's leading to the democratization of AI."

Thanks to ultrafast computers and networks, generative AI systems can process massive stores of knowledge. Using this data, they can write essays and stories, produce songs and paintings, and they can even con-

Unlike AI in the past, anyone can use the new ChatGPT systems to ask questions and obtain answers.

duct very good diagnoses in a medical setting. In a word, they can 'generate' new knowledge, hence the moniker generative AI.

Tests of ChatGPT have shown the system can even pass the U.S. medical school exams.

Not only can it answer true and false questions, but it can also produce an accurate diagnosis when told the symptoms that a mock patient is presenting with and their lab test results. It's just the kind of information a doctor gets in a medical office, when he or she must figure out what ails the patient.

"GenAI can answer these questions better than a lot of clinicians can, but it's not always perfect," said Dr. Rhew. From time to time, the latest iteration of GPT-4, which is found in the ChatGPT system, "hallucinates". That's tech-speak for making up answers. And occasionally, GPT simply gets things wrong.

That's why Dr. Rhew believes the systems

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Generative AI, a new wave of technology, is appearing in healthcare

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should act as assistants, instead of replacing doctors or any sort of human expert. “There needs to be a human in the loop to verify the results,” he asserted. “We call this a co-pilot, and we always want to make sure a human is part of the process.”

Given the dramatic growth of medical knowledge, ChatGPT and other genAI systems could help doctors with assessments and therapies. The artificially intelligent systems could comb the Internet for advances and the latest knowledge or best practices. If something seems out of kilter, however, the doctor is always there to check, using his or her own experience and knowledge.

Commercial systems that produce consistently accurate diagnoses and suggest the best therapies may still be some time off. On a related note, physicians have shown a degree of mistrust of AI systems, largely because they appear as “black boxes” that don’t tell us how they arrive at decisions.

Dr. Rhew, however, asserted that genAI systems can be asked how they arrive at an answer, and they will supply it. “They’re very good at quality assurance,” he said.

“You can even ask it to respond in a way that a seventh-grade student would understand, and it will answer in this way.”

On a more positive note, generative AI systems are already helping clinicians reduce their crushing loads of administrative tasks. Software solutions have appeared that can reduce the documentation that clinicians are currently required to do – documentation that’s leading to exhaustion and burnout for many.

For example, Abridge, a Pittsburgh-based leader in AI-powered medical documentation, this year announced a partnership with The University of Kansas Health System that it calls the most significant rollout to date of generative AI in healthcare.

Abridge said the new partnership has the potential to serve and support more than 1,500 practicing physicians across the University of Kansas Health System’s 140+ locations, as well as additional clinicians in a phased rollout.

Abridge’s technology identifies over 90 percent of the key points from provider-patient conversations and generates summaries in the formats preferred by clinicians. According to a company news release,



Dr. David Rhew, VP of Healthcare at Microsoft

lease, Abridge keeps the provider in the loop, enhancing their productivity, but never replacing their judgment. The core technology acts as an intelligent co-pilot, producing organized drafts and providing interactive tools to accelerate the editing process, ensuring that providers get off to a running start as soon as a visit concludes.

The technology also integrates with healthcare software, including Epic, a widely adopted electronic health record system, to simplify and streamline documentation.

“With Abridge, we have found a power-

ful solution that addresses the biggest challenge facing our providers – excessive time spent on documentation including non-traditional hours,” said Dr. Gregory Ator, chief medical information officer and head and neck surgeon at The University of Kansas Health System.

“This cutting-edge technology will not only close the documentation cycle in real-time but also improve the overall quality and consistency of our clinical notes. Our partnership with Abridge represents a major step forward in reducing burnout, improving provider satisfaction, and ultimately enhancing the delivery of patient care.”

Abridge’s solution addresses these pain points, starting with a draft that’s generated within a minute of the conversation ending. Abridge’s AI-powered interactive editing tools then support the provider to expedite the remaining edits.

Mainstream electronic health record companies are also adopting generative AI in their solutions. Epic, for example, has been experimenting with GPT-4, the version of the Large Language Model that underlies ChatGPT.

In March, Seth Hain, senior vice president of research and development at Epic, said the company sees promise in the new AI-based application and considers it to be “transformational” for the healthcare industry.

“We’ll use it to help physicians and nurses spend less time at the keyboard and to help them investigate data in more conversational, easy-to-use ways,” said Mr. Hain in a March 21 Microsoft press release.

For its part, Microsoft is a major investor in Open AI, the company that released ChatGPT late last year, making it available to the public. (Microsoft invested \$10 billion in the company in January 2023, building on earlier investments in 2019 and 2021.)

Microsoft has extensive plans for generative AI and intends to include it in a host of products, including its flagship software systems like Word and the rest of its Office suite, as well as Teams.

On the healthcare front, Microsoft’s Nuance division has been rolling out its DAX Express system in the United States, a software solution that uses AI and voice technology to record, understand and document the encounter between patients and physicians. Much like Abridge’s solution, it does this by monitoring the “ambient sound” in the doctor’s office, making sense of the language spoken between patients and clinicians, and automating the tedious task of charting.

While the DAX Express software fills out the charts, the clinician receives the fi-

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Gain Insights Into Canadians’ Attitudes About Digital Health

View the results from our 2022 Canadian Digital Health Survey.



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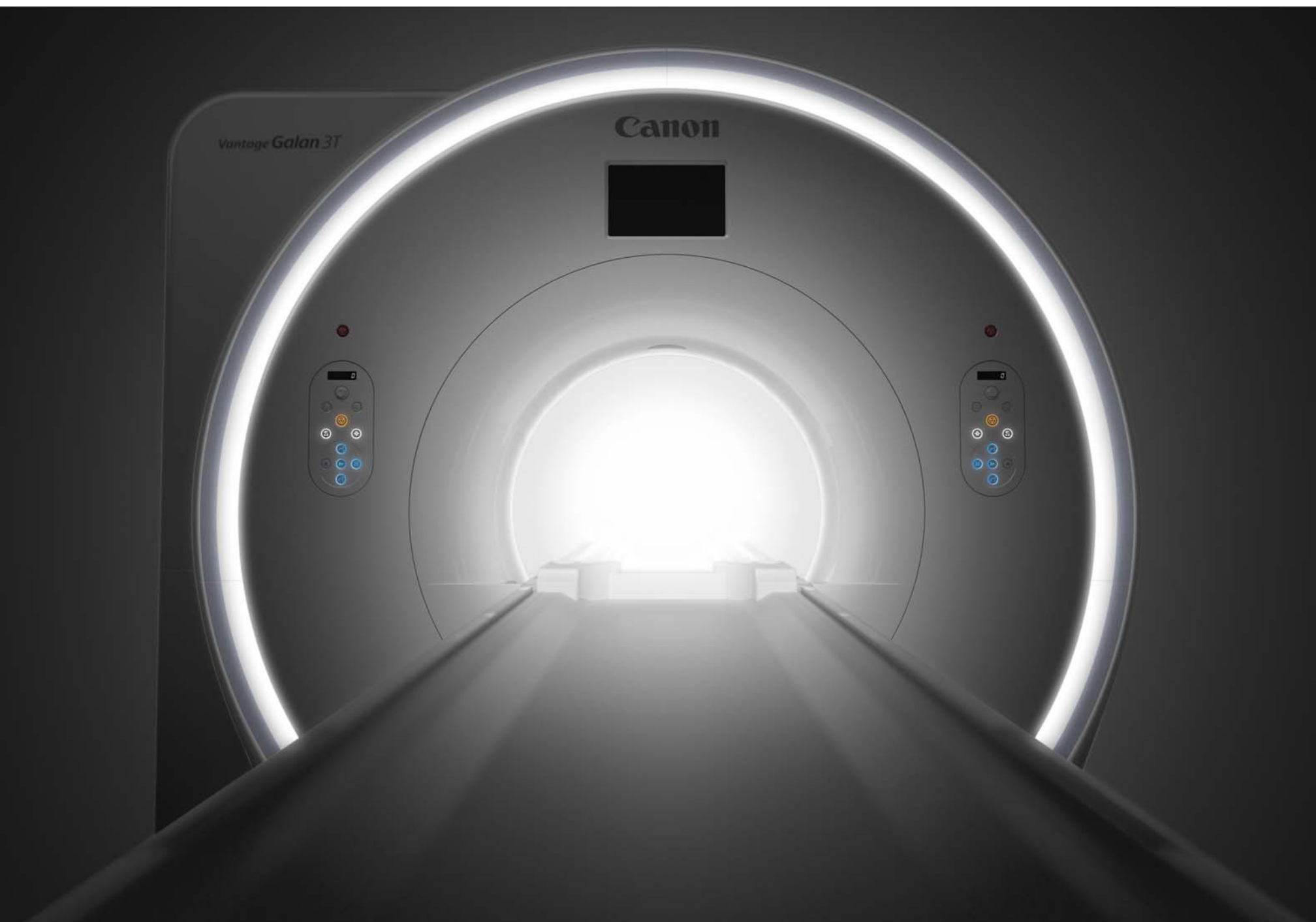
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BC is deploying its digital health strategy, including axing the fax

BY NORM TOLLINSKY

The demise of the fax machine is finally on the horizon in British Columbia, now that the province's Provincial Health Services Authority (PHSA) has signed contracts for the development of an eReferral system. An initiative of the PHSA's 2023 Digital Health Strategy, the system is expected to be launched by this time next year and available for use by B.C.'s primary care physicians and specialists.

Just one of many enhancements to the province's digital health infrastructure the PHSA is targeting, the eReferral system is being designed to integrate with the province's existing Health Gateway patient portal.

"Right now, we have heavy duty use of faxes and lost referrals are a huge problem," said Michael Tatto, the PHSA's executive director of enterprise architecture strategy and innovation. The system will generate notifications if a referral is not acted on in a timely manner and keep patients in the loop.

The PHSA began working on a digital health strategy in 2019, "but we didn't have a chance to get started because COVID got in the way," said Tatto. The resumption of the exercise in early 2022 gave the PHSA an opportunity to incorporate lessons learned from the pandemic and its impact on the delivery of healthcare. The year-long process included a comprehensive engagement exercise, and a review of digital strategies from other jurisdictions in Canada and around the globe.

"The engagement with Doctors of BC was great because it really pointed out some things that we could do differently," he said. "Digital tools are great, but it's important that we improve the provider ex-

perience, reduce the administrative burden and increase capacity."

Among the strategy's guiding principles are a commitment to equity, a recognition of the province's diversity and the unique needs of First Nations and marginalized communities. The ultimate goal is "a digitally enabled healthcare system trusted by all who use it," said Tatto. "If you're a patient, you want to trust that you're part of the system, that the information you're



getting is correct and that your doctors are working together. For a provider, you want to trust that we've done the due diligence to get you the information you need to execute the task at hand."

The 2023 DHS builds on B.C.'s existing CareConnect and Health Gateway portals. Care Connect is the province's secure, view-only electronic health record that offers authorized care providers access to patient encounters, lab results, medication history, diagnostic imaging and more.

"Acute care settings are connected inside their regions quite well," said Tatto. "It's the cross-regional communication where we can target more and that's a

problem across the country, so we're looking at ways of making those connections stronger, better and more consistent."

Health Gateway, the province's patient portal, allows patients to access lab results, proof of vaccinations, COVID-19 test results, health visits, immunizations, consultation notes, discharge summaries, and their medication history dating back to 1995. "Is it complete? No," said Tatto. "There are always data sets that are missing, so

that's where we're moving towards and focusing a lot more." Currently, the Health Gateway has more than 1.5 million users.

B.C.'s biggest challenge is freeing health information from the electronic medical record systems in use by the province's community providers and specialists. "We have approximately 30 EMRs in use in B.C. and that makes interoperability more challenging," said Tatto. "Alberta and Ontario took a different approach. Here, (the selection of an EMR) was very much up to the individual physician. That was just the way it happened. Integrating with 30 different EMRs is difficult, but that's what we're going to accept as a challenge."

The PHSA is working closely with Canada Health Infoway to address this challenge and is confident of coming up with ways to make it easier for vendors to connect to its systems.

"We're not going to create unique B.C. versions of everything because that doesn't help our vendor partners," said Tatto. "We want to make sure that if something has been solved in the country already and if there are interoperability standards that work, we're going to try really hard to leverage them."

"Our default will be to work closely with our partners across the country on industry-wide and pan-Canadian standards. If there's a standard that has been adopted outside B.C., we're going to do our best to make sure that we support that work."

Another important priority for British Columbia's DHS is the integration of health data from encounters with the province's nurse hotline and walk-in clinics. "Virtual health is another thing we need to look at, because making sure that people are attached to their health information is a core tenet of our digital health strategy."

Having already invested in the Health Gateway, Tatto sees patients in B.C. continuing to access their health information from a centralized provincial portal rather than importing data from multiple sources into health apps like Apple Health. "Our job as a system is to make sure that the data is available in a secure way and that if patients want to import it into Apple Health or Google Health they can do so."

The development of an eReferral system is one of the early deliverables resulting from the PHSA's digital health strategy, but many more enhancements to the province's digital health infrastructure are planned as part of its detailed and aggressive roadmap over the next couple of years.

GI clinicians launch virtual care program that helps patients with IBD

BY PETER HABASHI
AND DR. GEOFFREY NGUYEN

TORONTO – This year, a virtual care network to help with the treatment of inflammatory bowel disease was launched. The Canadian Network for Virtual Access to Specialists for Inflammatory Bowel Disease (CaNVAS-IBD) is a national pilot program to expand access to virtual care for IBD patients across Canada. CaNVAS-IBD is sponsored by the Helmsley Foundation and is part of the Crohn's and Colitis Canada PACE network.

This initiative intends to improve health outcomes, address gaps in care and develop innovative solutions that can create changes in the public healthcare system.

The CaNVAS-IBD pilot program is led by Dr. Geoffrey Nguyen (Sinai Health Systems, Toronto), along with Dr. Waqqas Afif (McGill University, Montreal), Dr. Charles Bernstein (University of Manitoba, MB), Dr. Sharyle Fowler (University of Saskatchewan, SK), Dr. Jennifer Jones

(Dalhousie University, NS) and Dr. Kerri Novak (University of Calgary, AB).

Access to Inflammatory Bowel Disease (IBD) continues to be an issue across Canada as our country has among the highest incidence of IBD in the world. According to the most recent Canadian data in 2018, there are approximately 270,000 Canadians living with IBD and the prevalence of IBD will rise steadily over the next decade.

While IBD can be diagnosed at any age, the age groups that are most likely to be diagnosed are adolescents and young adults from 20 to 30 years of age who require long-term and chronic care throughout their lifespan to optimize clinical care and outcomes. The wait time to see a gastroenterologist for inflammatory bowel disease (IBD) can vary depending on a number of factors, such as the location, the severity of the condition, and the availability of specialists.

The Canadian Association of Gastroenterology (CAG) established a wait time benchmark in IBD care to emphasize the importance of access in this

population. For instance, the recommended wait time to see a specialist for IBD is two weeks, but national audits suggest that the actual wait time is closer to 126 days. For this reason, it made sense to create a new solution for treat-



Peter Habashi



Dr. Geoffrey Nguyen

ing IBD patients, one that provided faster access to specialists.

The CaNVAS-IBD program has established provincial hubs championed by virtual care coordinators who facilitate virtual visits with IBD specialists in centres of excellence.

While the CaNVAS-IBD program was

launched earlier this year, we are building on six years of experience from the PACE telemedicine program at Mount Sinai Hospital. During this project, we found substantial deficiencies in specialist care early in the course of IBD and a lack of continuous IBD care in regions where the number of gastroenterologists per capita was low.

Our findings have been consistent over 18 months of operation, which demonstrates the feasibility of our program for enhancing access to underserved IBD populations. Already, great progress has been made. The program's median wait time for new consultations is 17 days and for patients with active IBD symptoms, only 8.5 days. Virtual care also showed the potential to yield significant cost savings for provincial travel grants that were unnecessary.

Peter Habashi, NP-Adult, is Director of CaNVAS-IBD. Geoffrey Nguyen, MD, PhD, Gastroenterologist, is Medical Director, CaNVAS-IBD. For more information, see: <https://www.canvasibd.ca/referral-info>



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CABHI conference disrupts and reimagines the experience of aging

BY NEIL ZEIDENBERG

The Centre for Aging + Brain Health Innovation (CABHI), based in Toronto at Baycrest Health Sciences, held its 5th annual CABHI conference in late March with the theme “Daring to Disrupt: Reimagining the Aging Experience.” This year’s event brought together over 1,350 participants from over 30 countries all focused on innovations in age-related technology.

Seniors are said to be the backbone of society. By 2051, it’s believed that one in four Canadians will be 65 or over. Understandably, over the next two decades, it’s also predicted there will be a substantial increase in cases of Alzheimer’s disease, dementia, and other chronic diseases.

“There are 600,000 Canadians currently living with Alzheimer’s and dementia and the costs to treat these indi-

New technologies are helping seniors to age at home, while maintaining their cognitive, emotional and physical health.

viduals will reach over \$16 billion by 2030,” said Jean-Yves Duclos, the federal Minister of Health. “That’s why the Government of Canada is supporting innovators like CABHI, with \$44 million since 2015, and a further \$30 million for the next three years, to help older adults and their caregivers.”

He added, they aim to help seniors safely age-in-place while maintaining their cognitive, emotional, and physical well-being.

Winner of this year’s People’s Choice Award went to LUCID (<https://lucidtherapeutics.com>), an AI-powered digital solution that transforms music into medicine. Personalizing therapeutic music experiences based on real-time mood, LUCID targets a wide range of health conditions, and symptoms like anxiety and agitation.

Historically, CABHI has held a pitch competition at its annual summits. This year, CABHI showcased finalists in three of its funding programs.

First were the finalists of the Mentorship, Capital & Continuation (MC2) program, in partnership with National Bank. This is a venture-like funding program where CABHI helps innovators scale and grow their companies. Winners can receive up to \$400,000 from CABHI, plus matching funding from CABHI partners including: Ontario Brain Institute, Greyhill Capital Partners, Ontario Bioscience Innovation Organization, and financing from Clearco.

Then there was also a showcase of the finalists of the Spark program. In this program, winners will receive up to \$50,000 to help front-line clinicians and researchers turn their ideas into prototypes or launch their solutions.

Some of the current cohort finalist projects include:

- Check your hearing. Change your life: Hearing loss can significantly reduce quality of life and reduce independence. This project uses an online hearing screening tool with a Baycrest audiologist to estimate a client’s hearing status.

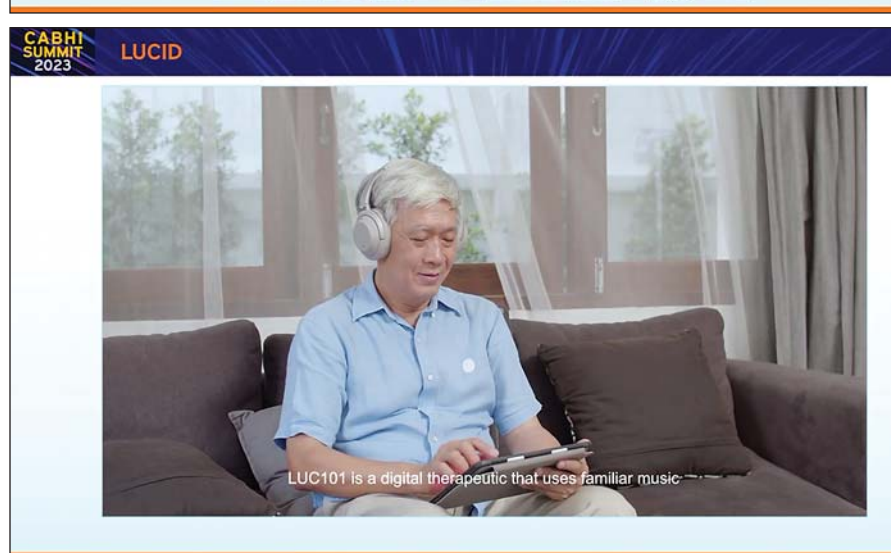
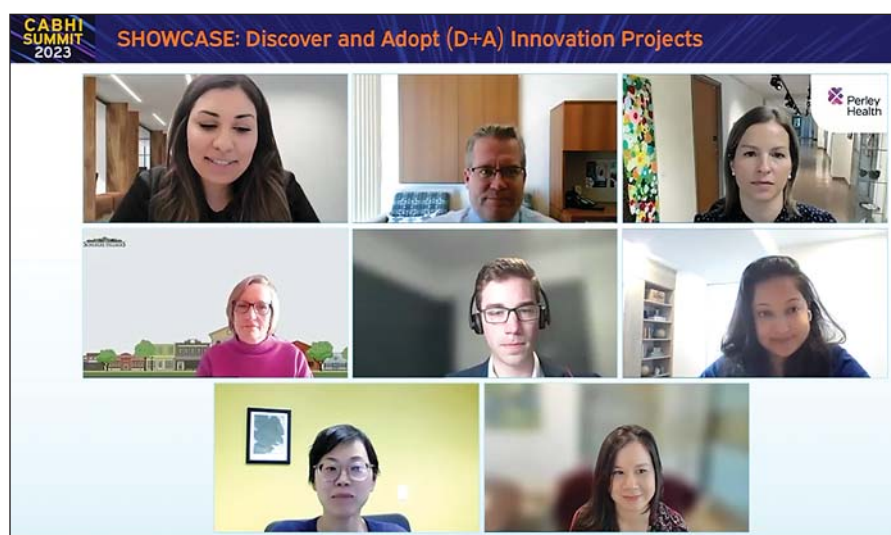
- To help dementia patients living in social isolation, Bruyere, in Ottawa, is providing clients with a virtual reality companion headset. Clients can hear a computer-generated companion speak to them, helping to alleviate social isolation.

- Home Care Workers Co-operative: A virtual caregiver support program that reaches out to the wider PSW community, asking them to connect to share their experiences; finding tools to support caregivers and bringing people together.

- Baycrest is using VR as a non-pharmacological leisure intervention. VR can improve quality of life and improve outcomes.

UHN – Immersive VR Therapy: rest and relaxation. Clients can select from a variety of videos; in 20-minute sessions patients are safe and engaged, leaving a lasting impact. It’s also entertaining and can help improve memory.

And the third showcase highlighted CABHI’s new Discover and Adopt (D+A) program designed to help companies get their solutions adopted into the health ecosystem. During the D+A showcase, participants discussed solving the adoption problem. Although many great services exist to improve quality of life, unfortunately



these solutions don’t always get into the hands of people who could really use them.

Funding is always a barrier to adoption, but finding key stakeholders to bring innovation into an organization is also essential. D+A gives organizations the ability and capacity to find these solutions, trial them to determine if they’re suitable for the intended audience and then advise about how to go about adopting it.

How can you use innovation to improve a resident’s quality of life? Danielle Sinden, director, Centre of Excellence and Research Operations at Perley Health, noted that results from quality-of-life surveys indicate the top focus to improve the resident experience. “Having residents participate in more meaningful recreational activities. A projector offers a slew of interactive activities for people of all cognitive abilities. Benefits include improved patient mood and responsive behavior. Staff see immediate results, and family can participate as well when they visit and engage with loved ones.”

Regarding dispensing of medication, AI technology can be used to monitor a patient’s movements at home. This can improve patient safety and reduce risky behavior leading to better outcomes.

Any advice to those starting a project? Blake Daly, manager, Health Innovation at Bruyere said, “Innovation is a collaborative process. Understand you will be collaborating with more stakeholders than you anticipate. Meet with patients and get their feedback. Find a partner interested in solving a specific problem.”

At a presentation on the Future of Seniors, global participants noted the use of technology is essential in the treatment of the elderly. They also believe there needs to be a new manner of thinking in the use of technology to measure progress and to determine whether a product is suitable for older adults.

Moreover, empathy will be a powerful tool for driving change. Hence, the sector needs to find people who are passionate about actually pursuing age-technology, and who want to make a positive impact.

When asked, “What will progress look like,” participants said it boils down to adoption of technology by seniors, their family members, and staff. That includes, for example, residents using voice recognition solutions like Alexa to stay socially engaged, to communicate with their family and friends and look after their body and mind.

Jennifer Giordano, manager, Clinical Operations at RetiSpec (<https://retispec.com>), an AI-based company focused on early detection of Alzheimer’s disease using non-invasive techniques such as retinal eye exams, said there are currently 12 novel projects with grants for seniors 65 and over. In these projects, RetiSpec is working with The Alzheimer’s Society and the Toronto Memory Program.

Using tools like RetiSpec, assessing and screening patients with cognitive decline for Alzheimer’s and dementia can take place in the community. Making assessments available close to home can improve participation in these studies, as it’s easier for many people.

Generative AI appears in healthcare

CONTINUED FROM PAGE 2

nal reports and checks to make sure that they’re accurate; if not, he or she can edit them before uploading them.

It’s been found that ambient voice systems of this sort can often chart more comprehensively than doctors. “If the doctor is tired, and is just trying to get through the day, he might not be charting everything. But the AI system will chart everything,” Dr. Rhew said.

Microsoft and Nuance are close to releasing DAX Express in Canada. “It’s coming soon to Canada,” he said.

Meanwhile, other companies have been devising their own versions of generative AI, including Google, which is using it in its search engine. It’s also planning to re-

lease a system for public use, called Bard. Meta, the parent company of Facebook, is also a major developer of generative AI.

Of course, the rise of such powerful systems have aroused fears that they could be misused. That fear recently led prominent figures in the technology industry, including Elon Musk, to call for a six-month moratorium of the development of systems beyond the capabilities of ChatGPT.

Dr. Rhew said there’s some sense in this, comparing the emergence of ChatGPT to the automobile in the age of the horse and buggy. “Now, with newer technology, we’ve introduced a car that takes us much faster. But we don’t yet have the stop signs and lines on the road that are needed. We need these rules to do things safely and to mitigate harm.”

Choosing wisely in practice: Integrating guidelines into electronic records

BY ISHAN ADITYA, AMAMA KHAIRZAD,
AND PUNEET SETH

In the quest to improve resource utilization, reduce harm to patients, and decrease the carbon footprint in healthcare, Choosing Wisely Canada (CWC) has been a leading voice, providing guidelines that positively impact clinicians in delivering high-quality care.

A major barrier to scaling the impact of these guidelines, however, is efficiently incorporating them into clinical practice without negatively impacting workflow. Electronic Medical Records (EMRs) represent an important vehicle for implementing CWC's guidelines, providing immediate access at the point of care in both hospital and outpatient settings.

To address this issue, a pilot project was launched in collaboration between TELUS Health and CWC to integrate recommendations from their "Cold Standard" viral toolkit into two EMR products: the Collaborative Health Record (CHR) and PS Suite.

This toolkit contained provider-facing recommendations and patient education tools aimed at helping patients manage viral upper respiratory tract infections and reducing unnecessary prescription of antibiotics. The aim of the pilot was to explore the feasibility of incorporating such recommendations into standard clinical content within EMRs, taking into account effort involved and uptake from clinicians.

"The Cold Standard", one of many recommendations provided by CWC, was selected for the pilot due to its broad applicability in primary care and since antibiotic resistance is a significant issue facing the Canadian healthcare system.

The Strategic Counsel of Canada conducted a study surveying 3,000 people to

viral cold), was made available as a form or document within the respective EMRs that can be sent or given to patients, allowing them to leave with something in hand.

Provider-facing content, such as guideline recommendations for point of care, were integrated into standard upper respi-

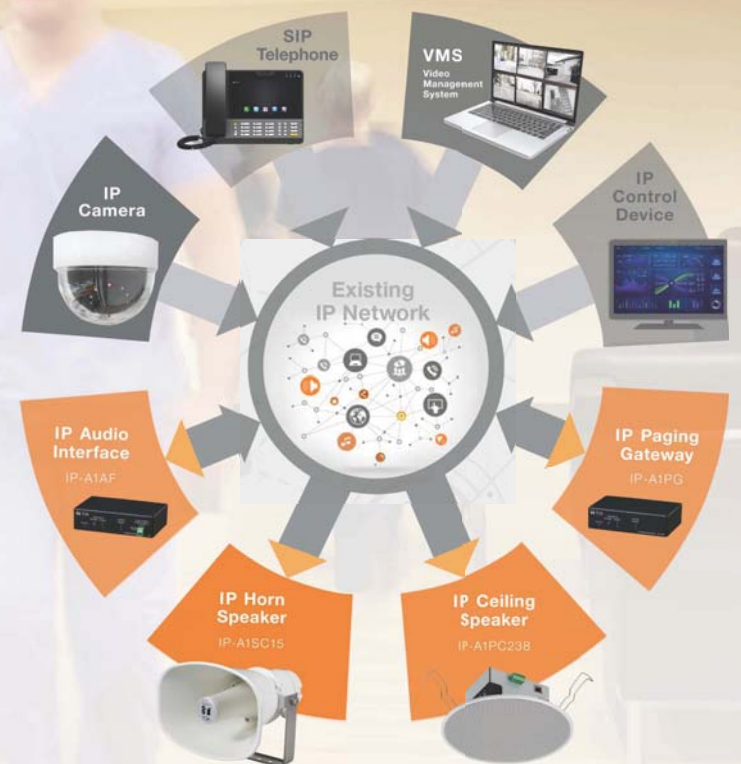
ratory infection documentation templates. In the case of the CHR, where there is a built-in digital health questionnaire system, pre-visit educational infographics from CWC were incorporated into cough/cold questionnaires.

For the pilot launch, user instruction

documentation was prepared for seamless implementation. However, as the toolset leveraged existing functions within the respective EMRs, there was little to no extra effort required on pilot sites and no change in their regular behaviour. The project re-

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gauge Canadians' understanding of antibiotics. Approximately 32.5 percent believed that antibiotics "can kill viruses" or that they are "effective against colds and flu" (27.9 percent). This coincides with the current situation where antibiotic resistance in the country is attributed to overprescribing antibiotics to combat viral illnesses.

The pilot was launched in late 2021, with several primary care clinics across Canada implementing the toolkit into their practices across 2022. The first phase of the project, which involved integrating the recommendations into the clinical content of both CHR and PS Suite, required relatively little effort by the stakeholders. Of note, no software development was required and any changes to the EMRs themselves were not necessary. Stakeholders within the primary care community and with pilot sites were engaged for feedback on the approach and the content, following which some adjustments were made.

Patient-facing content, such as the "Viral Prescription" (which provides recommendations to patients on how to handle a

Cortellucci Vaughan Hospital shows digital systems can improve care

BY JERRY ZEIDENBERG

VAUGHAN, ONT. – Mackenzie Health's new site – Cortellucci Vaughan Hospital – has now been open for just over two years and is among the most computerized medical facilities in Canada. It was designed from the ground up as a “smart hospital”, one that uses information systems to improve the flow of data to achieve better medical outcomes for patients.

“We didn’t install all of this technology just because it’s cool,” said Dr. Aviv Gladman, chief medical information officer. “It’s all for the sake of the patients.”

The approach is paying off for this state-of-the-art facility, located just north of Toronto in a fast-growing, multicultural suburb. The digital systems are helping the hospital achieve its mission of becoming what president and CEO Altaf Stationwala calls a “zero harm” hospital.

Among the most forward-thinking applications used at both of Mackenzie

The hospital's approach is based on the collection and sharing of data to smooth workflow and improve patient care.

Health's sites – Cortellucci Vaughan Hospital and Mackenzie Richmond Hill Hospital – are electronic, “quality dashboards” in hallways that display many of the quality metrics being measured by the hospital. In addition to being viewable by staff and clinicians, the electronic dashboards can be perused by patients and their friends and families.

The boards keep tabs on pressure injuries (bedsores), patient falls, hand-washing rates by clinicians, and central line associated blood infections (CLABSI).

Of note, central-line blood infections are widely prevalent in North America. In 2020, the Public Health Agency of Canada reported that 69 percent of all device-related hospital-acquired infections (HAIs) were caused by central-line blood infections. It cautioned that healthcare-associated infections pose a serious risk to patient safety and quality. They contribute to prolonged hospital stays, antimicrobial resistance, and unnecessary deaths.

To its credit, Mackenzie Health reduced its own CLABSI rates to nearly zero over a nine-month period, said Dr. Gladman.

Much of the credit for this goes to the quality dashboards, an initiative driven by Mackenzie Health's Quality and Patient Safety team who worked in partnership with the Digital Health team. The quality dashboards showed clinicians and the public a problem area, and focused the efforts of staff on taking the steps needed to improve.

“Full transparency is driving better performance,” asserted Purvi Desai, vice president Digital Health and CIO. She noted that a debate went on in the hospital as to whether so much information should be made visible to the public, especially if the numbers weren't good. But in the end, the displays went up showing key metrics.

“We went for full disclosure, and it has been motivating our staff,” said Deborah Lefave, nurse educator, Critical Care. She observed that there are constant huddles around the boards in the ICU, and that when excellent results are achieved, there are quick celebrations. “We bring out the chocolate,” she said. “It really builds morale.”

Importantly, the key indicator display boards are connected to the hospital's data warehouse. The data is collected continuously and is constantly refreshed on the quality dashboards – some of it the next day.

Dr. Gladman pointed out, moreover, that the hospital's technological approach is based on the collection and sharing of data to smooth workflow and improve patient care.

“It's all about ambient intelligence,” he said. “We're taking information and putting it into the hands of the people who need it.”

CEO Altaf Stationwala added that all the hospital's digital applications are connected to its Epic information system. That solution was acquired several years ago, becoming the first enterprise-wide Epic installation in Canada, when Epic didn't have much of a footprint in Canada and the selection of Epic was seen by some as risky. “The choice was driven by our clinicians,” he said. “Now, 22 additional hospitals in Ontario are running on Epic.”

For its part, Mackenzie Health developed its Epic system extensively, becoming the first full-service hospital in Canada to achieve the HIMSS EMRAM Level 7 designation, the highest stage on the EMRAM



Altaf Stationwala, president and CEO aims to make Mackenzie Health a 'zero harm' hospital.

ladder. Moreover, it tested and refined various applications at its 60-year-old Richmond Hill site, so they'd be ready to implement at the new Cortellucci Vaughan Hospital in nearby Vaughan.

A case in point is the hospital's real-time location system. Staff and clinicians all wear badges that can determine their location anywhere within the walls of Cortellucci Vaughan Hospital. Equipment is also tagged in this way, making it easy to find an extra IV pump or wheelchair.

Demonstrating how they can identify equipment on a computer screen, the team noticed that a smart bed had made its way from the second floor ICU up to the seventh floor. “A patient was probably transported in the bed,” said Purvi. A note was made to retrieve it – ending the mystery of the missing smart bed.

The RTLS has been especially useful during the COVID pandemic. “There have been supply chain problems in the last few years, and with equipment hard to come by, we don't want it sitting idle,” said Felix Zhang, chief technology officer. Thanks to the computerized locating system, staff can quickly obtain the equipment they need without spending much time searching.

As Purvi observed, “It saves a tremendous amount of time for clinicians. They can focus on patients, instead of rounding up equipment.”

The system also helps patients, too. For example, when staff and clinicians enter a patient room in the ICU, a monitor in the

room shows the identity of the person who just entered. That helps patients and their families, as they quickly know who they're working with.

The locating system also shows who is using the hand-hygiene unit upon entering and exiting a room, as it's tied into the data warehouse. To its credit, hand-washing rates are high at the hospital, but if and when they dip, various care units can be reminded to pay more attention to this basic infection control technique.

A major part of the hospital's communication solution is the Vocera system, which enables quick messages between staff, doctors and nurses – all on smartphones across both hospitals.

For their part, nurses make use of a pool of iPhones. Each day, upon arriving, a nurse will pick up an iPhone, tap it with their tag, and the phone will automatically populate with the nurse's patient list for the day.

Physician phones work in a similar way, showing their daily worklist. Doctors, however, tend to use their own smart phones as part of the hospital's BYOD program. Zhang mentioned that the phones are set up so that hospital information is walled off from personal data. “At the end of each day, the patient data is wiped from the phone, so the doctor never takes it out of the hospital,” he said.

The phones are particularly effective in assembling teams when different codes are sounded – such as blue for a patient in



Dr. Aviv Gladman, chief medical information officer: “It's all for the sake of the patients.”



Purvi Desai, vice president Digital Health and CIO. “Full transparency is driving better performance.”

cardiac arrest or white for a potentially violent patient or visitor.

In these cases, messages are sent to the appropriate teams to come immediately to the patient room or an area of the hospital where they're needed. If a doctor or nurse doesn't respond, the message is routed to the next appropriate person.

At the same time, overhead alarms sound in the unit – Dr. Gladman says that it's still a fire safety regulatory requirement. And a light flashes over the appropriate room, guiding staff to the right location.

As a project for the future, the hospital is testing the use of cameras to provide remote observation in some patient rooms. This could help with security by identifying people who should not be in a patient's room – and with patient safety.

Zhang observed that the system works, it's just that there are legal and social hurdles. The public worries, for example, that they're being tracked when they see cameras in rooms.

In the future, however, the issue may become whether the benefits outweigh the

The communication system, using smartphones and the Vocera system, has been adept at assembling teams quickly.

privacy liabilities – just as outdoor cameras are effectively used on streets for traffic and security purposes.

Each of the ICU rooms in Cortellucci Vaughan Hospital is large and bright. Patients and their families can adjust the lighting and temperature from their bedside tablets. Moreover, they're single-patient rooms, which of course is much better for infection control. And a computer panel outside each room summarizes the conditions of the patient inside – alerting nurses to infections, to pay special attention to falls, or even that a patient is potentially violent.

A large TV screen is mounted on the wall inside each room, as well as tablet beside the bed, with each providing entertainment and education and enabling the patients to order their own meals through a solution supported by GetWell.

The Hillrom smart beds can alert nurses when the patient has gotten out of the bed or is even trying – all the better for avoiding falls. “When an alarm goes off on a nurse's phone, it won't stop until the nurse goes into the room to check on the patient,” commented Lefave, explaining that this is important for patient safety.

The bed itself is programmed to know whether the patient needs extra precautions. For example, it will alert the nurse to use the guardrail for certain patients, such as frail or elderly.

Another area where Mackenzie Health is ahead of the curve is in linking all its medical monitors into the hospital's Epic electronic record. For example, bedside monitors in all patient rooms at both hospitals are all connected to the EHR so that nurses don't need to transcribe vital signs.

The solution for this was special middleware supplied by the hospital's main equipment vendor, Philips.

Of special significance, too, is Mackenzie Health's closed-loop medication man-

agement system, using Omnicell technology. These devices, the size of refrigerators, are robotic and can assemble the meds of each patient as instructed by clinicians. But to access the medication closet in the unit, a clinician must first use a fingerprint scanner that logs who entered the system to dispense meds.

As well, the system knows which drawers a nurse can open, based on his or her patient list. And access to narcotics is highly controlled – for some drugs, two persons are required to access the system.

That's all to reduce the misuse of medications and to boost patient safety. At the same time, the system can reduce the time needed to dispense medications, as a nurse can tell the system what they need from a smartphone at the bedside instead of keying in the information at the medication station.

At the point-of-care, the nurse scans the medication and the patient wristband; that tells him or her whether it's the right medication, dose, time and patient. Alerts sound if there are any discrepancies, enabling the nurse to check with another clinician. Moreover, all this information is logged into the system – again, a major method of tracking and raising patient safety.

Many of these systems were trialled first at Mackenzie Richmond Hill Hospital. Zhang noted that the tests “allowed us to identify where we needed to adapt technology to fit our processes and workflows to meet the needs of our patients,” as solutions don't always perform as advertised and must also be adjusted to the ways that staff work.

In some cases, moreover, “things were not worth the cost,” he said. In others, solutions didn't work out the way they were expected to. “We tested BlackBerries, and then moved to Android phones, and finally we settled on the iPhone. They're super-stable,” said Zhang.

Dr. Gladman asserted that many of the refinements of the system have been driven by front-line staff. “We always ask people, what do you need to do and what would you like to see next?”

For example, in the MAR, staff said they'd like to see blood sugar numbers automatically populate – so the team incorporated this capability into the record. Re-

pecting, and she goes into labour, the dad and kids can wait in the library,” said Zhang. As well, patients and staff can order books, CDs and DVDs from any library in the Vaughan library system, and they will be delivered to the Mackenzie Health Vaughan Library at Cortellucci Vaughan Hospital.

And as a bonus, every child born in the hospital automatically gets a library card.



Felix Zhang, CTO. Tests of the technologies validated some of them and eliminated others.

sponding to the needs and requests of staff is an important way to make sure that electronic systems are relevant to the way people actually work.

While it isn't a technological component, a nice feature of this high-tech hospital, and one that catches the attention of a visitor upon entering is the public library on the first floor. It's the first hospital-based library in Ontario that's part of a municipal library system, and it's a great resource for patients and their families.

“When families visit a mom who is ex-

It may take a few years to learn how to read, but he or she is set up and ready to go. The card can be used at any public library in Vaughan region.

On the digital side, the hospital is actively adding new solutions. “We're turning on new features every month,” said Stationwala.

He observed that Mackenzie Health is also reaching out to the community, to tie the continuum of health into its digital

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E-prescribing gives family physicians needed administrative support

In medicine, a great deal of communication still relies on fax, which is inefficient and can be unreliable. PrescribeIT facilitates direct, secure messaging between prescribers and the pharmacists.

In this Q&A article, Dr. Soreya Dhanji, a family medicine physician in Toronto, shares her experience with how implementing PrescribeIT has reduced the administrative burden in her practice and improved continuity of care.

Walk me through what a typical day at work looks like for you. How much time do you spend on administrative tasks?

During a typical day, I'll see patients booked back-to-back for a variety of concerns and procedures. I think I speak for many of my colleagues when I say that the actual practice of medicine and the interactions with my patients are my favourite parts of the job. However, increasingly, administrative tasks can lead to hours of extra work beyond direct patient care – from charting and completing lengthy patient referral forms, to answering communications from other members of the patient's care team such as pharmacists. It's all eating into time seeing patients.

When these administrative tasks pile up, I can spend anywhere from two to four hours after a full day of clinic getting caught up, which is a significant source of burnout among family physicians. In fact, streamlining and reducing required documentation and administrative work was one of the five recommendations from the Ontario Medical Association's Burnout Task Force in their 2021 report.

How can digital tools like PrescribeIT reduce the administrative burden for a physician's practice?

In medicine, much of our communication is still reliant on fax, which is inefficient and can be unreliable. Far too often, we'll encounter pharmacies or specialists having difficulty receiving a fax, or communications coming through that require further clarification, all adding up to time away from patients. A couple years ago, my practice implemented PrescribeIT, a national e-prescribing service that provides safer and more efficient medication management by connecting community-based prescribers to pharmacies in the community, enabling the digital transmission of prescriptions.

PrescribeIT's clinical communications tool also facilitates direct, secure messaging between prescribers and the pharmacists. Whether it's having confirmation from the pharmacy, discussing a patient's medical history, or addressing questions, the entire process is more streamlined.

It also gets documented directly within my EMR, which eliminates extra clerical work while still ensuring an accurate and up-to-date patient record. Even without 100 per cent of pharmacies enrolled yet, implementing PrescribeIT has noticeably reduced our administrative burden, saving me, on average, an hour a day.

How do you think broader adoption of e-prescribing will impact and improve health care delivery?

With e-prescribing, I find there's increased communication within the patient's circle of care and because it integrates directly with our EMR, it also improves continuity

of care. Being able to see that the patient has filled the prescription allows me to understand what the patient has tried when we're thinking of other approaches.

Recently, I had an elderly female patient on blood pressure medications for hypertension that I wanted to keep a close eye on and in this case, PrescribeIT allowed us to optimize the patient's safety and cardiac health. With the prescription, I requested that the pharmacist keep me apprised of blood pressure readings when the patient

came into the pharmacy between our regular follow-up appointments.

Despite adherence to the medication, the patient wasn't responding as we'd hoped and the pharmacist was seeing increases in the patient's blood pressure. Using PrescribeIT's clinical communication tool, the pharmacist alerted me to this and we were able to adjust the patient's medication regimen. I also had the necessary visibility into the situation, so that I could prioritize bringing the patient in for an exam.

Do you think e-prescribing is here to stay?

An estimated 1.8 million Ontarians are without a dedicated primary care provider. We need to take every available step to decrease administrative burdens in order to help family physicians free up time that can be spent with patients. In my experience, implementing tools like PrescribeIT is one of these steps. Even though not all Ontario pharmacies are enrolled with PrescribeIT yet, I've already seen a noticeable reduction in my time spent on pharmacy-related administrative tasks and this can only improve as PrescribeIT is more widely adopted.

With more Canadians receiving care from multiple health care professionals, I've also found that e-prescribing has reduced fragmentation of care between different health professionals. It's important we continue to raise awareness and emphasize the value of PrescribeIT, not only among health care practitioners but also patients.

Pharmacists are often more accessible to patients, so it's a significant benefit to patients to know that they can talk to their pharmacist about any concerns or their response to a medication and that this can easily be communicated directly back to their family physician. The more we can all work together, the better the outcome for all involved in the patient's circle of care.



Toronto family medicine physician Dr. Soreya Dhanji

Virtual nursing project in Nunavut shows improved outcomes

BY ALYA NIANG

In response to the pandemic, health systems across Canada quickly pivoted to launch or expand virtual care options. Since then, health systems have been recognizing how virtual care can address the diverse needs of patients and healthcare providers to deliver safe, timely and equitable care.

In 2020–2021, the Government of Canada provided funding to the provinces and territories to enhance technology and infrastructure that would facilitate the delivery of virtual care, to evaluate the impacts of virtual care or to establish policy supports for virtual care. As a result, provinces and territories implemented a wide range of initiatives.

To share the successes and challenges of these initiatives and to inform future virtual care policy and delivery, the Canadian Institute for Health Information (CIHI) conducted interviews across the provinces and territories.

This included Nunavut, where we

found high patient satisfaction with the Virtual Nurse Practitioner Chronic Disease Program.

While Nunavut has deployed telehealth services to its 25 communities for more than a decade, with equipment provided in every health centre to facilitate patient-provider communication, a strong foundation in primary care has been difficult to achieve due to challenges such as recruiting and retaining staff.

To address gaps, the new Virtual Nurse Practitioner (NP) Chronic Disease Program has been piloted to support patients at home, offering an adaptable model of care delivery that leverages NPs.

The program has a dedicated NP workforce providing chronic disease management in nine communities, where they meet patients virtually at minimum every three months and can have virtual specialist consults to support patient care. The program provides an opportunity for patients to be screened for chronic diseases and cancer,

including cervical and colorectal cancer, hypertension and diabetes.

Program results/successes from data collected between October 2021 and October 2022

- 358 new referrals were registered in October 2022, compared with 121 in December 2021. Nearly half of patients

Not only is the virtual nurse practitioner program popular with patients, it has also improved care delivery.

(45 percent) had three chronic diseases addressed per visit.

- Between 27 percent and 42 percent of newly referred patients were not up to date with screening for chronic diseases or cancer. Of these patients, more than 90 percent became up to date after their first intake appointment.

- Chronic disease biomarkers showed a statistically significant decrease following

program enrolment. Patients at higher risk (e.g., uncontrolled diabetes, significantly overweight) saw the greatest benefit, with a larger average decrease in their biomarkers.

- 96 percent of patients were satisfied with their overall experience; 93 percent of patients indicated that they had received the same quality of care with the NP virtually as with an in-person visit; and 94 percent felt that their cultural values had been respected during their appointment.

- 97 percent of patients felt that there was a positive change to their quality of life, and 94 percent felt that their chronic disease was better managed since seeing the NP virtually.

Overall, the program's success highlights the value of integrating NPs in virtual care to improve access to primary healthcare, and it provides an adaptable model for other jurisdictions across Canada that deliver care to rural and remote populations.

While virtual care has long been a

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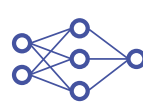
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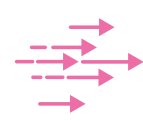
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Precision medicine is reaching fruition, but we must address equity issues

BY JERRY ZEIDENBERG

OTTAWA – CADTH, Canada's public agency for evaluating drugs and healthcare technologies, has produced a 'watch list' of the Top 10 precision medicine technologies likely to make an impact over the next five years. The blockbuster technologies have the potential to dramatically change the delivery of medicine, and they include liquid biopsies instead of surgical biopsies, and genetic sequencing of an individual's DNA to determine whether they are good or bad candidates for a certain drug.

"In the next five years, we may see greater implementation of these technologies into routine care, and they could drastically change medical treatment in Canada," said Sudhu Kutty, vice president of CADTH, at a conference that unveiled the new report. "They can reduce unnecessary care ... and they can maximize the benefits of treatments for patients and minimize the harms."

At the same time, CADTH acknowledged there are serious roadblocks that may hinder the progress of precision medicine, especially in Canada. The report is titled: "2023 Watch List: Top 10 Precision Medicine Technologies and Issues." The study serves, said, Kutty, "to separate hype from hope".

A group of expert panelists didn't mince

words about the challenges facing precision medicine in Canada, outlining how the new technology could become an elite form of diagnosis and therapy for the rich and privileged. "Patients are already accessing these tests, but access is totally determined by the socioeconomic status of those patients," asserted Dr. Shantanu Banerji, a medical oncologist at Cancer Care Manitoba. Dr. Banerji explained that the tests can be expensive and are often not covered by provincial health plans.

As a result, "Patients who have the means can go to other jurisdictions and parts of the world to access these precision technologies."

But he also noted that most patients – such as the average working person who suddenly finds himself sick and in hospital – don't have the financial resources for this sort of exclusive, medical tourism.

On the macro level, Dr. Banerji said that he has observed a marked difference in care between countries with universal payor systems and privately run healthcare. "In the latter, you definitely have these types of technologies being adopted more readily."

That's because the patient pays, either privately or through private-sector insurance. In Canada, however, patients are not allowed to pay privately for medically necessary procedures.

When it comes to covering the costs of



Dr. Shantanu Banerji, Cancer Care Manitoba

precision medicine in Canada, Dr. Banerji said the authorities tend to spend their time debating whether the price of precision medicine provides real value. "But they never truly follow up on that value and do the formal assessments," he said.

Dr. Karen Dewar, an associate VP at Genomics Canada, and a panelist at the CADTH conference, agreed with Dr. Banerji, and added another danger to the system: "We often don't look at the cost of not adopting these technologies."

Not only are patients poorly served by denying them access to new tests and methods, but "We also fall further behind others [internationally]," she said.

There are also geographic and systemic barriers, as expertise in personalized medicine is mostly concentrated in urban centres. "In the universal payor system, often these technologies are only used in tertiary settings, in university hospitals. But if it's going to be adopted, it should be a technology that's accessible to all."

Valerie McDonald, a patient advocate and panelist at the CADTH conference, illustrated the lack of equity in Canada when it comes to personalized medicine. One member of her family with breast cancer was able to receive a precision medicine test, while another family member, also with breast cancer but living in a different province, was denied the same test. "It's a fragmented healthcare system," she observed.

McDonald said that in the future, as the technology proliferates, it will be difficult for patients to know which tests are available, and where.

As well as financial and geographic barriers, an "ethnic" barrier also exists. Dr. Dewar pointed out that much of the research and data collection that precision

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Evolving the promise of precision medicine with theranostics

Theranostics is an exciting field of molecular medicine. Enabled by molecular imaging techniques such as positron emission tomography (PET) and single photon emission computerized tomography (SPECT), the theranostic approach uses specific targeting compounds for both imaging and therapy of a particular malignancy.

Its ability to identify areas of disease that are more likely to respond to targeted therapies is invaluable to cancer patients. And clinicians are praising its successes and its potential to help them more effectively navigate disease management by aligning patients with the treatments that will be most impactful for them.

With the evolution of advanced imaging technologies, and the continuous search to discover new tracers for targeted therapies, industry leaders such as GE Healthcare are fortifying the entire molecular imaging pathway, from providing access to emerging molecules to continuing to push the limits of molecular imaging with PET/computed tomography (CT) and SPECT/CT.

Innovations in molecular imaging technology introduce much more imaging data for processing and include highly sophisticated automated tools and artificial intelligence-based reconstruction algorithms to assist clinicians as they render complex diagnoses.

Molecular imaging is essential in theranostics, allowing for non-invasive, repetitive assessment of the compound

uptake and allowing for characterization of the tumor tissue, and therapy response over time.

In this data-rich environment, theranostic target pairs have been developed, validated, and successfully used in treating lymphomas, neuroblastoma, neuroendocrine tumors and more recently, certain prostate cancers.

Strong clinical need in areas such as prostate and other cancers continue to fuel the search for additional diagnostic and therapeutic pairings with the goal of improving quality of life and outcomes for cancer patients.

When clinically relevant prostate cancer is found and treated at an early stage before metastasis has occurred, treatments such as prostate cancer surgery and radiation often result in improved survival. Worldwide, however, prostate cancer is the most commonly diagnosed male malignancy and the fourth leading cause of cancer death in men.

Current screening methodologies for prostate cancer include blood test to quantify prostate-specific antigen (PSA), or hormone levels and common treatments include radical prostatectomy combined with radiation therapy, however, this route is not always a possibility due in part to the complex process required to detect tumors.

Despite advances in treating prostate cancer, certain prostate cancer types, called castrate- or hormone-resistant, continue to grow even when the patients' hormone levels reach beyond

the established low threshold.

Theranostics efforts are centered around treating these more lethal, castrate-resistant prostate cancers. The treatment combines a targeting compound or ligand with a radioactive particle which is injected into the patient and targets the cancer cells.

Because it is highly expressed in more than 95 percent of prostate cancers, prostate specific membrane antigen (PSMA) is one of the emerging diagnostic and theranostic biomarkers for prostate cancer detection as well as tar-

The theranostic approach uses specific targeting compounds for both imaging and therapy of a particular malignancy.

geted therapies and is a predictive biomarker for prostate cancer.

Clinicians monitor treatment-induced metabolic changes to the tumor, which serves to indicate the likelihood of successful response to treatment. Targeting PSMA in theranostics efforts can help impact clinical management decisions and identify patients who may receive the greatest benefit from targeted therapies.

Health Canada recently approved PLUVICTO (lutetium – ¹⁷⁷Lu – vipivotide tetraxetan injection) for the treatment of adult patients with prostate-specific membrane antigen, PSMA-positive metastatic castration-resistant prostate

cancer (mCRPC), who have received at least one androgen receptor pathway inhibitor (ARPI) and taxane-based chemotherapy.

Many other small molecules and antibodies targeting PSMA have been developed and labeled, such as ¹⁷⁷Lu, ¹⁶¹Tb, ¹³¹I, ⁹⁰Y, ⁶⁷Cu, ⁴⁷Sc, and are currently being studied in preclinical and clinical studies.

With the long-term success of PET imaging biomarker ¹⁸F-FDG (FDG) in oncology, and newly approved therapies such as ¹PLUVICTO, many other useful diagnostic and theranostic biomarker discoveries are likely to gain approval for clinical use to support personalized treatments and improved outcomes.

As utilization of molecular imaging technology expands, clinical interest in new radiopharmaceuticals is continuously growing.

An important aspect of introducing these new tracers is the ability to produce and distribute them so clinicians have access to them.

Cyclotrons, PET radiochemistry systems and tracer production facility solutions are required to deliver FDG to a large number of clients or supply a research program with a wide range of tracers.

As a leader in the molecular imaging and radiopharmaceutical industry, GE Healthcare supports the continued discovery and production of new tracers and therapies with powerful tools to streamline their production.

Applying higher knowledge: The three pillars of personalized care

Personalized care, often referred to as precision medicine, is widely understood as a way to improve healthcare by diagnosing and treating patients based on their own genetic characteristics rather than applying a one-size-fits-all approach. Yet personalized care goes well beyond genomics-guided treatment.

In the U.S., the Precision Medicine Initiative was announced almost a decade ago, in 2015. At that time, Dr. Larry Chu, a Stanford professor advising President Barack Obama on the program, offered some insight as to the effort's scope and goals.

"I think precision medicine means precisely diagnosing conditions, then integrating all relevant patient data and insights to guide care to the best outcomes. It is about providing the right treatment to the right patient at the right time."

Here in Canada, precision medicine is also being embraced. The Canadian Institutes of Health Research (CIHR) have spent the better part of the past decade investing in new and better ways to collect and manage data, all in support of what they call personalized health delivery.

The most recent effort is called the Personalized Health Initiative (PHI) and has four main objectives: optimizing patient empowerment in personalized healthcare approaches; developing data integration and analysis tools; assessing the value of personalized healthcare for effective implementation and delivery; and increasing researcher awareness about the importance of integrating sex- and gender-based analysis in assessing relative costs and benefits.

With this initiative, the CIHR is aiming to improve health outcomes in the areas of prevention, diagnosis and treatment, deliver economic and social benefits, and improve the way health systems function.

How to deliver more personalized care: There is an emerging consensus that a move to personalized care is both an essential step forward and a transformative breakthrough for healthcare. Yet there is less clarity about how to approach such an effort.

In our view, innovating personalized care rests on three pillars:

- Organizing care around a patient's medical condition
- Providing precise diagnosis for actionable decisions
- Delivering therapy outcomes that matter to patients

Organizing care along the patient's individual clinical pathway requires implementation and continuous improvement of best-practice standards. This depends on the seamless integration of diagnostic and therapeutic options. It also requires education to ensure that caregivers are aware of these options and can ensure that their patients have access to them. This, in combination with the digital automation of workflows and products, lays the foundation for reducing unwarranted variations as a precondition for personalizing care.

Next, offering precise diagnosis for actionable decisions demands greater precision of single imaging or laboratory data points as well as the integration of the most relevant data from multiple sources. Intelligent algorithms have already paved the way for a more integrated and data-driven approach to precise decision-making. In the future, this will

make it possible to build digital twins of patients and their disease-related structures. In this way diagnostic processes, therapeutic procedures, and even outcome prognosis will be supported holistically.

Finally, we can deliver therapy outcomes that matter most to patients by

combining highly precise imaging with minimally invasive or robot-assisted procedures. This allows for monitoring and, if needed, immediate adaptation of the intervention course. Furthermore, frequent and multimodal imaging options are an integral element of intelligent radiother-

apy, serving as a foundation for personalized treatment options and ongoing treatment adaptations. This approach is also associated with fewer risks and side effects.

A Look Ahead: There are many reasons for optimism about the future of personal-

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Designing effective healthcare dashboards: A picture is worth more than words

Dashboards are much more effective when you know how to make their messages stick.

BY AHMAD CHAMY AND SHIRLEY FENTON

Healthcare executives today spend roughly 85 percent of their workdays on meetings and phone calls receiving status reports and updates. They suffer from the growing pressure of being inundated with information. Often, they lack attention management which hinders them when making effective and efficient decisions. You would be hard pressed to find an executive say at the end of their day, “I have some extra mental capacity to handle more”. As an analyst or a manager responsible for communicating important information to these executives, you need to be aware of the forces that are working against you and optimize your role and mode of communication.

It is important to understand why dashboards, when done right, are much better modes of communications than the traditional PowerPoint or PDF status report.

Why data visualization matters: The Picture Superiority Effect refers to a phenomenon where people recall pictures better than they remember the corresponding words. To put it more simply, pictures are superior to words when it comes to recalling and recognizing information.

For example, a group of researchers at the University of Rochester in 1970 studied the ability of participants to recall pictures by exposing them to more than 2,000 pictures for between five to 10 seconds at a time. After three days had passed, the participants could still recall over 90 percent of the images.

Another group of researchers at Michigan State University examined the effects that pictures had on health-related communications. In their 1966 experiment, the researchers assigned participants either a full text or illustrated instructions on wound care to 400+ patients who visited the ER for lacerations.

They found that patients who were given illustrated instructions outperformed text-based ones.

The patients who received illustrated instructions:

- Were more likely to have read the instructions (98 percent vs 79 percent in the text based instructions group)

- Were more likely to understand the instructions (46 percent vs 6 percent)

- Acted on the wound care advice more often (77 percent vs. 54 percent)

Communicating effectively with images and visualization is one of the best tools in the dashboard developers’ toolkit. In fact, communicating with images is six times more effective than words alone. Studies have shown that whereas we remember only 10 percent of



Ahmad Chamy



Shirley Fenton

what we hear and 30 percent of the text we read, we remember a whopping 80 percent of the pictures we see.

Effective healthcare dashboards – a solution to information inundation: A dashboard is a tool that decision makers use to rapidly monitor current conditions that require a timely response to fulfill a specific role. Dashboards, as opposed to conventional reports, are action oriented vs. strictly informative.

Dashboards also leverage pre-attentive attributes – a pre-attentive attribute is a term for things that people notice without even noticing they’ve noticed

them. In data visualization – especially when dashboarding – this means viewers will instantaneously see specific visual cues. Some examples of pre-attentive attributes are Colour, Form and Spatial Position. For success with dashboards, you should also:

- Understand your audience: Gather business and data requirements using stakeholder and end use interviews to appropriately serve the audience.

- Leverage an iterative approach to dashboard development: Apply agile project management principles to tackling dashboard development.

- Use the guided analytics approach for dashboard layout: Understanding your audience’s mental models and building dashboards that follow their decision-making process will mean your dashboards will be used and not be shelved in your data platform.

- Appropriately select visuals: There are lots of data visuals to choose from. Understanding how quantitative and qualitative data should be visualized is crucial.

- Design user friendly charts: Eliminate chart junk and build simple yet impactful data graphs.

- Avoid data visualization pitfalls: Learn how data visualizations can distort and skew data findings causing confusion to avoid them.

- Set goals for dashboard benefit realization: Dashboard development projects’ success do not just depend on delivery of the product but rather the active use of the dashboards in decision making. It’s important to have strategies to train users on the dashboards and to measure adoption and usage of these dashboards.

Learn More: You can learn about these principles in detail in the “Effective Healthcare Dashboards” course at NIHI. For more information, visit www.nihi.ca.

Ahmad Chamy is a Founder and CEO of D Cubed Analytics. Shirley Fenton is Vice-President of the National Institutes of Health Informatics and a co-founder of Waterloo MedTech.

The role of health data in enabling connected healthcare

BY DR. RASHAAD BHYAT

There has been a lot of discussion about the challenges facing our healthcare system – on the front pages of newspapers, in overwhelmed emergency rooms, and in the halls of government offices. And in February, the federal government and Premiers reached an agreement on healthcare funding. As a primary care physician, I was especially pleased to see a focus on health data included within the federal government proposal that the Premiers accepted, as I know the powerful role digital tools can play in supporting patient care by enabling more comprehensive access to health data.

I recently saw a patient for a follow-up appointment, and we were missing two specialist consultation records that I have no way of access-

ing except through a fax request, which pulls my staff away from more meaningful tasks. If I’m lucky, I’ll have the records within a few weeks.

Unfortunately, I’m not alone in these struggles. Research commissioned by Canada Health Infoway found that 82 percent of clinicians report not always having a summary of patient care received outside their practice setting, with 92 percent wasting time searching for patient information from other care settings.

In approximately eight years, Canada will experience a rapid increase in the number of people older than 85. These are our most vulnerable citizens, with many comorbidities and highly complex care needs. My colleagues and I already spend more time than we have on charting, specialist referrals, forms, coordinating preventive care, and other time-

intensive tasks. With a more connected healthcare system, we can get ahead of some needless administrative inefficiencies, and ensure that more time can be spent on providing care to patients.



Dr. Rashaad Bhyat

This is where the work I do as clinician leader at Canada Health Infoway comes into play. We are excited to partner with the federal government, provinces and territories, the private sector, and the health workforce to co-author the next chapter of health system modernization. Improved interoperability – the ability of health technology sys-

tems to “speak the same language” based on the use of common standards – is a key piece of this.

In a more connected healthcare system, clinicians and patients benefit through better and more integrated care delivery across care settings, more effective communication across care teams, improved service delivery, and more efficient workflows.

Secure collection, sharing and use of health information will enable system improvements through the application of advanced analytics. A digitally connected health system will also save time for, and reduce the stress of, our healthcare providers, who continue to bear the brunt of delivering care on the front lines.

Dr. Rashaad Bhyat is a Toronto physician and Clinician Leader at Canada Health Infoway.

Overcoming challenges in combating healthcare-associated infections

DR. HALDEN SHANE

Disinfection in healthcare settings is crucial in preventing the spread of healthcare-associated infections (HAIs), or infections often acquired by patients while receiving medical treatment. For years, HAIs have placed a significant burden on the Canadian healthcare system, with the Public Health Agency of Canada estimating approximately 220,000 patient infections each year.

However, HAIs prove more than just a danger to the reinfected patient, as those same patients incur prolonged hospital stays, increased risk of spreading infection (and consequent increased morbidity and mortality rates), as well as additional healthcare financial and resource costs.

Overcoming challenges: One of the largest challenges in ensuring proper disinfection in any healthcare setting is issue of limited resources, including staffing and supplies. Healthcare providers are often overworked and under-resourced, making it difficult to implement and maintain adequate cleaning and disinfection practices. In addition, shortages of critical supplies such as personal protective equipment and disinfectants have been an ongoing issue during the COVID-19 pandemic, further exacerbating the challenge of ensuring proper disinfection.

Another challenge in disinfecting healthcare settings is the complex nature of the environment. Healthcare facilities are often large and have a high volume of patients, making it difficult to maintain a clean and disinfected environment. In addition, there are many surfaces and medical equipment that must be cleaned and disinfected at different levels of varying specificity. The appropriate treatment of these areas can mean the difference between failed inspections, increased funding, and even higher ratings.

Strategies for improving disinfection practices: To address the challenge in disinfecting to prevent HAIs and circumnavigate staff shortages, healthcare facilities are implementing various strategies, including the use of labor-reducing technology. One such technology is SteraMist, a unique disinfection system that uses hydrogen peroxide mist and revolutionary natural science to kill bacteria, viruses, and fungi on surfaces. SteraMist has been extensively shown to be effective in reducing the risk of HAIs in healthcare settings, including those caused by antibiotic-resistant bacteria and viruses such as *C. auris*.

In addition to SteraMist, some facilities turn to ultraviolet (UV) disinfection systems to supplement traditional cleaning and disinfection practices. These systems utilize ultraviolet light to provide a low-level reduction of bacteria and viruses on surfaces. However, it is important to note that UV systems have significant limitations, as they require direct line of sight to be effective, may not reach all areas in a room, may increase room turnover time, and can even affect some surfaces over time.

Another approach to improving disinfection protocols is through staff education and training. When ensuring the proper training and education of staff on disinfection best practices, healthcare fa-

cilities improve consistency and effectiveness of employed disinfection methods. Additionally, healthcare facilities implementing measures to improve resource availability, such as implementing centralized inventory management systems to ensure that critical supplies, including disin-

fectants and personal protective equipment, are readily available when needed.

Despite these efforts, the prevention of HAIs remains an ongoing challenge, with the emergence of antibiotic-resistant bacteria significantly contributing to the epidemic. Particularly difficult to treat and

highly contagious within healthcare settings, antibiotic-resistant bacteria are resilient in nature and often require significant effort to counter the spread.

Appropriate antibiotic use and infection prevention: To prevent the develop-

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New tools emerging to help reduce clinician burnout caused by excessive documentation

AI is being harnessed to capture conversation and to automatically create notes and prescriptions.

BY DIANNE DANIEL

With one in two Canadian doctors reporting burnout, the push is on to understand contributing factors and take action to support medical professionals. One area in the spotlight is the electronic medical record (EMR), with several start-ups now aiming to use advances in AI and digital technology to reduce the administrative burden facing physicians, improve workflow and give back something that's sorely lacking: their time.

"I'm a millennial digital native so I grew up in the consumer world with smartphones and very advanced technologies in my private life, and then I got into medical school thinking healthcare is so important to society, one would expect to see investments in the user experience at that level as well ... and I saw that wasn't the case," said Dr. Noah Crampton, a member of the Toronto Western Family Health Team at University Health Network. Dr. Crampton was so dissatisfied with the amount of onerous administrative work facing MDs, he decided to focus his academic research on improving the experience.

According to the CMA National Physician Health Survey, conducted every three to four years and most recently released last fall, 54 percent of physicians are reporting burnout, up from 31 percent in 2017. Top barriers to maintaining their consistent health and wellness include lack of time (64 percent), heavy workload and/or stressful work environment (60 percent) or challenges arising from scheduling (56 percent).

A self-described futurist, Dr. Crampton is on a mission to make that everyday workflow better as CEO of Mutuo Health Solutions Inc., a start-up he co-founded to transform the traditional patient-doctor visit using hands-free speech recognition and cutting-edge AI technology.

The company's flagship product, launched in Canada as AutoScribe, automatically captures conversation during a patient visit in real-time using speech recognition, and then applies the latest natural language processing to parse the dialogue into suggested actions in the EMR, including the composition of a clinical note, orders for lab work or tests, referral letters and billing instructions. All actions are reviewed and approved by the physician at the end of the visit, removing the need to be clicking on a computer while in front of a patient and reducing the amount of charting time overall.

The technology builds on Dr. Crampton's medical school research which focused on understanding how input data in a medical record could be used to improve downstream activities and how emerging AI technologies could help to automate administrative tasks. Working with a large data set of doctor-patient visit information – including audio and transcripts that were linked to corresponding medical notes – his early work showed it was possible to train a machine learning model to predict with high accuracy what a medical note would look like just by listening to a patient encounter.

AutoScribe takes it a step further, triggering spe-

cific downstream tasks based on the conversation, such as ordering a prescription. It also learns from each edit of a medical note to match a doctor's personal nuances and improve accuracy in the future.

"At first it was about making sure the key concepts were being extracted, were being converted into the proper clinical nomenclature and vocabulary, and organized into the right structure," he explained. "From there we said it's working well, let's try to spin it up into a start-up."

Ten early adopters of Mutuo Health AutoScribe helped to fine-tune the platform, which is marketed as a software-as-a-service and currently integrates with Telus Practice Solutions and the Open Source Clinical Application Resource (OSCAR) EMRs, with more integrations planned. Three tiers of service are available: tier one generates a standard Subjective, Objective, Assessment and Plan (SOAP) note at the end of a visit; tier two adds the ability to see the SOAP note live and provides templates for specialty notes such as psychiatry, geriatrics and neurology; tier three is a premium service that accepts custom

medicine," said Dr. Crampton, noting that although he learned to multitask his cognitive load in medical school, AutoScribe is a welcome alternative.

"I'd rather pay money to remove that load that forces me to focus on my computer, so that I can get back to the real driver of why I went into medicine: because I wanted to interact with patients, be there for them and give my clinical judgment," he said.

Dr. Jenny O'Driscoll is a practicing ER and family medicine doctor in Ontario who also serves as MD Lead, Family Medicine, at Rocket Doctor Inc., a technology start-up that is delivering an entirely new way of thinking about how primary care is delivered. The concept has been called a 'shopify for doctors' because physicians who use the company's virtual platform remain independent providers but gain access to a suite of easy-to-use digital tools that help with scheduling, recordkeeping and patient management. They set their clinic hours according to when they are available, choose the medical conditions they are comfortable treating virtually and are matched to patients who sign on to the service accordingly.

For Dr. O'Driscoll, a busy mother of three, the model is helping to create a work-life balance.

"The convenience of having Rocket Doctor, where I can fit things into my schedule with the convenience of working from home, has been awesome," she said. "I can work between nap-time or after putting the kids to bed ... It keeps me practicing."

During the pandemic, when virtual care in Ontario was covered by OHIP, Dr. O'Driscoll would see patients virtually from 7 p.m. to midnight, mostly for mental health and addiction, but also for minor conditions such as urinary tract infections or skin infections as well as prescription renewals. She recalled treating a 12-year-old girl with anxiety, depression and OCD whose family was extremely grateful for the virtual help because they couldn't afford to take time off of work to take their daughter to an in-person clinic. "With Rocket Doctor, I can have a concentrated one- or two-hour shift here and there to see people where I'm not slammed with an eight-hour clinic," she said. "People are always poo-pooing virtual care, saying it's not the

same as in person, but there is a role for it."

The model is not intended to replace a full EMR, but to be a "virtual first solution" that makes it "really simple" for doctors to work online, said Rocket Doctor CEO and founder Dr. Bill Cherniak. The idea came to him during the fall 2019 flu season as he was working in a busy emergency department and saw many patients who really didn't need to be there. He was inspired to mesh advanced diagnostics with virtual care to reduce those unnecessary visits.

Triage is the first step on the cloud platform, which uses algorithms to ensure a patient is appropriate for virtual care and then matches them to an available physician. Patient information is securely shared as required for continuity. If a doctor takes time off, dedicated care coordinators will ask patients if they'd like to wait to be seen by the same doctor or be referred to another clinician. Doctors are also provided with a suite of simple digital tools



note templates already used by physicians and includes a human scribe in the loop to correct any errors in the AI-generated notes.

Designed for doctors by doctors, the automated medical scribe tool supports both virtual and in-person visits and is designed to be flexible so any medical profession can adopt it. Early feedback indicates users are happy with the level of accuracy of the note generated, the speed of output, and the EMR integration provided, as well as the affordable price point, he said. An ongoing challenge is that notes tend to be very detailed, which is good as a baseline but now the company is working to develop a model that will give users the ability to indicate where information can be reduced.

"The new large language models – like ChatGPT – have just opened up in the last year this unbelievable ability to automate some of these onerous administrative tasks and really bring back the joy of

to enable referrals to specialists and automatically generate forms.

"It's 100 percent up to the physician what they want to do with our technology and system," said Dr. Cherniak, adding that the goal is flexibility. Some doctors do eight hours of virtual clinic duties and don't book another shift for three weeks, while others may make themselves available on a daily or weekly basis.

"The ability to talk about what you want to do with your practice, how you want to see patients in what timeframe at what speed, what kind of chief clinical complaints you're comfortable seeing – that's made doctors' lives better," he said.

Rocket Doctor currently operates in Alberta and B.C. where it is covered by provincial health insurance. Prior to the Ontario government decision to stop funding virtual visits by family doctors on December 1, 2022, the platform was treating 500 patients daily in the province. Now it is funded for addiction help only in Ontario, with a user fee required otherwise.

One advantage to the virtual model is that specialist referrals were happening faster, reducing stress levels for both patients and providers. Dr. O'Driscoll found that patients she referred to specialists on Rocket Doctor were seen anywhere from one week to two months later, whereas when she works in a hospital ER setting, those referrals typically take nine months to a year.

At a time when new family medicine doctors are shying away from the administrative load and overhead required to run a practice, she believes Rocket Doctor could be an alternative. Another "game-changing" benefit is that the platform has partnered with Ambience Healthcare – a U.S.-based AI start-up founded by Mike Ng and Nikhil Buduma – to offer access to Ambience AutoScribe, another automated medical scribe publicly launched this past February.

Similar to Mutuo Health's technology, Ambience AutoScribe captures the nuances of each patient-doctor exchange and uses AI to generate notes that are immediately available to review, edit and sign off on without breaking workflow.

"We started the company with a mission to super-charge every healthcare provider with AI superpowers," said Ng, who serves as CEO. He said they first discovered the inordinate amount of time clinicians were spending on documentation and administrative tasks while running their first co-founded business, a virtual primary care practice that used an AI chatbot to screen patients. After investigating templates, macros, phrase expanders and virtual scribes, they decided to tackle the problem themselves.

time users and on a per-minute basis for part-time users, and available for any web-based EMR workflow, Ambience AutoScribe is currently used daily by providers in specialties ranging from family medicine and behaviour health to psychiatry and geriatrics. On average, documentation time is decreased by 75 percent, said Ng.

"For a very long time, providers have almost accepted that spending a lot of time

multitasking during the visit – hundreds of clicks and keystrokes and then having to spend time afterward to complete documentation – is part of the job and with the pressures to provide more care they almost feel trapped," said Ng. "When they try AutoScribe for the first time, it gives so much hope, realizing they can now really focus on providing patient care."

For Dr. O'Driscoll, the automated med-

ical scribe is game-changing. Typically, she'd be facing one hour of administrative work for every hour of clinic she performs. With Ambience AutoScribe she's not only saving hours of her time, but her mental load is vastly reduced.

"I'll see a patient ... and by the end of that conversation, that note is already transcribed for me and I can move the patient into the chart. It's so exciting," she said.



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Choosing the right electronic medical record: One physician's experience

When Dr. Forson Chan and his wife Dr. Kristie Wong opened Oakmount Medical, their family practice clinic in Burnaby, BC, they faced a common problem awaiting clinic owners: choosing the right Electronic Medical Record (EMR) for their team.

Aging patient panels with increasing medical complexity and staffing shortages are common problems that doctors and clinics regularly face. An intuitive EMR is paramount to address these challenges and reduce administrative burden.

Seeking a solution that would empower his team as well as his patients, Dr. Chan tackled this selection with a meticulous, hands-on approach. His advice: figure out how long it takes to perform your common workflows on different EMRs. In short, try them out yourself!

After having adopted the MYLE Integrated Care Platform by MEDFAR Clinical Solutions at his clinic for a little over a year, Dr. Chan shares what it has been like to work with “the platform that had everything I needed.”

As part of his local Division of Family Practice, Dr. Chan's vision is geared towards collaboration and that extends to his choice of EMR. Allowing doctors to work closely together is a major factor for Oakmount Medical. “We wanted to find a solution that would work with us and for us in attaining that goal of streamlining collaboration in our city.”

Increased efficiency: Having worked in other clinics where staffing support was often stretched thin, Dr. Chan recognized the importance of a solution that streamlines daily workflows. Leveraging automation to work faster and smarter as

well as functionalities that allow tasks to be completed remotely reduces the high clerical staff turnover rates experienced by many clinics.

Moreover, an intuitive platform such as MYLE facilitates the training of administrative personnel and reduces the monotony and frustration with their tasks.

“When a clinic is not overextended, it's a transformative factor for quality of life and the ability to deal with emergencies,” added Dr. Chan. “Our staff are usually able to respond to every single task, message, and fax received almost immediately or at worst within one hour, in addition to taking phone calls from patients.”

Better use of data for better patient outcomes: The ability to pull, organize and interpret his clinic's large amount of data with a powerful analytics module also turns out to be a game changer in terms of efficiency.

Used on a bi-weekly basis, MYLE Analytics has enhanced the clinic's ability to meet requirements in quality improvement projects while zeroing in on common safety issues in primary care.

“As part of our New-To-Practice contract in BC, we're required to conduct Quality

Improvement projects to optimize the care that we provide,” Dr. Chan explained. “MYLE Analytics allows us to target patients that have suboptimally controlled diabetes, overdue pap smears, and polypharmacy. It helps us to search, identify, categorize, and understand our panel. All that data is very important for us, to optimize the care that we provide.”

Fostering patient engagement: “The most wonderful feature that I've come to appreciate with MYLE is the patient portal. A lot of patients want copies of their CT scans, MRI scans, and lab reports. At a



Dr. Forson Chan and Dr. Kristie Wong.

click of a button, you can share any result or document directly with a patient. It's just so easy!”

Easing anxious patients is another benefit of MYLE observed by Dr. Chan. “In the past, a lot of doctors' offices would tell patients that no news is good

news. But that kind of communication often leads to problems where things get missed. If a patient never hears back about their investigations for ruling out cancer, how would they know if the result was truly normal, or if a fax was missed, or if there was a missing test on the requisition?” he asks.

“Anxiety and adverse outcomes are reduced when everyone is on the same page, even when results are normal. In MYLE, with a click of a button, a quick message is sent and everyone is informed.”

A new standard: By choosing MYLE as their EMR solution, Dr. Chan and his team at Oakmount Medical have seen firsthand how the right solution can help clinics work more efficiently, improve patient outcomes, and enhance the overall quality of care. With its easy-to-use platform, powerful analytics tools, and patient engagement features, the MYLE Integrated Care Platform has become a game changer for this family practice, offering a new standard for EMR excellence in British Columbia.

The three pillars of personalized care

CONTINUED FROM PAGE 13

ized care. A number of big data initiatives worldwide are giving medical researchers the ability to uncover connections and patterns in data that would not be obvious if data sets were smaller and studied by human brainpower alone. At the same time, AI offers the promise of making medical care more precise and more scientific by further enabling rules-based diagnosis and treatment planning. The hope is that dis-

eases will be precisely diagnosed based on the integration of all relevant patient data and insights at the point of decision.

Susan Dentzer, CEO of America's Physician Groups, has observed that “medicine can now look to piles of data to identify what molecular or genetic signatures lie underneath a person's condition or constellation of symptoms.” By way of example, she notes there is now an increasing suspicion that type 2 diabetes is not one type of disease, but rather a collection of different subtypes. Information like this allows doctors to address different subtypes in specific ways thereby improving the effectiveness of treatment, reducing costs, and avoiding complications.

Innovative approaches to personalized healthcare are essential for laying the groundwork for the medical revolution of the future. A key element of this medical revolution will be greatly enhanced predictive analytics, deployed to identify risk of disease onset or progression, making earlier intervention possible and perhaps preventing some diseases from progressing.

Soon, a stronger focus on personalized medicine will also make it possible to accurately identify disease subtypes to determine which drugs work best for each. We envision a future in which it will be possible to identify optimal therapeutics based on an individual's phenotype, disease subtype, or tumor signature, and where we will be able to uncover new uses for existing compounds, drugs, and medicines.

We believe this future is within reach, and that effective collaboration between healthcare policy makers and those on the front lines of research and technological innovation can help to make it a reality.

This piece was adapted from an article originally published in the Harvard Business Review titled “Expanding Precision Medicine: The Path to Higher Value Care.” It was sponsored by Siemens Healthineers.

Virtual nursing project in Nunavut improves outcomes

CONTINUED FROM PAGE 10

part of our healthcare landscape, Canada has historically lagged behind our international peers in its adoption. New findings from the 2022 Commonwealth Fund (CMWF) International Health Policy Survey of Primary Care Physicians show impressive advancements during the pandemic.

Canadian physicians increased their adoption of certain digital health tools – gains that now approach the CMWF country average, resulting from a concerted focus on virtual service delivery.

The 2022 CMWF survey examined the similarities and differences in access to care between Canada and 9 peer countries; it was conducted online between February and September with almost 1,500 physicians. Findings show the following:

- 93 percent of Canada's primary care physicians are now using electronic medical records (EMRs), up from 73 percent in 2019, similar to the CMWF average (93 percent).
- 84 percent are satisfied with practising virtual care, compared with 68 per-

cent of their international peers.

- About 1 in 4 (27 percent) use remote monitoring or connected medical devices to monitor patients with chronic conditions, which is higher than the CMWF average of about 1 in 5 (19 percent).
- 38 percent are now electronically exchanging patient clinical summaries with doctors outside their practice, up

The Commonwealth survey showed impressive advances among Canadian clinicians using computerized solutions.

from 25 percent in 2019; and 55 percent are exchanging laboratory and diagnostic test results, up from 36 percent in 2019.

- Compared with the CMWF average, fewer Canadian primary care practices can communicate electronically with other practices, even though most (76 percent) have access to regional, provincial or territorial information systems.
- More practices now offer patients op-

tions to request appointments online, communicate via email or a secure website about a medical concern, and view patient visit summaries online compared with 2019 (Figure 1).

• Physicians reported that virtual care has had a positive impact on improving the timeliness of care and the effective assessment of mental and behavioural health needs of their patients.

The success of new initiatives like the Nunavut NP program and the growth trends demonstrated through the CMWF survey reflect the positive impact of focused efforts to increase technology adoption. Although they bring Canada more in line with its international peers, there are likely further gains that need to be made to fully integrate virtual services as part of Canada's health systems beyond the pandemic.

Please visit www.cihi.ca/en/virtual-care-in-canada for additional information on virtual care services across Canada.

Alya Niang is a Communications Specialist, Canadian Institute for Health Information.

Precision medicine

CONTINUED FROM PAGE 12

tests are based upon come from “people of European ancestry.”

She added, “So even if some demographic groups are able to access the tools, they may not be representative of their heritage and genetic background.” As a result, the tools may not work as well for some groups as for others – an ethnic barrier, in addition to the financial one.

“We have to look at ways of sharing data from across the world,” said Dr. De-war. “Data sharing is one of the big barriers to precision health.”

Dr. Banerji explained that genomics and the whole range of ‘omics’ technologies consist of assays that tell us more about an individual’s health. “As an oncologist, I consider myself quite fortunate to be at the forefront of the use of a lot of these technologies. It’s quite exciting to see how it has transformed cancer care and provided patients with the opportunity to access drugs that we perhaps didn’t even think of a decade ago.”

This new area of knowledge means that it’s necessary for doctors and other health-

care professionals to stay up to date with advances being made in precision medicine. It’s also incumbent on governments to invest in training programs for this purpose, to update the skills of practitioners. “It was hard enough for them to make the investments before COVID,” said Dr. Banerji. “After the pandemic, it’s become even harder because of so many competing interests.”

An attendee in the audience asked a question that widened the scope of what was being considered. The person asked whether behavioural data, personal lifestyle and environment should be considered, and not just the genetic information of the patient.

Dr. Banerji heartily agreed and noted that a great deal of data is contained in one’s cell phone, for example, as people input all kinds of data about their lifestyle into their phones and other electronic devices each day. However, he pointed out the data is highly siloed, and difficult to obtain, due to privacy laws and other rules and regulations. “There needs to be changes on the administrative front to allow more fluid exchange of data – in local, national and international jurisdictions,” he said.

This would provide healthcare professionals with a more ‘holistic’ view of the patient’s health.

2023 Watch List: Top 10 Precision Medicine Technologies

Digital Tools to Access Genetic Information and Navigate Care

Digital tools such as patient portals and other applications give clinicians, patients, and families direct access to individualized health information. In the context of precision medicine, these technologies can help people connect with their genetic test results, understand the implications of findings, and provide them with opportunities for meaningful engagement with health care professionals to discuss results that could help improve their health outcomes.

Liquid Biopsy for Informing Cancer Treatments

Liquid biopsy is an emerging technology that detects genomic information in bodily fluids and could alter traditional pathways of care for cancer. While traditional approaches of precision-based testing rely on surgical biopsies, liquid biopsies could shift existing approaches toward less invasive testing technologies. The technology is based on growing evidence that among certain cancers, tumour cells can release DNA into bodily fluids. These DNA fragments may have a distinct genomic profile compared with DNA shed from healthy cells and, with the appropriate testing technology, can help describe features about the cancer that can be important for guiding treatment.

“Omics-Based” Sequencing Technologies Across Pathways of Care

Whole genome (the entire DNA code of an individual), exome (the DNA code of all protein coding regions), and transcriptome (global gene expression as measured by RNA) sequencing are precision medicine technologies that are referred to as “omics-based” technologies because they characterize the complete or comprehensive set of molecular information of individuals’ cells and tissues. The comprehensive nature of omics-based sequencing technologies allows for a single test to be performed at the onset of clinical presentation rather than a series of individual tests, helping to improve diagnostic information and possibly increase speed of diagnosis.

Pharmacogenomics Tests for Mental Health Conditions

Pharmacogenomics testing characterizes genes that may influence how drug therapies are processed by an individual. This type of testing can provide information about suitable drug targets, interactions between different drugs, and who may be at an increased risk for side effects. Unlike some clinical areas, such as oncology, there have been relatively fewer developments of precision medicine technologies in the field of mental health care. However, with more developments in pharmacogenomics, there is a possibility that precision medicine technologies could lead to significant change over the next 5 years in terms of how drug-based therapies are prescribed for mental health conditions.

Population-Based Genetic Screening Interventions

Screening aims to detect the early signs of specific health condition or assess the likelihood of having specific health conditions among people who are otherwise asymptomatic. Many screening interventions, including those that use genetic testing, are often limited to specific subpopulations with certain risk factors based on age, family history, or other health behavioural or demographic factors. However, using stringent criteria for genetic screening can miss a substantial proportion of people who may have high-risk mutations.

Digital systems improve quality of care

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systems. It has been working to connect its Epic system to local long-term care partners who use the PointClickCare patient record system, so there are tighter connections between the hospital and long-term care homes.

“We want to improve the warm hand-offs, so it’s seamless from the patient perspective,” said Stationwala, referring to the transfer of patients from hospital to long-term care, or visa versa.

In the past, many of these transfers were done using paper forms, in which the necessary information was missing, sometimes delaying the transfer or making it more difficult. With digital connections, the goal is to deliver all the needed data with less effort, making the transfers easier for clinicians, administrators and patients.

“They’ve done this in the U.S., but not so much in Canada,” said Stationwala. “We’ve now got some sites fully implemented.”

And on another front, Mackenzie Health is bringing electronic systems and tracking into the area of the supply chain.

Stationwala observed that the grocery sector, for example, can trace products right back to the manufacturer using barcodes and other systems. Healthcare hasn’t been able to do that, but the COVID pandemic showed the importance of being able to

Mackenzie Health’s Stationwala wants to bring new supply chain techniques into the hospital world.

track and trace products to fix problems with important supplies, such as PPE.

“We’d like to be able to do that in healthcare,” said Stationwala. To that end, Stationwala is himself working with supply chain organizations, to bring their solutions and approaches into the Canadian healthcare sector.

However, in the end, said Stationwala, improvement is all about change management. Staff and clinicians must be on board, and they must want to adapt: “To make meaningful changes, you have to have the users involved.”

Integrating guidelines into the EMR

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ceived positive feedback within the pilot sites, leading to the addition of the developed materials into the standard content library for respective EMRs.

Early data suggests that between the two pilot EMRs, there is a greater uptake of the content within the CHR as opposed to the PS Suite. This may relate to workflow considerations within the CHR that automate patient engagement, thereby eliminating the need for any additional actions required from the provider. The developed content has now been deployed in dozens of clinics across five provinces and has become a standard part

of the clinical content offered to clinics.

Overall, the pilot shows that the implementation of “The Cold Standard” into EMRs is an efficient, cost-effective means of improving resource utilization while adhering to CWC’s guidelines of antibiotic stewardship. The pilot’s success has opened the door to integration of additional recommendations from CWC.

While further research to better understand impact on both patient and provider experience must take place, along with an evaluation of the impact on end clinical outcomes, this pilot establishes a simple and pragmatic way to effectively leverage EMRs to improve the functioning of our overall healthcare system.

Challenges in combating infections

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ment of antibiotic-resistant bacteria, healthcare providers must use antibiotics appropriately. This includes prescribing antibiotics sparingly and necessarily, using appropriate antibiotics for specific infections while following proper prescription guidelines. In addition, healthcare facilities must implement strict infection prevention and control measures, including proper cleaning and disinfection practices to prevent the spread of antibiotic-resistant bacteria.

The complex nature of maintaining healthcare environments and the logistics of resource limitations can, at times, prove a challenge to even the most prestigious hospital. The situation is far from impossible, however, as one of the easiest ways to tackle the contagion of HAIs, short staffing issues, limited resource availability, and growing financial burdens within healthcare departments can

be as simple as focusing on implementing proper disinfection.

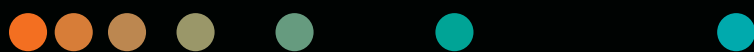
Effective tools: SteraMist has been used in a variety of healthcare settings, including hospitals, long-term care facilities, and clinics. Its effectiveness in reducing the risk of HAIs has made it a valuable tool in the fight against infection transmission in healthcare settings. In addition, its ability to disinfect quickly and efficiently has allowed healthcare providers to reduce downtime for disinfection, allowing for more efficient use of resources and facilities.

Having transformed healthcare disinfection, SteraMist improves infection control in an ongoing effort to reduce the growing risk of HAIs worldwide. Visit SteraMist.com to learn more about how SteraMist disinfection can be easily implemented into your unique infection prevention protocols today!

Dr. Halden Shane is CEO of TOMI Environmental Solutions, Inc.

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