

Thinking outside the box to improve surgical safety for patients

BY ANA GAJIC

How does an operating room's team culture impact a patient's surgical outcomes? What about the number of times the OR door opens during a procedure? Or the types of distractions the team experiences while performing surgery?

The International Centre for Surgical Safety – a research and innovation centre within the Li Ka Shing Knowledge Institute at St. Michael's Hospital in Toronto – aims to answer these types of questions to enhance safety for patients around the world. It breaks down barriers within the OR to understand how complex factors can impact patients and team members.

"The operating room is one of the most secretive environments in our society," says Dr. Teodor Grantcharov, surgeon and director of the ICSS. "Throughout the years we've created false expectations of perfection in the OR. This is the biggest limitation for learning. By studying what we do right and wrong, we can see opportunities to improve."

With innovative technology that extracts the digital footprint of every surgical procedure through audio-visual data, physiological data and data from devices and sensors, the ICSS team uses human and artificial intelligence to analyze these metrics and make suggestions for improvements.

Though everything is captured, no information is used punitively. All data goes towards understanding how a surgery can be enhanced to create an optimal environment for teams to work in and for patients to thrive.



St. Mike's Dr. Teodor Grantcharov: "All data goes towards understanding how a surgery can be enhanced."

"Traditionally, we research the patient experience before surgery and after," said Dr. Vanessa Palter, a cancer surgeon and scientist at the ICSS. "For any surgical patient, what happens in the operating room is probably the most important part of their experience but it has been significantly under investigated."

The centre started with a vision to address this gap. Dr. Grantcharov's first lab at

St. Michael's focused on surgical simulation and education. From there, he and his team developed the now commercialized OR Black Box concept, which is the technology that monitors operating rooms.

The team behind the OR Black Box has spun off this technology and others into a company called Surgical Safety Technologies and the St. Michael's Hospital Foundation secured funds to transition Dr.

Grantcharov's research lab into the International Centre for Surgical Safety.

The technology of the OR Black Box, which captures everything that happens in the OR, has spread to other hospitals in Canada, the United States and Western Europe. Time Magazine featured this innovation as one of the best inventions in 2019. At St. Michael's, 10 ORs will be equipped with the Black Box. This all means more data for the team to analyze in their research.

"The collaboration with other centres is key to the success of the ICSS," said Amy Dionne, managing director of the centre. "Not only do we have a team that's diverse in skill set – spanning from engineers to clinicians to computer scientists – but our partners' diverse environments help us ensure our evidence is grounded in reality."

In a recent example, the research team published a study in Surgical Endoscopy that looked at distractions in the OR. They found that irrelevant conversations in the OR were a modifiable factor that was associated with the surgeon feeling distracted. This, Dr. Grantcharov said, is one example of a small but important shift to improve surgical safety patients.

As the key stakeholders, patients have been great supporters of this work. In fact, many are surprised that the idea of observing ORs to improve on surgical processes is novel.

"Patients feel like we offer them the characteristics of a healthcare professional they want to see," Dr. Grantcharov said.

"Teams that are open, transparent, accountable and good communicators are teams that create the best care experiences for our patients."

Surgeons testing virtual care system for follow-ups receive high marks

BY DUNCAN ROZARIO, MD

The ability to provide healthcare via a technological interface which provides an audio and video component is an existential pivot to our current model of care. In 2016 Kaiser Permanente in the U.S. reported that 52% of its 110 million physician-patient interactions took place virtually.

In contrast, in Ontario last year the Ontario Telemedicine Network (OTN) reported 770,000 virtual visits out of a total of 124 million patient visits representing only 0.62% of total visits.

In Canada, 86% of us have a smartphone, and the same percentage have broadband access at home – two key requirements for virtual care. This has the capability of increasing the number of touchpoints between caregivers and patients and adds to the patient experience.

In the US, the United Healthcare group has demonstrated that while virtual visits take the same patient-clinician interaction time, they save the patient on average 106 minutes compared to an in person visit and that 92% of issues were resolved on the virtual visit.

In a 2018 Canadian survey, 47% of respondents wanted to have virtual ac-

cess to their caregivers. This is about giving patients choice, and has the potential to reduce the expensive "bricks and mortar" infrastructure we currently require in healthcare.

There are numerous barriers to our current model of healthcare – time off work, parking, transportation, weather, childcare and language of service. Virtual care saves millions of kilometres of unnecessary driving resulting in huge reductions in greenhouse gas emissions.

Rapid access to care can reduce the delay in diagnosis and treatment, improve quality, and reduce the need for hospital care.

Unlike a phone call, for a physician to be able to see a patient allows a much more profound degree of communication, assessment of nonverbal cues, the ability to read body language, and the ability to make the decision whether the virtual visit has served its purpose, or whether an in-person visit is necessary.

In Canada, at times, traveling in poor weather may be inconvenient or dangerous, patients may have mobility issues, be in poor health, frail, or may be immunosuppressed from chemotherapy.

Imagine in one's office being able to do with a video chat, routine follow-up

visits, review pathology or other tests, discuss mammograms, ultrasounds, or directly visualize an incision after surgery, all from the comfort of the patient's chosen venue.

Seeing patients in person, physical examination, and the therapeutic touch will never be completely replaced but virtual care would be just another care modality in our healthcare system.

Strategies: Understanding the importance of rapidly expanding virtual care options, the Ministry of Health and Long Term Care (MOHLTC) and the Ontario Telemedicine Network (OTN) are allowing care providers to test a variety of modern virtual care solutions and receive standard fees.

In Oakville, we are using the Reacts system (<https://reacts.com>), developed in Canada by Dr. Yanick Beaulieu, an intensivist in Québec, to provide virtual care to a wide variety of patients using readily available smartphones or a personal

computer. This next-generation application allows not only virtual care, messaging, and sharing of images, but also the use of augmented reality to enhance care provider training.

Unlike many other virtual care solutions, Reacts allows providers to call and message patients similar to apps like Apple's FaceTime, instead of using a cumbersome chat-room model where both participants need to enter a virtual chat-room to communicate.

In my office, my secretary books a virtual appointment over a 30-minute time range and asks them to be logged into the app and keep their smartphone with them or be near their computer. This gives me needed flexibility in a busy office.

Patients are sent a reminder email with details of the appointment and are referred to our pilot website (<http://oakvillesurgery.com/evisit.html>) which explains how to have a virtual visit using Reacts.

At some point over that time range I call my patient, complete the virtual visit, view incisions as needed, and then document the visit in my EHR. Patients are then invited to complete a patient

CONTINUED ON PAGE 22



Dr. Duncan Rozario

Kaiser Permanente makes use of visual analytics with diabetic populations

CONTINUED FROM PAGE 20

and PCPs they can view and discuss detailed patient data. Previously, PCPs “would spend a lot of time trying to collect information about their patients and would have trouble getting it,” said Shen.

In Q3 of 2018, dashboards designed specifically for clinics provided Clinic Outcomes Performance metrics, including a clinic scorecard, key demographics breakdown, PCP and clinic comparisons, and detailed patient reporting. “This allows each of our clinics and their leadership to see how each location is doing,” said Shen.

Operational improvements since implementing the workflow transformation with visual analytics include huge time savings. “We’ve eliminated 12 hours per month collecting data and building reports,” said Shen.

Care manager performance improvements include reducing A1C turnaround time from five or more days to one day, a 10 percent increase in message volume completion, and they are maintaining an average momentum (the time when care managers are actively doing something, like ordering lab reports, titrating medication, etc.) of 40 percent.

“It is one of the most important tools we have to hold care managers accountable and increase quality of lives for our diabetic

Kaiser Permanente wants to create predictive analytics, which will show which diabetic patients may lose control.

patients,” said Irene Hsieh, Director, OC, Complete Care and Pain Management.

Shen said, “We’re showing a multi-year trend of improving control rates in Orange

County. Since 2016 we’ve increased A1C control rates by 9 percent, which equals about 4,000 diabetics who are now in control,” he said, revealing that translates to cost savings of \$1.9 million.

Asked about next steps for their Tableau visual analytics, Shen noted the project is ongoing. “It will never end,” he said. Next, they want to create a Patient Snapshot View – a single view to bring in disparate data regarding patient status.

“It will let our care managers save time preparing for patient visits without having to dig around the EMR system,” he said.

They also want to create Predictive Analytics, which will enable them to assess whether and when a patient currently in control of diabetes is likely to go out of control. Adding predictive modeling will let them predict risk of churn showing which patients are likely to go out of control first so they can prioritize patients.

Asked if they are also going to look at patients who do not yet have diabetes, Shen said yes, they plan to look at what they can do for non-diabetic patients who are at risk.

Organizations fail to give security the attention it deserves

CONTINUED FROM PAGE 10

privacy consulting firm and developer of software solutions.

“The healthcare sector is doing a poor job of educating staff,” said Lo. “They may use a checklist approach each year and check off various topics. But how do we know that people have really absorbed it?” Chances are, he said, they haven’t.

Instead, employees must be given more interactive training. As well, the training shouldn’t be limited to once a year.

Jodi Moore, enterprise sales director at Aruba, noted that organizations should regularly run tests and stage simulations. “Do a phishing attack on your own organization,” she said. If people see that they can fall for a staged attack, they’ll be less likely to succumb to a real phishing attack.

“This learning can be invaluable,” she said, and can help change the behaviour of staff so they’re more careful about clicking on links in unusual-looking e-mails.

Moore also pointed to the growing number of devices in organizations, through which hackers can stage attacks and obtain data. The amount of data flowing through these devices makes it nearly impossible to monitor using older techniques, which ultimately rely on human intervention.

Her company, Aruba, has instead created a system that uses artificial intelligence and “User Entity Behaviour Analyt-

ics” to monitor devices for unusual activities. “We can look at a user, and factor in the people he or she normally speaks to, the devices he normally touches, and even the countries he regularly talks with. If something odd happens, like unusual activity or downloads, we’ll spot it.”

Moore said various devices can be given risk scores, with different actions taken when various levels of risk are breached. “You might have an IV pump that starts talking to different devices. If it breaches its risk score, it can be automatically quarantined.”

Surgeons testing virtual care system receive high marks

CONTINUED FROM PAGE 14

experience survey online to provide us with feedback on how we can improve.

I use this system to assess all patients within 48 hours of surgery to answer questions about their procedure and assess pain control on our multimodal pain system. Reacts also has a virtual waiting room, and has tremendous flexibility in workflow that can be adapted to many use cases.

In our completed pilot study of March 2019 to October 2019 we completed 1,097 virtual visits and have enrolled 35 physicians. Our patient experience survey data over the same period gave our Reacts pilot a 9.47/10 rating for overall patient experience.

When asked if the Reacts visit was superior to an in-person visit, 77% strongly agreed. Having successfully completed

our pilot we believe the Reacts system is ready for wide-scale use in the province of Ontario.

Dr. Sacha Bhatia and William Falk in their 2018 report for the C.D. Howe Institute propose a “virtual first” philosophy

The healthcare of the future does not exist in the past; virtual visits may become the primary way of interacting.

that uses virtual care and secure email to provide care whenever possible. They emphasize the importance of adopting secure email to communicate between care providers and with patients. Appropriate remuneration needs to be in place to fairly compensate these changes.

As many different secure and effective

market solutions are developed, we will soon have an abundance of effective options to provide virtual care. The Ministry of Health and Long-Term Care is reviewing technology options at this time and will need to approve widespread changes before the telemedicine market is open to a variety of solutions.

Conclusion: I believe we have a right to greater quality healthcare, where we need it, how we need it, and when we need it so that we can live to our greatest potential. This is fundamentally about choice, putting patients in the centre of their care, and reducing costly bricks and mortar service when clinically appropriate.

The healthcare of the future does not exist in the past and an integrated system using virtual visits and secure email may ultimately be the primary way for us to interact with our caregivers in the not too distant future.

Caregivers concerned with market-share should improve the care and its delivery, and then encourage the payment systems to support that, which we are already seeing with bundled care programs. Physicians, patients, and administrators must understand the value of virtual care and secure email, and address issues of privacy, security, compensation, technology development, EHR integration, licensure, government regulation, local culture, and research to provide an integrated solution that places patients in the centre of their care.

Broadband internet access must be accessible to rural communities. We must develop secure encrypted email solutions that allows communication in healthcare to move into the 21st century.

Patient experience must be at the core of our vision as healthcare providers, understanding that patient expectations are fluid, and the best of class experiences one receives in other business interactions are now expected in healthcare..

Duncan Rozario, MD, is Chief of Surgery, Oakville Trafalgar Memorial Hospital.

Intelrad

CONTINUED FROM PAGE 12

adopted at hospitals in Edmonton, where MIC’s radiologists provide reading services.

In addition to Smart Worklist, MIC has also contracted for Intelrad’s newest product, called Odyssey.

Odyssey makes use of clinical AI to analyze diagnostic images and alert radiologists of unusual findings. When this happens, the system can route cases to the top of all radiologist’s list, so they’re read with greater priority.

On the clinical AI side, Intelrad has partnered with Zebra Medical of Israel – which is regarded as one of the world’s leading developers of medical AI systems.

There are currently four different AI solutions available on the Intelrad platform from Zebra, Wood said. They in-

clude detection of intra-cranial hemorrhaging, or bleeding of the brain; pneumothorax and pleural effusion; spine compression fractures; and coronary calcium scoring.

These solutions are FDA-approved in the United States and are currently

Intelrad is offering free usage of the Zebra Medical apps until December 2020 for users of its Smart Worklist.

awaiting the green-light from Health Canada, which should happen very soon, Intelrad said.

Wood noted that four more algorithms from Zebra Medical will be made available in the near-future, and additional ones are in the works.

Interestingly, the company is offering free usage of the Zebra Medical

clinical apps until December 2020 for customers who are deploying Smart Worklist. This gives radiologists a chance to experiment with AI and to see how it can add value to their day-to-day operations.

The clinical AI system can automatically scan diagnostic images for the four different types of problem areas, and if they choose, users can configure its usage in any way they like.

Whether its workflow or clinical problem-solving, AI is going to be used increasingly in the years to come, said Wood. “It’s such a useful tool, and there’s so much data being generated by radiologists.”

But Wood noted that AI isn’t perfect – at least not yet. “It’s extremely helpful, but you always want a person checking what it comes up with. AI and radiologists seem to have complementary skills, such that the combination nearly always scores the highest accuracy.”