

# Focus on technology: surgical selfies, ransomware attacks, AI-assisted mental health care

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**R**ecent research suggests that remotely monitoring patients recovering at home from surgery or COVID-19 may improve some outcomes and ease pressure on health systems — although governments and physicians are still grappling with how to balance virtual care and in-person services.

One randomized controlled trial in *npj Digital Medicine* found that monitoring wound healing after surgery via a smartphone tool and “selfie” snapshots of the incision nearly quadrupled the odds of diagnosing surgical site infections within a week after the procedure compared to routine follow-up at 30 days.

The study involved 492 people who underwent emergency abdominal surgery between July 2016 and March 2020. Researchers randomly assigned half of the participants to use the smartphone tool to complete questionnaires about their wounds and, if they were experiencing any symptoms of infection, send photos to their surgical team.

Rates of surgical site infections and average time to diagnosis were roughly the same in both the smartphone group and those receiving routine care. However, researchers found that patients in the smartphone group were 3.7 times more likely to have an infection diagnosed within a week after their operation. They were also less likely to visit family doctors or other community care providers in the month after their procedure and reported more positive experiences accessing care.

According to the authors, the study wasn’t big enough to parse the impact of

remote monitoring on the time it took to diagnose infections, but their findings suggest that remote wound care is safe, feasible, and effective.

A larger Canadian study conducted during the pandemic linked remote monitoring after surgery with decreased pain and increased detection and correction of medication errors.

The randomized controlled trial published in *The BMJ* followed 905 patients for 30 days after nonelective surgery. Half the participants received remote monitoring devices, including a tablet computer, to measure their vital signs, share photos of their wounds and connect virtually with nurses.

The other half received standard care — that is, they were instructed to check in with their doctor in a month or sooner if any issues came up.

Researchers found no difference between the groups in “days alive at home,” the study’s main outcome. But more patients in the remote monitoring arm had a drug error detected (29.7% v. 5.5% in the standard care group) and corrected (28.4% v. 4%) — especially errors related to patients not taking their medications.

The remote monitoring group was also less likely to report pain at seven, 15 and 30 days, or to require acute care or visit the emergency department.

According to Dr. Philip Devereaux, a cardiologist and perioperative care physician at Hamilton Health Sciences involved with the study, checking in with patients regularly meant their concerns could be addressed quickly — often with simple

interventions such as recommending acetaminophen to reduce pain. Reducing readmissions and emergency department visits decreased costs and strain on hospital services as well, he told CBC News.

A nonrandomized remote monitoring study published in the *Annals of Internal Medicine* found that Americans recovering at home from COVID-19 who received twice-daily texts to check in about their symptoms were less likely to die than patients receiving standard care.

A 24/7 team of telemedicine clinicians followed up with patients who reported worsening symptoms in response to the automated texts. At 30 days, there were 1.8 fewer deaths per 1000 patients among the 3488 people enrolled in the remote monitoring service than among the 4377 who received standard care. At 60 days, there were 2.5 fewer deaths per 1000 people in the remote monitoring group.

The study authors attributed the difference to remote monitoring patients having more frequent contact with telemedicine and visiting the hospital more frequently and sooner than others recovering at home.

However, some clinicians and patients remain apprehensive of the broader shift to virtual care during the pandemic. One survey of 1500 rheumatology patients and clinicians conducted by researchers at the University of Cambridge earlier this year found more than four in five rated remote medicine as worse than face-to-face consultations, even though most said virtual care was more convenient.

In Canada, health officials in Ontario, British Columbia and Manitoba have

urged doctors to resume in-person visits, arguing there are limits to the care that can be provided remotely.

And it doesn't appear that virtual care has delivered expected improvements in primary care wait times. A *PLOS One* study showed that the rapid expansion of telehealth in New Brunswick during the COVID-19 pandemic didn't significantly improve timely access to care. More primary care doctors reported seeing patients within five days of consultation requests (92% v. 79% before the pandemic) but they also saw fewer patients (18 per day v. 25 before the pandemic). "The findings indicate a possible decrease in demand instead of an improvement in timely access to care," the authors concluded.

Meanwhile, the Canadian Agency for Drugs and Technologies in Health (CADTH) recently published recommendations for implementing remote monitoring programs involving telemedicine and digital platforms for patients with cardiac conditions. Monitoring via implantable devices was outside the scope of the recommendations.

"The pandemic has been a turning point for remote monitoring programs, but the uptake across Canada remains fragmented and inconsistent," according to Lesley Dunfield, vice president of medical devices and clinical interventions at CADTH.

The recommendations emphasize the need for easy-to-use technologies and technical support, and the potential for remote monitoring approaches to increase clinician workloads and create disparities in care for people who don't have advanced devices or reliable internet.

### In other health technology news:

- The Communication Security Establishment, Canada's foreign signals intelligence agency, said it is aware of 235 ransomware attacks against Canadian targets so far this year, and more than half were critical infrastructure providers, including those in the health sector. The actual number of attacks is probably higher as many go unreported. Newfoundland and Labrador is still reeling after a cyberattack

that led to the cancellation of thousands of medical appointments and the theft of patients' and employees' personal information. The full extent of the breach — described as one of the worst in Canadian history — is unknown, but Eastern Health CEO David Diamond warned that anyone who has worked for the authority in the last 14 years should assume their personal information, including social insurance number, has been stolen.

- A cluster randomized clinical trial of 951 people with mental disorders conducted in England found that using artificial intelligence to provide personalized treatment recommendations improved the odds of lasting clinical improvement by 7% versus starting people on lower-intensity treatments such as guided self-help before escalating to other therapies. The AI-assisted approach, developed by an international team including researchers at Western University, sought to match the intensity of treatment to the complexity of each case based on a patient's symptoms, personality traits, social functioning, and other demographic details. The treatments recommended by the tool ended up costing an extra £100 per person on average because more patients accessed higher-intensity therapies from the outset.
- Investment in health care technology has boomed during the COVID-19 pandemic, according to Deloitte's *Road to Next* report. American health tech companies have raised \$23.8 billion across 556 deals so far this year, up from \$17.4 billion in 2020 — a trend driven by growing "consumerization" of health care and health systems overhauling technology infrastructure to deliver more virtual care.
- In a cohort study of 28 189 Americans published in *JAMA Network Open*, most patients with elevated blood pressure or hypertension who used a blood pressure monitor and connected smartphone app with digital coaching were able to control and lower their blood pressure. After one year, 53% of participants who started the study with elevated blood pressure saw it

improve by at least one category, compared to 69.7% of people who had stage 1 hypertension at baseline and 85.7% who had stage 2 hypertension. Those who engaged the most with the app saw the greatest reduction in blood pressure over time. However, the study notably lacked a control group.

- Governments, health professionals and researchers should treat digital technologies as increasingly important determinants of health, especially for children, according to *The Lancet and Financial Times Commission on governing healthy futures 2030: growing up in a digital world*. The report calls for efforts to build trust in digital health and regulate powerful players in the sector, as well as for a new approach to data collection based on protecting individual rights while promoting the public good. The authors also urge decision-makers to invest in "enablers of digitally transformed health systems," including through "strong country ownership of digital health strategies and clear investment roadmaps."
- The United Kingdom's National Health Service is encouraging people with urgent but not life-threatening health problems to use an online triage service before visiting emergency departments. If necessary, the service connects people with a health professional by phone. The UK's largest emergency departments saw record traffic in September, treating 1.39 million people. Earlier this year, Canadian research showed that introducing a virtual physician service to help nurses manage a surge in calls to British Columbia's telehealth hotline headed off thousands of visits to clinics and emergency departments.
- A real-time smartwatch alert system detected the onset of SARS-CoV-2 infection in 80% of cases in a prospective study of 3318 participants. During the study, published in *Nature Medicine*, 2117 participants received alerts about unusual changes in physiological and activity signals such as heart rate and steps. The system generated alerts for presymptomatic and

asymptomatic SARS-CoV-2 infection in 64 of 84 cases where participants later tested positive for the virus. Other respiratory infections, stress, alcohol consumption and travel also triggered alerts, but at a much lower frequency.

- Older adults with mild dementia can learn to use smartphone-based memory aids that help them remember everyday tasks, according to a small study published in the *Journal of the American Geriatrics Society*. The four-week trial, involving 52 adults whose

average age was 75, found that participants were able to learn to use a voice-recorder or reminder app that prompted them to execute tasks such as calling a lab on a specific day. Declining ability to remember and carry out daily tasks — also known as prospective memory — is a key driver of impairment among people with dementia. Participants reported improvements in their ability to remember daily tasks, and that the smartphone memory aids were acceptable to them.

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