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WATERLOO REGION

Artificial Intelligence could help clear surgical backlog created by COVID-19

By **James Jackson** Record Reporter

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WATERLOO — A third-year computer science major at the University of Waterloo believes artificial intelligence and machine learning could be a powerful ally in clearing the surgical backlog created by the COVID-19 pandemic.

Natasha Rozario used open source AI tools from Google to examine more than 10,000 operating room bookings from 2017 to 2019 and found AI could optimize scheduling better than humans, potentially leading to a 40 per cent increase in the frequency of ORs running on time.

“What machine learning really excels in is finding these patterns in large data sets,” said Rozario, an undergraduate student in Waterloo’s David R. Cheriton School of Computer Science. “Finding patterns in three years’ worth of data isn’t easy for humans, but machine learning can.”

During her research, Rozario found surgeons use the average time of their last 10 cases as the booking time for future procedures, but that method can result in about half of all cases running overtime.

Surgeries that go into overtime incur extra costs, and potentially delay other procedures, she said. The flip side of that is some surgeries finish in less time than they’re allotted, meaning a surgical room can sit empty and further waste time and resources.

By providing AI access to thousands of past procedures instead of just the past 10, machine learning can better determine just how long they will take and that information allows hospitals to improve scheduling, Rozario found.

The AI isn’t prioritizing certain procedures over others — that responsibility still falls to surgeons and hospital staff — it simply helps create a more optimized schedule, Rozario said.

Her co-author on the paper was her father, Duncan Rozario, the chief of surgery at Oakville Trafalgar Memorial Hospital. She was inspired to begin her research after the first wave of the COVID-19 pandemic led to significant surgical delays in Ontario.

From March 19 to May 26, health service providers and organizations, including hospitals, were directed to reduce elective surgeries and other non-emergency clinical activities to preserve capacity during the pandemic.

According to the provincial health care advisory group Health Quality Ontario, surgical volumes were reduced by up to 95 per cent compared to the previous year.

A study from the Canadian Medical Association Journal published in November found that by June 13 the backlog was approximately 148,364 surgeries. Non-urgent surgeries would take 84 weeks to clear, requiring 717 surgeries, 719 operating room hours, 265 hospital ward beds, and nine intensive care unit beds per week to clear, the study found.

Time-sensitive surgeries could take about 14 weeks to clear.

Grand River Hospital, St. Mary's General Hospital and Cambridge Memorial Hospital did not immediately respond to requests for current surgical backlogs in Waterloo Region.

To help clear the backlog and create more capacity to manage future COVID-19 outbreaks and surges, the Ontario government also announced an investment of \$741 million in September.

Rozario's study, "Can machine learning optimize the efficiency of the operating room in the era of COVID-19?," was published in the Canadian Journal of Surgery. It examined anonymous surgical room booking information for 10,553 cases and the AI not only helped ORs run more efficiently, but could also save money by reduced nursing overtime by 21 per cent.

That reduction in overtime could save hospitals as much as half a million dollars over three years, Rozario found, even after the pandemic ends and the backlog is cleared.

"It can save time, optimize patient care and save money."



James Jackson is a Waterloo Region-based reporter focusing on business and technology for the Record. Reach him via email: jjackson@therecord.com

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