Study: COVID-19 forecasting tool allowed hospital to manage patient capacity, resources amid pandemic's third wave

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A partnership between London Health Sciences Centre (LHSC), Ivey Business School and King's University College helped created a COVID-19 forecasting tool used by the hospital. (L to R) Tim Rice, senior director, Victoria Hospital at LHSC, Ivey professor Mehmet Begen, Ivey professor Gregory Zaric and King's professor Felipe Rodrigues. Credit: Rena Panchyshyn/London Health Sciences Center

During the peak of the third wave of the COVID-19 pandemic in 2021,

the health-care system's capacity was stretched and hospitals across Canada relied on each other to share resources and provide care.

Experts from London Health Sciences Center (LHSC), Ivey Business School and King's University College developed a simulation model to help hospital leaders make decisions on resources and capacity, ensuring LHSC was ready to accept patient transfers from outside the hospital's catchment area, including Toronto and Manitoba.

To enable the most efficient use of resources during a crucial time, LHSC leaders needed a solution.

"The tool allowed us to maintain optimal care for all LHSC units by making decisions grounded in real-time data," said Tim Rice, senior director at LHSC's Victoria Hospital.

The pandemic required collaboration across the health-care system to ensure hospital capacities were balanced while maintaining the ability to care for non-COVID patients. In addition to strategies like having field hospitals at the ready, patient transfers between hospitals were critical to managing the pandemic response.

Hospital leadership partnered with researchers from Ivey Business School and King's University College, building on previous collaborations, to create the model. They developed a Monte Carlo simulation tool designed to predict whether the hospital would be over capacity when responding to COVID-19 related impacts, such as changes in hospital admission rates, managing the impact of outbreaks and balancing the pandemic response with planned hospital activity.

The work was published in the open-access journal *BMC Public Health*.

The tool, created in Excel so any hospital could use it, helped forecast

the usage of critical care and medicine unit beds over a one-week period. It was based on data from the previous week, including admission rate and average length of stay for both COVID-19 and non-COVID-19 patients.

The spreadsheet-based simulation tool also factored in assumptions about future arrivals of patients from outside the region to predict capacity needs and whether additional beds dedicated for COVID-19 patients would be required.

"By inputting this data into the model, the impact to overall hospital bed capacity was better understood and provided LHSC leaders the information they needed to make objective decisions, including the resources required to meet the ongoing demands of the pandemic," Rice said.

When Manitoba hospitals required support from LHSC, at a time when the hospital was already supporting both the London region and fielding requests from Toronto, the team was prepared and confident to make key decisions on how many patients LHSC had the capacity to accept from other hospitals and how to most effectively use hospital resources.

"The tool serves as a future resource for emergency preparedness and new iterations of the model are in development to help with ongoing capacity planning," Rice said.

"It is our hope that the legacy of this partnership will live on in the future work it supports."

More information: Mehmet A. Begen et al, A forecasting tool for a hospital to plan inbound transfers of COVID-19 patients from other

regions, *BMC Public Health* (2024). DOI: 10.1186/s12889-024-18038-3