Computer model shows the best ways to slow the spread of COVID-19

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Researchers at the University of Waterloo created the first computational model that simulates many variables affecting the transmission of COVID-19 to slow the spread of variants.

The model takes raw data already in use to forecast case numbers and hospitalizations, and then adds other factors, such as vaccination rates, the use of masks and lockdowns, and the number of breakthrough infections.

The researchers based their computation model on Ontario's recent experience with COVID-19 and data from the Ontario COVID-19 Science Advisory Table.

"We were actually building the model when the Delta variant was still the dominant one in Ontario," said Anita Layton, professor of applied mathematics at Waterloo and Canada 150 Research Chair in mathematical biology and medicine. "We simulated a variant that was similar to Omicron, and the model is helpful for understanding whatever variants will come next."

The research team can change the parameters of the computational model to see what would happen with a new variant. It can also show what it would take to stop variants that are more contagious than others. As a result, the model can show where vaccination levels need to be or what levels of restrictions are necessary to keep a new variant at bay.

"It includes vaccination and different vaccine types, delays in second and third doses, the impacts of restrictions and even the competition among different variants of concern," said Mehrshad Sadria, a Ph.D. student in applied mathematics at Waterloo who also worked on the new model. "We want policymakers and stakeholders to have the most pertinent information so they can make the best decisions."

The researchers plan to develop the model to include even more factors that influence the spread of COVID-19 in specific communities.

"We'd like to investigate how people of different ages are impacted and

compare different levels of vaccination between and within age groups," Layton said. We're also looking to make it more refined so we can focus on specific regions of Ontario, which can then be helpful for looking at resource distribution."

The research team's paper on the computation model appears in *Scientific Reports*.

More information: Anita Layton et al, Understanding the Dynamics of SARS-CoV-2 Variants of Concern in Ontario, Canada: A Case Study, *Scientific Reports* (2021). DOI: 10.21203/rs.3.rs-788073/v1

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