Interactive tool shows the science behind COVID-19 control measures

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Credit: Tim Mossholder on Unsplash

An online tool to illustrate the effects of different COVID-19 control measures has been developed by a team of University of Cambridge researchers.

The 'lowhighcovid' tool is intended to highlight the potential impact of different control strategies on the rate of spread of COVID-19. It is designed as an educational tool, and is not intended to be used as a COVID-19 disease management or forecasting tool.

"Our website is intended to demystify infectious disease modeling, and highlight the broad type of model behind government policies for the control of COVID-19," said Nick Taylor, a Ph.D. researcher in Theoretical and Computational Epidemiology in Cambridge's Department of Plant Sciences who was involved in developing the tool.

Control measures, including social distancing and lockdown, affect the rate at which COVID-19 spreads through a population. The interactive model allows users to see the likely effects of different measures, depending on when they are started and the length of time they are in place.

There are a wide variety of approaches to modeling the spread of disease. Models used so far for COVID-19 range from detailed individual-based models, which are run many times for each set of parameters to give a range of predictions, to well-established deterministic models which divide the population into Susceptible, Infected and Resistant classes (referred to as an SIR model) resulting in a single prediction for one set of parameters. The new tool allows users to explore how a modified SIR model can be used to understand and manage infectious disease transmission.

Users select a country, a control measure, and how long the control is in place. The model then predicts how rapidly coronavirus will spread through the population. It illustrates how various control strategies applied today might impact the number of infections, hospitalizations, ICU bed requirements and deaths.

"COVID-19 spreads so rapidly that it is capable of quickly generating enough seriously ill patients to overwhelm the intensive care unit capacity of most healthcare systems in the world. This is why most countries have opted for strategies that slow the infection rate," said Taylor.

A real-time data feed within the new tool allows users to follow the progress of the current pandemic, and to compare this across different countries. The data feed was designed by Daniel Muthukrishna, a Ph.D. student at the University's Institute of Astronomy.

Explanatory videos, included alongside the interactive model, give users a greater insight into some of the science underlying disease control strategies.

"Biological systems are very complicated, and there are still many uncertainties surrounding COVID-19," said Dr. Cerian Webb, a post-doctoral researcher in the Epidemiology and Modelling Group of the University's Department of Plant Sciences who

provided the videos. "Controlling this disease is a difficult task, and there is no perfect strategy—each has advantages and disadvantages."

Provided by University of Cambridge