

SYNOPSIS

04/15/2020

Review of “Projecting the transmission dynamics of SARS-CoV-2 through the postpandemic period”

Article citation: Kissler SM, Tedijanto C, Goldstein E, Grad YH, Lipsitch M. Projecting the transmission dynamics of SARS-CoV-2 through the postpandemic period. *Science*. 2020 Apr 14 [Epub ahead of print]. Available from: <https://science.sciencemag.org/content/sci/early/2020/04/14/science.abb5793.full.pdf>

One-Minute Summary

A model was created to assess the impact of non-pharmaceutical intervention scenarios, such as social distancing, through the pandemic and post-pandemic periods with the following findings:

- Assuming that SARS-CoV-2 transmission is not affected by seasonality, one-time social distancing reduced the epidemic peak size. However, lifting social distancing resulted in a resurgence of cases, because much of the population remained susceptible. In a number of scenarios (including 20-weeks of effective social distancing), the peak after lifting social distancing was almost as large as if there had been no social distancing.
- Intermittent social distancing may be required with the goal of keeping the number of critical care patients below a threshold based on critical care capacity in the United States.
- Recognizing that there is approximately a 3-week lag between implementing social distancing and peak demand for critical care, the authors proposed possible illness rates that would turn “on” social distancing (35 cases per 10,000 people) and turn “off” social distancing (5 cases per 10,000 adults). Diligent surveillance data would be required to inform these triggers.
- Based on current critical care capacity in the United States, intermittent social distancing could be required until 2022, with social distancing in place between 25% and 75% of the time (depending on the assumptions used).
- Increased critical care bed capacity could allow longer periods of circulation before exceeding this capacity and therefore before implementation of social distancing, resulting in immunity accumulating more quickly.
- Effective treatments or vaccines, or rigorous contact tracing and quarantining of contacts could decrease the need for stringent ongoing social distancing.
- Serologic tests will help to determine the extent and duration of immunity which will impact spread of the virus in the post-pandemic period.

Additional Information

- Estimates of seasonality, immunity and cross-immunity to HCoV-OC43 and HCoV-HKU1 (two seasonal betacoronavirus which are in the same genus as SARS-CoV-2) from data from the United States were used as the basis for a SARS-CoV-2 model.
- The researchers varied the following parameters to assess their impact on circulation of SARS-CoV-2: 1) cross-protective immunity from HCoV-OC43 and HCoV-HKU1 on SARS-CoV-2; 2) seasonality of circulation of SARS-CoV-2; 3) maximum transmissibility (R_0) of SARS-CoV-2; and 4) duration of immunity to SARS-CoV-2.
- Parameters used in the model to assess the impact of interventions included: a latent period of 4.6 days; an infectious period of 5 days; R_0 ranged from 2.2 to 2.6 in the winter and 60% and 100% of that value in the summer (the latter indicating no seasonality to transmission); 3.08% of infections required hospitalization but not critical care and 1.32% required critical care; a mean duration of hospital stay of 8 days if critical care was not required, and if critical care was required, 6 days of non-critical care and 10 days in critical care. It was assumed that there was no cross-immunity between HCoV-OC43 or HCoV-HKU1 and SARS-CoV-2.

PHO Reviewer's Comments

As with any model, the outputs are contingent on the design of the model and the assumptions used to create the model. This is a rather complex model based on data from seasonal betacoronaviruses to which SARS-CoV-2 parameters were added.

Citation

Ontario Agency for Health Protection and Promotion (Public Health Ontario). Review of "Projecting the transmission dynamics of SARS-CoV-2 through the postpandemic period". Toronto, ON: Queen's Printer for Ontario; 2020.

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