SYNOPSIS

06/20/2020

Review of "Effectiveness of isolation, testing, contact tracing, and physical distancing on reducing transmission of SARS-CoV-2 in different settings: a mathematical modelling study"

One-Minute Summary

- This modelling study **estimated the reduction of Coronavirus Disease 2019 (COVID-19) transmission under different public health strategies and settings, and estimated the number of contacts that would need to be quarantined under different strategies.**
- **Compared with no control, the greatest reduction in the effective reproductive number (R_{eff}) were approaches that combined strategies.**
- **Strategies that reduced number R_{eff} the most (>60%) were combined measures as follows:**
    - Self-isolation + household quarantine (HHQ) + manual contact tracing of acquaintances + app-based tracing + limit to four daily contacts with other individuals (66%)
    - Self-isolation + HHQ + manual contact tracing of all contacts (64%)
    - Self-isolation + HHQ + manual contact tracing of acquaintances + limit to four daily contacts with other individuals (64%)
    - Self-isolation + HHQ + manual contact tracing of acquaintances + app-based tracing (61%)
- **Strategies that reduced R_{eff} the least (<40%) were single or limited measures as follows:**
    - Mass testing of 5% of population per week (2%)
    - Self-isolation within home (29%)
    - Self-isolation outside home (35%)
    - Self-isolation + HHQ (37%)
- If gatherings outside of home, school, or work are limited (i.e., limit gatherings in settings that have a high proportion of contacts that are difficult to trace), then the effect on transmission reduction was similar for manual contact tracing of acquaintances and manual contact tracing of all contacts. Assuming 1,000 new symptomatic cases per day, 15,000 to 41,000 contacts would be quarantined each day (depending on contact tracing strategy used).
- **To keep R_{eff}<1, a high proportion of cases need to self-isolate and a high proportion of contacts need to be traced successfully in the absence of other measures.**

- However, if **self-isolation and contact tracing is combined with physical distancing**, particularly those that reduce contacts that would be difficult to trace, the authors conclude that this would **increase the likelihood of achieving sustained control of COVID-19**.

Additional Information

- The transmission model used data from 40,162 United Kingdom participants with recorded social contacts from the BBC Pandemic dataset.
  - This dataset was collected in 2017-18 (i.e., prior to COVID-19) and includes information on close contacts which broadly reflect those that have been associated with COVID-19 transmission
  - Individual-level transmission was stratified by setting (household, work, school, or other)
- The control strategies explored in the model were: 1) self-isolation of symptomatic cases; 2) quarantine of household contacts; 3) manual tracing of acquaintances (contacts that have been met before); 4) manual tracing of all contacts; 5) app-based tracing; 6) mass testing regardless of symptoms; 7) limits on daily contacts made outside home, school, and work; and 8) having a proportion of the adult population work from home.
- Some of the assumptions used in modelling:
  - Mean delay from onset to isolation = 2.6 days
  - Individuals became infectious 1 day before onset of symptoms
  - Proportion of cases who are eventually symptomatic = 70% of adults, 30% of children
  - Probability that symptomatic case will self-isolate and get tested = 90%
  - Secondary attack rate among household contacts = 20%
  - Secondary attack rate among other contacts = 6%
  - Proportion of contacts who are acquaintances (i.e., have been met before): household (100%), school (90%), work (79%) and other settings (52%)
  - Proportion of population that would have the app installed = 53%
- The authors acknowledge that their individual-level transmission model does not take into account network effects and the associated temporal aspects of outbreak size and dynamics. In addition, the assumptions made were optimistic in some instances (e.g., delay in onset to isolation); however, the authors contend these assumptions are plausible.

PHO Reviewer's Comments

- None.

Citation

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