CORRESPONDENCE

Challenges in specifying parameter values for COVID-19 simulation models [version 1; peer review: awaiting peer review]

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Abstract
A recent modelling paper on the coronavirus disease 2019 (COVID-19) epidemic in the US (Bartsch et al.) suggested that maintaining face mask use until a high vaccine coverage (70–90%) is achieved is generally cost-effective or even cost-saving in many of the scenarios considered. Their conclusion was based on the assumed effectiveness of continued face mask use, cited from a study that reported an 18% reduction in the effective reproduction number associated with the introduction of state-level mask mandate policies in the US in the summer of 2020. However, using this value implicitly assumes that the effect of face mask use in 2021 through 2022 is the same as that of summer 2020, when stringent nonpharmaceutical interventions were in place. The effectiveness of universal mask wearing in 2021–2022 is probably more uncertain than considered in Bartsch et al. and rigorous sensitivity analysis on this parameter is warranted.

Keywords
COVID-19, mathematical models, simulation, mask mandates, cost effectiveness
In a recent paper in *Lancet Public Health*, Bartsch et al.\(^1\) used an age-stratified transmission model to simulate the coronavirus disease 2019 (COVID-19) epidemic in the US and predicted the cost-effectiveness of maintaining face mask use until a high vaccine coverage (70–90%) is achieved. Their simulations showed that continued face mask use is generally cost-effective and even cost-saving in many of the scenarios considered. Such model-based economic analyses along with epidemiological evidence have the potential to guide policymakers in a timely manner.

One of the biggest challenges in modelling studies is how to reliably choose parameter inputs as their misspecifications can substantially affect the conclusions.\(^2\) Bartsch et al.\(^1\) chose over 80 parameter inputs in their model, one of which represented the effectiveness of continued face mask use. The authors referred to a study that analysed temporal changes in the effective reproduction number ($R_t$) around the introduction of state-level mask mandate policies in the US in the summer of 2020 to find an 18% reduction in $R_t$ associated with the policies.\(^3\) Bartsch et al. chose this 18% for their effectiveness parameter; however, we need to be careful because this choice implicitly produces an assumption: the effect of face mask use in 2021 through 2022 is the same as that in summer 2020, when stringent interventions including a stay-at-home order and school closure were in place.

This assumption may need to be revisited. COVID-19 frequently spreads over social contacts in settings where people do not wear masks, e.g. dining at restaurants, drinking at bars and social gathering with friends and relatives,\(^4\) and the stringent interventions in 2020 aimed to restrict contacts in these settings for outbreak control.\(^5\) With an increased proportion of contacts in these settings after the lifting of restrictions, public space mask mandates alone may not be able to easily achieve an equivalent $R_t$ reduction of 18%.

Conversely, there are also changes from summer 2020 that likely favour the effect of facial mask use, e.g. improved supply of better-quality masks.\(^6\) In sum, the mask effectiveness in 2021–2022 is more uncertain than considered in Bartsch et al. Rigorous sensitivity analysis on this parameter (e.g. between 5% and 50%) is warranted to provide a balanced view on this important policy question.

**Data availability**

No data are associated with this article.

**References**


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