Correspondence/Letter to the Editor

Reply to ‘Coronavirus disease 2019 prevention, control and modelling metrics’

Dear Editor,

We thank the authors for their keen interest and useful insights into our article.1 Their suggestion of using i-metric is an interesting one, and we might consider this term for future articles relating to our mathematical model.

Ours is not a deterministic model but a stochastic one.2 The stochasticity is applied to our assumptions as mentioned in Table 2. The q-metric in our model ranges from 1 to 90 to cover the entire hypothetical range of possibilities and has been modeled in discrete intervals of 10, for which confidence intervals are given in Suppl Table 5. Assumptions regarding input parameters for estimating q-metric were based on studies referenced in the article. While the confidence intervals of q-metric were not explicitly computed, the range of confidence intervals of the input parameters themselves vary over a narrow band and are unlikely to lead to large uncertainties in the estimated q-metric for planning of health-care resources.

Across the world, estimates of infection fatality rates (IFR) have been falling, as the epidemic has progressed.4 The current age-stratified Center for Disease Control (CDC), USA estimates, when extrapolated to Indian demographic data, now yield 0.15% as the estimated IFR for India.5 Our article was submitted on 12 April 2020, three weeks into lockdown, when the only available data were from China. That gave us a calculated IFR of 0.498% for India.6 Until Indian data are published, one has to extrapolate from available data, with suitable assumptions. A clerical error which had crept into the first uploaded preprint was corrected to 49,842 out of 10 million before the final version was published.

By 05 June 2020, a total of 434 articles had been published regarding mathematical modeling for COVID-19. A systematic review reveals that only 72 were published in peer-reviewed journals, of which 41 (57%) were SEIR models, which was the commonest type of mathematical model used.7

We have reached the figures regarding shortage/unavailability of personnel qualified to operate ventilators after consulting intensivists, anesthesiologists, and physicians directly involved in COVID-19 care and also after critically analyzing national availability figures of various medical specialties in India. It emerged very clearly that ventilatory management in complicated COVID-19 cases cannot be addressed by an average clinician with brief training. Extensive experience is required. To this, we have factored shift requirements and personal protective equipment (PPE) restrictions, which we have explained in the article and supplements. As newer modalities of COVID-19 management emerge, including prone treatment, the estimated requirement of ventilators appears lesser today, than it did on 12 April.

In the absence of previous experience in dealing with a novel illness sweeping across the globe, mathematical modeling provides the first step for pragmatic health-care planning. The fact that of the 434 articles, only 72 were published after peer review, shows interpretation with sentience and abundant caution.

‘All models are wrong, but some are useful’ said George E.P. Box. In our modeling endeavor, we have targeted possible usefulness.

Disclosure of competing interest

The authors have none to declare.

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