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Implications of suboptimal COVID-19 vaccination coverage in Florida and Texas

In July, 2021, another wave of COVID-19 began in the USA as the highly infectious delta (B.1.617.2) SARS-CoV-2 variant drove outbreaks predominantly affecting states with relatively low vaccination coverage. Some US states have shown the feasibility of rapidly achieving high vaccination coverage. Specifically, an average of 74·0% of adults had been fully vaccinated in Vermont, Connecticut, Massachusetts, Maine, and Rhode Island by July 31. By contrast, two states facing substantial delta-driven surges, Florida and Texas, had fully vaccinated only 59·5% and 55·8% of their adult residents, respectively.[1] Here, we estimate the deaths, hospital admissions, and infections that could have been averted if Florida and Texas had matched the average vaccination pace of the top-performing states and vaccinated 74·0% of their adult populations by the end of July.

We adapted our agent-based model of SARS-CoV-2 transmission[2,3] to the demography, contact patterns, and age-stratified vaccination trajectories of Florida and Texas. We further accounted for the emergence and spread of the alpha (B.1.1.7), gamma (P.1), iota (B.1.526), and delta variants, in addition to the original strain.[2,3] Vaccine efficacies against infection and symptomatic and severe disease for different vaccine types, each variant, and by vaccine dosage were parameterised from clinical studies (appendix pp 4–5). The model was calibrated to the reported incidence in each state between Oct 1, 2020, and Aug 31, 2021 (appendix p 6). Using the calibrated model, we evaluated the impact of enhanced vaccination rollout by scaling the daily vaccine doses distributed to achieve 74·0% coverage of fully vaccinated adults by July 31, 2021, and continued with the associated daily rates of vaccine rollout. We then simulated the epidemiological trajectories of outbreaks in Florida and Texas and compared them with the observed cases, hospital admissions, and deaths in these two states from Dec 12, 2020, to Aug 31, 2021.

We found that enhanced vaccination would have markedly blunted the increase in cases, hospital admissions, and deaths in Florida and Texas (figure; appendix p 6). From the start of vaccination on Dec 12, 2020, until Aug 31, 2021, Florida had reported 2 221 520 COVID-19 cases and Texas had reported 2 142 833. Achieving 74·0% vaccination coverage by July 31 and continuing with the associated daily rate would have averted 664 007 additional cases (95% credible interval [CrI] 419 219–848 020) in Florida and 647 906 additional cases (507 298–789 885) in Texas (appendix p 7). By Aug 31, the enhanced vaccination in Florida would have reduced hospital admissions by 61 327 (95% CrI 49 723–73 501) and deaths by 16 235 (13 243–19 473). The reduction in hospital admissions in Texas during the same period would have been 37 587 (95% CrI 31 575–44 659) and the reduction in deaths would have

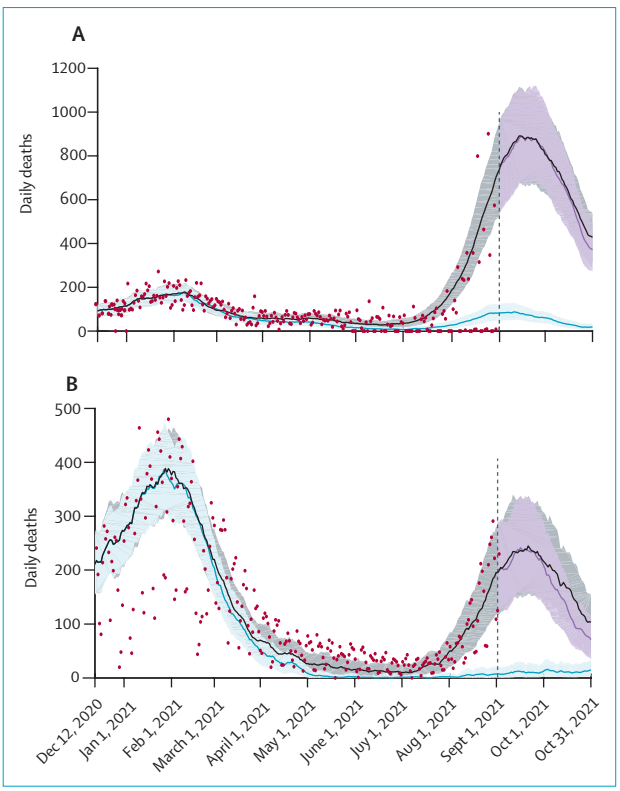

***Figure*: Model projections of daily deaths in (A) Florida and (B) Texas**
Black lines show mean estimates, with uncertainty bounds of simulations shown in grey shaded areas. Red dots are reported data. Blue lines and shaded areas show the model projections for mean estimates and uncertainty bounds under the counterfactual scenario of enhanced vaccination with 74·0% coverage of adults by July 31, 2021. The purple lines and shaded areas show the model projections for mean estimates and uncertainty bounds under the scenario of a 50% increase in daily vaccination rate starting from Sept 1, 2021. All uncertainty bounds are 95% credible intervals.

See **Online** for appendix

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been 6353 (5227–7501). Collectively, these two states could have averted more than 95 000 hospital admissions and 22 000 deaths had they reached the vaccination coverage achieved by the top five states and continued at the same pace until Aug 31, 2021.

We further projected the epidemiological impact of a 50% increase in the daily vaccination rate in Florida and Texas compared with the status quo from Sept 1, 2021 (figure; appendix p 6). Our projections suggest that between then and Oct 31, 2021, such acceleration of vaccination would prevent more than 26 000 cases and 1200 deaths in the two states.

Hospitals and intensive care units in several US states are currently overwhelmed by a surge in symptomatic COVID-19 illness almost entirely among unvaccinated individuals. The combination of relatively lower vaccination rates in southern and central US states, especially among younger people, is even more concerning as schools return to in-person classes and non-pharmacological measures such as mask wearing and physical distancing are relaxed. As the pandemic continues, efforts to increase vaccination will be crucial to preventing future SARS-CoV-2 variants that can fuel additional waves of severe illness, hospital admissions, and deaths.

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Addendum needed on COVID-19 travel study

The Article by Mathew Kiang and colleagues[1] is one of very few studies available to inform policy makers in Hawaii, USA, on the efficacy of different testing and quarantine strategies for preventing new introductions of SARS-CoV-2 variants into the island populations.

The primary endpoint of the study—the cumulative number of infectious days—is proposed to measure the risk to the destination population of importing infection through travel. However, the tallies include infectious days before travel, which do not expose the destination population. To assess exposure to the destination population only, the tally should start on the day of travel. Such a tally is shown in figure A, which overlays graphs from figure 1 of Kiang and colleagues' Article. Aligned are the curves for no testing and strategy 1 (PCR test within 3 days of departure) so as to start the count of

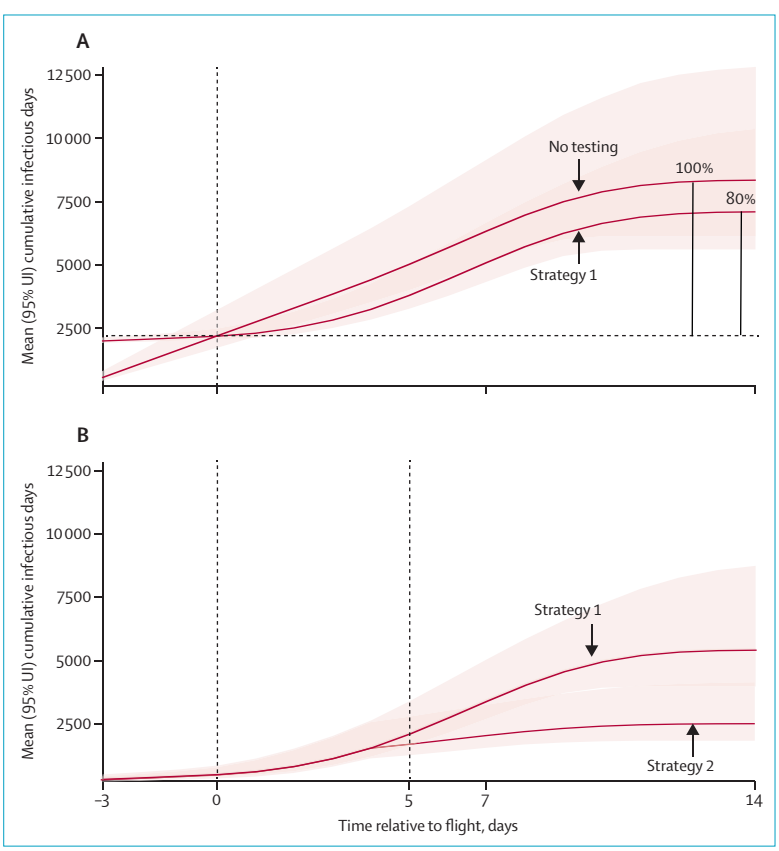

***Figure*: Overlays of strategies from Kiang and colleagues' study[1]**
(A)The graphs for the strategy of no testing and strategy 1 (PCR test within 3 days of departure) are offset to start the count of infectious days on the day of travel. (B) The graphs for strategy 1 and strategy 2 (PCR test within 3 days of departure, 5-day quarantine after arrival, and PCR test 5 days after arrival) are overlaid.