



Invited Commentary | Infectious Diseases

In Search of the Best Way to Identify Those Who Would Benefit Most From COVID-19 Vaccination—Who Goes First?

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The rapid development of the COVID-19 vaccines and the excellent results from the phase 3 randomized clinical trials, which demonstrated approximately 95% efficacy of both mRNA vaccines for the prevention of severe laboratory-confirmed COVID-19 and even higher efficacy against severe disease and death from COVID-19, led the US Food and Drug Administration to grant both Pfizer-BioNTech and Moderna vaccines emergency use authorization in December 2020. Vaccine rollout in the United States started on December 14, 2020. By March 13, 2021, more than 101 million doses had been given across the United States, and more than 11% of the US population was fully immunized. While this is a remarkable accomplishment, at the current pace of approximately 1.7 to 2.0 million shots daily, it will take 8 months to vaccinate 75% of the population with a 2-dose regimen. That is not nearly fast enough, considering that more transmissible and likely more deadly SARS-CoV-2 variants are spreading fast.

We all knew that vaccine supply would be limited at the start of vaccine rollout, and thus, the US Centers for Disease Control and Prevention (CDC) and the National Institutes of Health asked the National Academies of Sciences, Engineering, and Medicine to convene an ad hoc committee to develop an overarching framework for COVID-19 vaccine allocation to assist policy makers. The report of this committee¹ provided a roadmap based on ethical principles of maximizing benefit, equal concern for all individuals, and mitigation of inequities for fair vaccine allocation. The report recommended a phased approach for vaccinating the population. These overall recommendations informed more specific recommendations by the CDC Advisory Committee on Immunization Practices (ACIP) and committees advising various states in their immunization plans.

The ultimate goals of a COVID-19 vaccination program are to reduce morbidity and mortality and to return to normal life by limiting transmission. However, the public health strategy behind the National Academies' allocation approach while supplies are limited was to prioritize the reduction of death and severe disease and the protection of the health care system rather than to interrupt transmission. There are several justifications for this mortality- (and severe morbidity-) first strategy: death is irreversible, and there is a social consensus regarding preventing severe morbidity and mortality. Moreover, meaningfully interrupting transmission requires vaccinating a critical mass of the population, which is challenging in a limited-supply scenario.¹ In any case, there is currently limited evidence that authorized vaccines reduce transmission and acquisition of SARS-CoV-2, adding even more uncertainty regarding a transmission-first approach.

Because we know that the vaccines are quite effective in reducing severe disease and hospitalization, the populations prioritized initially have been adults 65 years and older followed by persons with high-risk medical conditions. To date, more than half of the people who have received at least 1 dose of the COVID-19 vaccine are 65 years or older.²

Is this the best way to operationalize a mortality-first strategy given the limited supply of COVID-19 vaccines? Considering the limited initial supply, modeling vaccine allocation is a potential way to maximize benefits. Elsewhere in *JAMA Network Open*, Ioannou et al³ present a model developed using the electronic health records of 7.6 million US veterans to better identify who to vaccinate first to prevent a greater number of COVID-19 deaths. To do this, the investigators used data on veterans available at the Veterans Affairs Corporate Data Warehouse and developed a model to estimate the risk of SARS-CoV-2-related death during follow-up using patient characteristics.

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Subsequently, they compared the performance characteristics of 3 COVID-19 vaccine prioritization strategies: persons vaccinated sequentially based on model scores; age-based allocation; and CDC-ACIP phased allocation. Their findings suggest that prioritizing those more likely to die of COVID-19 during vaccine rollout would result in 22.4% fewer deaths than an approach based on the CDC-ACIP phased vaccination and 17.9% fewer deaths than an approach based solely on age. Ioannou et al³ provide substantive evidence that their model is a potentially attractive tool for operationalizing a mortality- (and severe morbidity-) first strategy. However, this tool—and other similar data-driven tools—rely on a robust and complete data source, such as the VA or managed care organization data. Nevertheless, increasing the effect of each dose on mortality prevention, even if it is limited to organizations such as the VA, could be worth it.

Other investigators have also used modeling to suggest alternative approaches. Bubar et al⁴ used a mathematical model and concluded that mortality would be minimized by prioritizing adults older than 60 years, while a vaccine that effectively blocked transmission prioritized to adults aged 20 to 49 years would minimize incidence.

Vaccine prioritization in a public health emergency is always difficult, and scaling up rapid vaccination is hard, but it is even harder if the desire is to do it with equity. Among 23 states that have released data on vaccination distribution by race/ethnicity, White residents are being vaccinated at substantially higher rates than Black residents, in many cases 2 to 3 times higher.⁵ Thus, it becomes critically important that whatever model we use for COVID-19 vaccination is closely monitored and, if the results are not what is desired, that course corrections be made to avoid the risk of increasing disparities with vaccination.

ARTICLE INFORMATION

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