Speed Versus Efficacy: Quantifying Potential Tradeoffs in COVID-19 Vaccine Deployment

Background: The global effort to develop a vaccine for coronavirus disease 2019 (COVID-19) has already produced 2 candidates, each requiring 2 doses, with reported efficacies exceeding 90% (1). The U.S. Food and Drug Administration (FDA) has granted Emergency Use Authorization for both vaccines (Pfizer-BioNTech and Moderna). Their reported efficacies greatly exceed the 50% threshold the FDA cited in a June 2020 guidance document (2). Additional vaccine candidates at earlier stages of development hold the promise of single dosing, simpler storage requirements, and more rapid immunity after vaccination (3).

The availability of multiple vaccine options would be a welcome development but would create policy dilemmas. How do we define the "best" vaccine, and which populations should receive it? Should the FDA expect all candidates to meet or exceed the 90% efficacy benchmark established by the 2 frontrunners? From a population perspective, how good is "good enough"? Given that some portion of the population will inevitably fail to return for a second dose, might a single-dose vaccine that is 75% effective and takes 2 weeks to achieve

vaccination in the United States (4), and took 4 weeks to achieve lifetime protection, allowing for partial immunity after the rst dose. We compared this vaccine with 2 hypothetical, single-dose alternatives, one conferring lifetime protection and the other with stable ef cacy of uncertain duration (exponentially distributed with a mean duration of 6 months). Both of these single-dose vaccines were assumed to achieve more rapid daily uptake (0.75%)

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