Supplementary Appendix

This appendix has been provided by the authors to give readers additional information about their work.

Supplement to: Keehner J, Horton LE, Binkin NJ, et al. Resurgence of SARS-CoV-2 infection in a highly vaccinated health system workforce. N Engl J Med. DOI: 10.1056/NEJMc2112981

Supplemental Appendix

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Methods:

The study population was restricted to members of the UC San Diego Health's (UCSDH) and UC San Diego Health Sciences (UCSDHS) workforce who were 18 years of age and older. Workforce numbers varied slightly by study month, from 18,964 to 19,035 of whom approximately 58% worked in the Health System, which includes the hospitals and outpatient clinics, and the remainder were in Health Sciences which includes the faculty and staff in the Schools of Medicine, Pharmacy, and Public Health, the residency and fellowship programs, and biomedical research laboratory staff.

UCSDH made COVID-19 vaccination readily available to the clinical workforce initially at vaccination stations within the two hospitals and later to the rest of the workforce at its two superstations. Numbers of fully vaccinated persons were obtained from UCSDH's vaccine registry and were also collated from sources outside of UCSDH. These included the County of San Diego and California state COVID-19 vaccination registries and proof of vaccination uploaded by individuals as part of a July 15, 2021 vaccination mandate for all University of California personnel, students, or trainees. Numbers of unvaccinated individuals were obtained by subtracting the number of individuals who had received at least one dose of vaccine from the total workforce population.

Cases of SARS CoV-2 were identified through a variety of channels, including daily symptom screening for those working onsite using a smart phone application or a tablet available at the secured Health System's entrances, care seeking for symptoms, and testing of contacts to known cases. All cases underwent detailed investigation by a dedicated team, which was also responsible for contact tracing. PCR and sequencing of suspected cases were performed in two UCSDH laboratories. In addition to the cases investigated at UCSDH, the County of San Diego Public Health Services notified UCSDH of a small number of UCSDH workers who had undergone testing elsewhere. All cases were tracked in a REDCap database beginning October 25, 2020. Data collected on each case included the date of the start of symptoms, and the type of symptoms, known exposures, worksite location, and job type. If vaccinated, dates and type of vaccine were obtained from the medical record system and verified with the case and persons with no record of UCSDH vaccination were asked to provide these data.

For purposes of the analysis, only those cases with both a positive PCR and at least one symptom at the time of testing were included in the analysis. Symptoms queried included fever, chills, cough, shortness of breath, difficulty breathing, fatigue, myalgias, headache, loss of taste or smell, sore throat, congestion or runny nose, nausea, vomiting or diarrhea. The analyses excluded from both the case numbers and the population denominators those who (a) received the Janssen vaccine, (b) received only one dose of an mRNA vaccine, (c) had a positive PCR within 14 days of a second mRNA dose, or (d) had a positive PCR between October 25, 2020, and February 28, 2021.

We used the model described by Moline et al. (1) to calculate vaccine effectiveness, with a slight modification to the variance calculation that was necessary because of the structure of

our data. In this approach, Poisson regression with robust standard errors and offsets included for the proportions of vaccinated and unvaccinated individuals was used to calculate vaccine effectiveness and 95% confidence intervals (1). Confidence intervals for attack rates were calculated using the Wilson score interval with the finite population correction adjustment.

Reference

1. Moline HL, Whitaker M, Deng L, et al. Effectiveness of COVID-19 Vaccines in Preventing Hospitalization Among Adults Aged ≥65 Years — COVID-NET, 13 States, February–April 2021. MMWR Morb Mortal Wkly Rep. ePub: 6 August 2021. DOI: http://dx.doi.org/10.15585/mmwr.mm7032e3external icon