

CORRESPONDENCE

SARS-CoV-2 Infection after Vaccination
in Health Care Workers in California

TO THE EDITOR: Data from phase 3 clinical trials of messenger RNA (mRNA) vaccines through November 2020 showed 94.1% efficacy for the prevention of symptomatic severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection at 14 days after the second dose of the mRNA-1273 vaccine (Moderna)¹ and 95% efficacy at 7 days after the second dose of the BNT162b2 vaccine (Pfizer).² Since the results of these trials were published, a nationwide surge in coronavirus disease 2019 (Covid-19) has been noted, SARS-CoV-2 variants with increased infectivity have emerged, the Food and Drug Administration has granted emergency use authorization for these two mRNA vaccines, and vaccination has been initiated across the United States.

Since the start of the vaccination campaign, the development of Covid-19 has been reported in persons who have received one or both doses of vaccine.³ Both the University of California, San Diego (UCSD) and the University of California, Los Angeles (UCLA) health systems began to vaccinate health care workers on December 16, 2020. On December 2, in addition to defining a low threshold for testing of symptomatic persons, UCSD mandated that asymptomatic health care workers undergo weekly testing by polymerase-chain-reaction (PCR) assay of nasal swabs. On December 26, UCLA instituted an optional testing program for asymptomatic health care workers with PCR assay of nasal swabs. This program has allowed for increased detection of asymptomatic SARS-CoV-2 infections after vaccination.

Pooled data were obtained in deidentified format from an electronic employee health record system at UCSD and UCLA.⁴ Exemption from institutional review board approval was obtained.

From December 16, 2020, through February 9, 2021, a total of 36,659 health care workers received the first dose of vaccine, and 28,184 of these persons (77%) received the second dose. Among the vaccinated health care workers, 379 unique persons tested positive for SARS-CoV-2 at least 1 day

after vaccination, and the majority (71%) of these persons tested positive within the first 2 weeks after the first dose. After receiving both vaccinations, 37 health care workers tested positive; of these workers, 22 had positive test results 1 to 7 days after the second dose. Only 8 health care workers tested positive 8 to 14 days after the second vaccination, and 7 tested positive 15 or more days after the second vaccination (Table 1). As of February 9, a total of 5455 health care workers at UCSD and 9535 at UCLA had received the second dose 2 or more weeks previously; these findings correspond to a positivity rate of 0.05%.

In our cohort, the absolute risk of testing positive for SARS-CoV-2 after vaccination was 1.19% among health care workers at UCSD and 0.97% among those at UCLA; these rates are

Table 1. New SARS-CoV-2 Infections among Vaccinated Health Care Workers from December 16, 2020, through February 9, 2021.

Days after Vaccination	Vaccinated Persons		
	With New Infection (N=379) <i>number</i>	Tested (N=14,604)* <i>number</i>	Eligible for Testing (N=36,659)† <i>number (percent)</i>
Dose 1			
Days 1–7	145	5794	35,673 (97.3)
Days 8–14	125	7844	34,404 (93.8)
Days 15–21	57	7958	32,667 (89.1)
Day 22 or later, before dose 2	15	4286	32,327 (88.2)
Dose 2			
Days 1–7	22	5546	23,100 (63.0)
Days 8–14	8	4909	16,082 (43.9)
Day 15 or later	7	4167	14,990 (40.9)

* Shown are the numbers of unique health care workers who underwent testing (not the number of individual tests).

† Shown are the numbers and percentages of persons among 36,659 vaccinated health care workers who were eligible to undergo testing each week as of February 9, 2021.

higher than the risks reported in the trials of mRNA-1273 vaccine¹ and BNT162b2 vaccine.² Possible explanations for this elevated risk include the availability of regular testing for asymptomatic and symptomatic persons at our institutions, a regional surge in infections in Southern California during our vaccination campaigns,⁵ and differences in demographic characteristics between the trial participants and the health care workers in our cohort. The health care workers were younger and had an overall higher risk of exposure to SARS-CoV-2 than the participants in the clinical trials. In addition, the cutoff dates for reporting in both initial vaccine trials were well before this surge, no testing of asymptomatic persons was included in the BNT162b2 vaccine trial,² and only a single screening of asymptomatic persons was performed in the mRNA-1273 vaccine trial before the second dose was administered.¹

The rarity of positive test results 14 days after administration of the second dose of vaccine is encouraging and suggests that the efficacy of these vaccines is maintained outside the trial setting. These data underscore the critical importance of continued public health mitigation measures (masking, physical distancing, daily symptom screening, and regular testing), even in environments with a high incidence of vaccination, until herd immunity is reached at large.

Jocelyn Keehner, M.D.

Lucy E. Horton, M.D., M.P.H.

UC San Diego Health
San Diego, CA

Michael A. Pfeffer, M.D.

David Geffen School of Medicine at University of California,
Los Angeles (UCLA)
Los Angeles, CA

Christopher A. Longhurst, M.D.

Robert T. Schooley, M.D.

UC San Diego Health
San Diego, CA

Judith S. Currier, M.D.

David Geffen School of Medicine at UCLA
Los Angeles, CA

Shira R. Abeles, M.D.

Francesca J. Torriani, M.D.

UC San Diego Health
San Diego, CA
ftorriani@health.ucsd.edu

Drs. Abeles and Torriani contributed equally to this letter.

Disclosure forms provided by the authors are available with the full text of this letter at NEJM.org.

This letter was published on March 23, 2021, at NEJM.org.

1. Baden LR, El Sahly HM, Essink B, et al. Efficacy and safety of the mRNA-1273 SARS-CoV-2 vaccine. *N Engl J Med* 2021;384:403-16.
2. Polack FP, Thomas SJ, Kitchin N, et al. Safety and efficacy of the BNT162b2 mRNA Covid-19 vaccine. *N Engl J Med* 2020;383:2603-15.
3. Dagan N, Barda N, Kepten E, et al. BNT162b2 mRNA Covid-19 vaccine in a nationwide mass vaccination setting. *N Engl J Med*. DOI: 10.1056/NEJMoa2101765.
4. Reeves JJ, Hollandsworth HM, Torriani FJ, et al. Rapid response to COVID-19: health informatics support for outbreak management in an academic health system. *J Am Med Inform Assoc* 2020;27(6):853-9.
5. Dong E, Du H, Gardner L. An interactive web-based dashboard to track COVID-19 in real time. *Lancet Infect Dis* 2020;20:533-4.

DOI: 10.1056/NEJMc2101927

Correspondence Copyright © 2021 Massachusetts Medical Society.