CORRESPONDENCE

Breakthrough Infections in BNT162b2-Vaccinated Health Care Workers

TO THE EDITOR: Hacisuleyman et al.[1] described a cohort of 417 health care workers who had received the BNT162b2 (Pfizer–BioNTech) or mRNA-1273 (Moderna) mRNA vaccine. Two women in that cohort (0.48%) had breakthrough infections with SARS-CoV-2 variants. At our institution, 1137 health care workers were fully vaccinated with BNT162b2. Of these, 4 immunocompetent women (0.35%) had breakthrough infections; these infections occurred later than those in the study by Hacisuleyman et al. (at a median of 62 days after the second vaccine dose, as compared with 25 days) (Table 1).[1,2] This failure rate is higher than that in the initial phase 3 trial, in which 0.05% of vaccinated participants (8 of 17,411) had a breakthrough infection 7 or more days after the second BNT162b2 vaccine dose,[3] but is lower than in other recent studies involving health care workers.[2,4,5]

The health care workers at our institution had

Table 1. Characteristics of BNT162b2-Vaccinated Health Care Workers with Breakthrough Infections.*

Characteristic	Patient 1	Patient 2	Patient 3	Patient 4
Sex	Female	Female	Female	Female
Age (yr)	35	28	40	48
Coexisting conditions	None	None	None	None
Profession	Nurse	Medical student	Midwife	Technician
Vaccine	BNT162b2	BNT162b2	BNT162b2	BNT162b2
Time from first to second vaccine dose (days)	21	21	21	21
Vaccine-related reactions	Local pain	None	Local pain	Local pain
Reason for PCR testing	Symptoms or illness in unvaccinated household contact	Routine staff screening	Symptoms or illness in unvaccinated household contact	Symptoms or illness in unvaccinated household contact
Time from second vaccine dose to infection (days)	52	47	71	72
Symptoms of infection†	Day 1, sore throat and dyspnea	Day 1, none; day 2, rhinorrhea and cough	Day 1, none; day 5, rhinorrhea and loss of sense of smell and taste	Day 1, none; day 3, rhinorrhea and myalgia
Ct values for N1/N2†	Day 1, 34/35	Day 1, 20/20; day 4, 20/24; day 17, 39/39	Day 1, 19/19; day 14, 33/32	Day 1, 25/25; day 14, 30/30; day 20, 36/33; day 24, 34/32
Day of first negative PCR result†	Day 5	Day 22	Day 18	Day 32
Variant of concern	B.1.1.7 (household contact)‡	B.1.1.7	B.1.1.7	B.1.1.7
Clinically relevant mutations in gene encoding spike	Not determined	delHV69/70, N501Y, A570D, D614G, and P681H	delHV69/70, N501Y, A570D, D614G, and P681H	delHV69/70, N501Y, A570D, D614G, and P681H

* Ct denotes cycle threshold, N1 nucleocapsid 1, N2 nucleocapsid 2, and PCR polymerase chain reaction.
† Timing is relative to the time of diagnosis (diagnosis occurred on day 1).
‡ Material was not available for PCR testing in this patient; identification of the variant of concern is based on test results for the household contact.

only mild symptoms but high viral loads (cycle thresholds of <25) and prolonged viral shedding up to 32 days after diagnosis. We performed a genomic characterization of the spike protein variants (delHV69/70, N501Y, A570D, D614G, and P681H), and all strains were classified as the B.1.1.7 (or alpha) variant.

Vaccinated health care workers can be infected with variants of concern transmitted from unvaccinated household contacts and may transmit SARS-CoV-2 in the hospital if not screened early enough. Finally, variants of concern may not only be more transmissible than the original SARS-CoV-2 but may also escape vaccine protection more frequently.

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

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