

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.

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Disclosure forms provided by the authors are available with the full text of this letter at [NEJM.org](https://www.nejm.org).

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) number	Tested (N=14,604)* number	Eligible for Testing (N=36,659)† number (percent)
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.

This letter was published on March 23, 2021, at [NEJM.org](https://www.nejm.org).

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DOI: 10.1056/NEJMc2101927

BNT162b2 mRNA Covid-19 Vaccine Effectiveness among Health Care Workers

TO THE EDITOR: The surge of coronavirus disease 2019 (Covid-19) around the world and the need for urgent and intensive medical care have weighed heavily on health care systems and hospitals. Health care workers are at high risk of exposure to Covid-19, both in the community and in the workplace when providing care to patients.¹ Covid-19–associated isolation and quarantine of health care workers place additional burdens on health care services. Since the intro-

duction of vaccines, prioritizing vaccination of health care workers has been advocated, and data on vaccine effectiveness among health care workers in real-world settings is beginning to emerge.

We examined vaccine effectiveness among health care workers at the Hadassah Hebrew University Medical Center (HHUMC), a two-campus medical center in Jerusalem that employs 6680 people. Jerusalem has one of the highest incidence rates of Covid-19 in Israel.² In

Table 1. Incidence of Covid-19 among Vaccinated HCWs at HHUMC.*

Week since First Dose	Vaccinated HCWs at HHUMC		Vaccinated HCWs Newly Positive for SARS-CoV-2		Incidence of Covid-19 among Vaccinated HCWs	
	Received a First Dose of Vaccine†	Tested for SARS-CoV-2 at HHUMC‡	Positive on Testing at HHUMC	Positive on Testing at HHUMC or Community Clinics	HCWs Tested at HHUMC	HCWs Tested at HHUMC or Community Clinics§
	<i>no. of workers</i>		<i>no. of workers</i>		<i>no./1000 workers</i>	
Week 1	5297	1152	37	50	32.1	9.4
Week 2	5247	1215	40	47	32.9	9.0
Week 3	5200	1126	22	29	19.5	5.6
Week 4	5164	685	11	11	16.1	2.1
Received second dose	4864	607	7	7	11.5	1.4
Did not receive second dose	300	78	4	4	51.3	13.3
Week 5	5050	451	2	3	4.4	0.6
Received second dose	4934	434	2	3	4.6	0.6
Did not receive second dose	116	17	0	0	0	0
Week 6	4947	309	0	2	0	0.4
Received second dose	4793	295	0	2	0	0.4
Did not receive second dose	154	14	0	0	0	0
Week 7	4079	157	3	5	19.1	1.2
Received second dose	4069	151	3	4	19.9	1.0
Did not receive second dose	10	6	0	1	0	100.0

* Health care workers (HCWs) were tested at the Hadassah Hebrew University Medical Center (HHUMC), community clinics, or both locations. Positive results on testing at community clinics were reported by the local office of the Israeli Ministry of Health to the Hadassah Infection Prevention and Control Unit.

† At each week since the first dose, the number of HCWs represents the number at risk (i.e., those who were not infected during the previous week).

‡ HCWs who were tested more than once per week were counted only once.

§ The denominator used to calculate incidence among the vaccinated HCWs tested at HHUMC or community clinics was the number of HCWs who received a first dose of vaccine. Systematic testing of all vaccinated HCWs was not performed; therefore, some positive cases may have been missed.

addition to its regular activities, HHUMC is currently treating patients with Covid-19 in eight dedicated wards. To create a safe hospital environment, HHUMC established a proactive, periodic screening program for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) for all personnel.³ From the beginning of the epidemic through January 31, 2021, of the 6680 health care workers, 689 (10.3%) were infected, mostly due to exposure to Covid-19 in the community; the trends in incidence among health care workers were similar to that in the Jerusalem population (Fig. S1 in the Supplementary Appendix, available with the full text of this letter at NEJM.org). Vaccination with two doses of the Pfizer–BioNtech vaccine, given 21 days apart,⁴ began on December 20, 2020. Within 8 weeks, 5297 of 6252 (84.7%) health care workers who had not been previously infected by December 20 were vaccinated. Most of the health care workers (98.9%) who had received the first dose of vaccine and were not infected by day 21 received the second dose. We collected data regard-

ing the vaccine status of health care workers and the infections that occurred among them. Among the vaccinated workers, the weekly incidence of Covid-19 since the first dose declined notably after the second week; the incidence of infection continued to decrease dramatically and then remained low after the fourth week (Table 1 and Fig. S2). Since September 2020, the probability of being free from Covid-19 had steadily decreased until the commencement of the two-dose vaccinations, after which infections among vaccinated health care workers occurred far less often (Fig. S3). Of note, the numerator used to calculate the incidence of Covid-19 was the number of patients with infection that was detected on either mandatory or voluntary testing; systematic testing of all vaccinated health care workers was not performed. Therefore, we may have missed some positive cases.

In our study that was conducted in an active hospital setting in a community with a high incidence of Covid-19, vaccination of health care workers with the BNT162b2 vaccine resulted in a

major reduction of new cases of Covid-19 among those who received two doses of the vaccine, even when a surge of the B.1.1.7 variant was noted in up to 80% of cases.⁵ These findings suggest that widespread and effective vaccination among health care workers provides a safe environment, even in the presence of a high rate of SARS-CoV-2 infection in the community.

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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.

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DOI: 10.1056/NEJMc2101951



An interactive
graphic is
available at
NEJM.org

Duodenal Microbiota in Stunted Undernourished Children with Enteropathy

TO THE EDITOR: Although the study by Chen et al. (July 23 issue)¹ is commendable, the claim of a causal role for microbiota in environmental enteric dysfunction (EED) is unsubstantiated. There is no appropriate human control group, and the assignment of causality derives from questionable results in an animal model. The prepubertal age of the animals² was not comparable to the age of the children (approximately 18 months), with missing data including the total number of animals tested and the number of tests performed. Information on whether experimental replication was achieved was not furnished. The rationale for the microbiota dose was not available, and the dose response was not reported. The rapid death of some of the animals that received the microbiota is consistent with acute toxicity. In the context of toxicity, animal weight loss is expected and cannot be used as a surrogate for stunted growth, which is an intrinsically more complex phenomenon. The brief duration of exposure (9 days) leading to an acute effect and the ensuing histologic changes provide a snapshot of the initial deleterious effects of the microbiota on enteric function, but the lack of follow-up and the experiment's short duration do not allow for clear comparisons with children who have long-lasting EED. Similarly, the authors neither reported the extent to which the 36 chil-

dren with luminal samples were representative of the entire cohort nor presented information regarding the adequacy of the data set for the generation of statistically significant correlations and regressions. However, the study does provide new data that may be leveraged in tackling environmental enteric stunting.

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The views expressed in this letter are those of the author and do not represent an official position of the Department of Health and Human Services.

No potential conflict of interest relevant to this letter was reported.

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DOI: 10.1056/NEJMc2030388

TO THE EDITOR: Chen et al. report a relationship between duodenal microbiota and EED. Although emerging evidence suggests that long-term exposure to enteropathogens contributes to the pathogenesis of EED,¹ especially in countries where subclinical infections with enteropathogens are