

## CORRESPONDENCE

## Effectiveness of Ad26.COVS and BNT162b2 Vaccines against Omicron Variant in South Africa

**TO THE EDITOR:** The B.1.1.529 (omicron) strain of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has rapidly become dominant among the variants of concern in the coronavirus disease 2019 (Covid-19) pandemic in all regions of the world. The omicron variant now accounts for 95.4% of genetic sequences of SARS-CoV-2 in Africa, 96.0% in North America, and 87.6% in South America. This variant has been shown to escape antibody neutralization by both the BNT162b2 messenger RNA vaccine (Pfizer–BioNTech) and the Ad26.COVS vaccine (Johnson & Johnson–Janssen),<sup>1,2</sup> which are the only two Covid-19 vaccines that have been administered in South Africa. We established the early effectiveness of the two-dose BNT162b2 vaccine regimen during the omicron-driven fourth wave in South Africa.<sup>2</sup> The national vaccine program in South Africa has distributed 26,262,060 doses of the BNT162b2 vaccine and 8,477,267 doses of the Ad26.COVS vaccine. As of May 1, 44.8% of adults in South Africa had been fully vaccinated with two doses of the BNT162b2 vaccine or a single dose of the Ad26.COVS vaccine. Assessing vaccine effectiveness is critical for national vaccine programs.

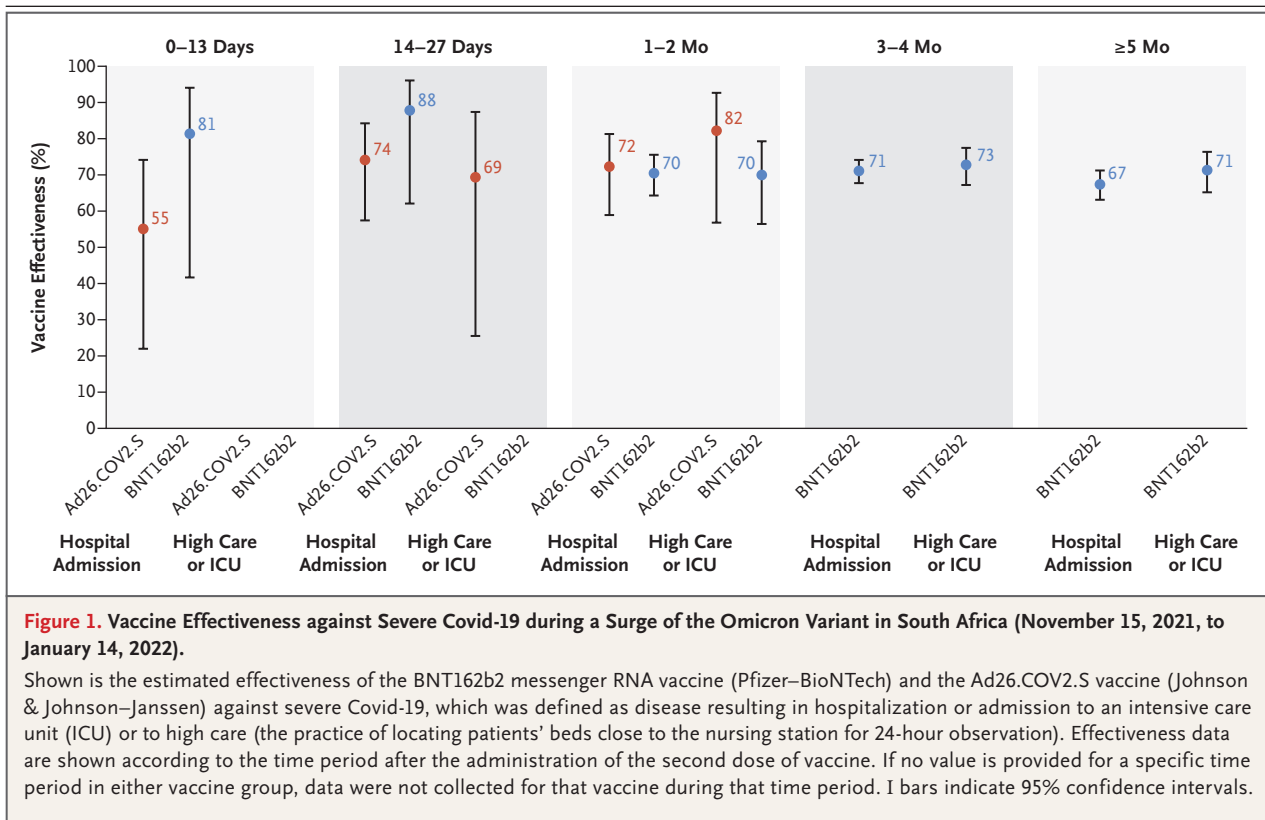
Starting in October 2021, health care workers who were participating in phase 3b of the Sisonke study of the early vaccine access program<sup>3</sup> were eligible to receive a second dose of the Ad26.COVS vaccine (Fig. S1 in the Supplementary Appendix, available with the full text of this letter at NEJM.org). Using data from Discovery Health, a South African managed care organization, we estimated the vaccine effectiveness of the original two-dose series of the BNT162b2 vaccine and a second (booster) dose of the Ad26.COVS vaccine against severe Covid-19 caused by the omicron variant. Severe Covid-19 was defined as hospitalization or admission to an intensive care unit (ICU) or to high care. (The latter refers to the practice of locating patients' beds close to the nursing station so that they can be observed 24

hours a day.) We analyzed data sets that included the results of polymerase-chain-reaction (PCR) assays to detect SARS-CoV-2, preauthorization admission data, a full history of members' claims records, chronic disease registrations, and data regarding body-mass index to assess individual risk factors. Vaccination status was determined from claims data in the private sector. We compared vaccine effectiveness against severe Covid-19 during the period from November 15, 2021, to January 14, 2022, when the omicron-driven fourth wave was occurring in South Africa (Tables S1 and S4 in the Supplementary Appendix).

We applied a test-negative design and data exclusion rules to obtain estimates of vaccine effectiveness<sup>4</sup> (Table S3). In this analysis, we used covariate-adjusted logistic regression to estimate vaccine efficacy. We also performed a sensitivity analysis using only PCR results within the Gauteng province (which includes Johannesburg and several other heavily populated cities), given the geographic concentration of the omicron variant during the study period. Vaccine effectiveness was compared between the two vaccine groups according to the number of days since the second vaccine dose had been administered (0 to 13 days, 14 to 27 days, 28 to 87 days [1 to 2 months], 88 to 147 days [3 to 4 months], and 148 days [5 months] or longer) (Tables S3 and S4). Follow-up was shorter in the Ad26.COVS vaccine group because vaccination in the BNT162b2 group had been initiated earlier in the study.

During the omicron surge, we analyzed the results of 162,637 PCR tests, of which 93,854 (57.7%) had been obtained from participants who had received two doses of the BNT162b2 vaccine given at least 42 days apart or two doses of the Ad26.COVS vaccine given 4 to 6 months apart. Among these participants, the test positivity rate was 34%; of those with a positive PCR test, 1.6% had been admitted to a hospital and 0.5% to an ICU or to high care.

Among the participants in the Ad26.COVS



vaccine group, the vaccine effectiveness against hospitalization for Covid-19 was 55% (95% confidence interval [CI], 22 to 74) within 13 days after the second dose, 74% (95% CI, 57 to 84) at 14 to 27 days, and 72% (95% CI, 59 to 81) at 1 to 2 months. Among the participants in the BNT162b2 vaccine group, the vaccine effectiveness was 81% (95% CI, 41 to 94) within 13 days after the second dose, 88% (95% CI, 62 to 96) at 14 to 27 days, 70% (95% CI, 64 to 76) at 1 to 2 months, 71% (95% CI, 68 to 74) at 3 to 4 months, and 67% (95% CI, 63 to 71) at 5 months or longer. Among the Ad26.COV2.S vaccine recipients, the vaccine effectiveness against ICU admission or high care was 69% (95% CI, 26 to 87) at 14 to 27 days and 82% (95% CI, 57 to 93) at 1 to 2 months after the second dose; among the BNT162b2 vaccine recipients, the vaccine effectiveness against ICU admission or high care was 70% (95% CI, 56 to 79) at 1 to 2 months, 73% (95% CI, 67 to 77) at 3 to 4 months, and 71% (95% CI, 65 to 76) at 5 months or longer (Fig. 1).

After two doses, both vaccines were equally effective against severe disease caused by the omicron variant. These estimates of vaccine ef-

fectiveness were calculated in a South African population with a high background prevalence of SARS-CoV-2 exposure during the Covid-19 pandemic.<sup>5</sup> These data provide reassurance about the continued value of the national Covid-19 vaccine program during a surge in the omicron variant.

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Supported by the South African National Department of Health through funding to the South African Medical Research Council, by the South African Solidarity Fund, by the Michael and Susan Dell Foundation, by a grant (21-V0001) from the ELMA Vaccines and Immunization Foundation, and by a grant (INV-030342) from the Bill and Melinda Gates Foundation. The Ad26.COV2.S vaccine that was used in this study was provided by Johnson & Johnson.

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

This letter was published on May 4, 2022, at NEJM.org.

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DOI: 10.1056/NEJMc2202061

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