



Department of Health and Social Services

Adam Crum, MSPH, Commissioner
Anne Zink, MD, Chief Medical Officer

3601 C Street, Suite 540
Anchorage, Alaska 99503 <http://dhss.alaska.gov/dph/Epi>

Division of Public Health

Heidi Hedberg, Director

Local (907) 269-8000
24 Hour Emergency (800) 478-0084

Editors:

Joe McLaughlin, MD, MPH
Louisa Castrodale, DVM, MPH

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Effectiveness of COVID-19 Vaccine Booster Dose Against COVID-19 During the SARS-CoV-2 B.1.1.529 (Omicron) Wave — Alaska, December 2021–January 2022

Background

The SARS-CoV-2 B.1.1.529 (Omicron) variant was first identified in November 2021 and since then has spread rapidly around the world, becoming the dominant variant in Alaska by late December 2021.¹ This variant can partially escape immunity conferred by prior vaccination and infection.² Even before the Omicron variant became dominant, analyses of vaccine effectiveness documented waning immunity associated with increasing time since completion of a primary COVID-19 vaccine series.³ In response, booster doses have been recommended.

Methods

This analysis is a test-negative case-control study.⁴ Among symptomatic persons seeking SARS-CoV-2 testing, the vaccination history of people who test positive (“cases”) is compared to the vaccination history of people who test negative (“controls”). If a booster dose is effective at preventing COVID-19, cases would be disproportionately less likely to have been boosted compared to controls, all else equal.

Data on test results during the Omicron wave and self-reported symptoms at the time of testing were obtained via the COVIDSecure system, which is used by many SARS-CoV-2 testing sites in Alaska. These data were linked to Alaska’s immunization information system to ascertain vaccination and booster status and linked to Alaska’s infectious disease surveillance database to ascertain history of prior documented SARS-CoV-2 infection.

Persons tested December 26, 2021 through January 20, 2022 at general public community testing sites using the COVIDSecure system were eligible to be included if 1) they had completed the primary series of the Pfizer or Moderna COVID-19 vaccines at least 5 months prior to testing or received the Janssen COVID-19 vaccine at least 2 months prior to testing; 2) had not had a prior documented COVID-19 case within 90 days of testing; and 3) reported at least one of the following symptoms: shortness of breath, sore throat, cough, loss of taste or smell, fever, or congestion. Although booster dose eligibility criteria changed during the study period, to maintain consistency, the most current eligibility criteria were applied to the entire study period. Adjusted odds ratios (aOR) measuring the association between having received a COVID-19 booster dose and testing positive were calculated using multivariable logistic regression.

Results

In total, 5,184 persons (2,318 test-positive cases and 2,866 test-negative controls) were included in the analysis (Table).

Table. Vaccine Booster Dose Status of Cases and Controls Undergoing SARS-CoV-2 Testing During the Omicron Wave — Alaska, December 26, 2021 – January 20, 2022

	Cases (%)	Controls (%)
Main analysis		
Boosted	641 (28)	1,549 (54)
Not boosted	1,677 (72)	1,317 (46)
Sub-analysis: persons with prior history of SARS-CoV-2		
Boosted	61 (25)	182 (39)
Not boosted	180 (75)	287 (61)

Of these persons, 3,391 (65%) were tested at sites in Anchorage. In the unadjusted analysis, the odds of being boosted were considerably lower among cases than among controls (OR: 0.32, 95% CI: 0.29–0.37, p-value: <0.0001). An analysis adjusted for the following factors: age; sex; whether the patient reported a possible exposure to someone with COVID-19; the number of

reported symptoms; days since December 26, 2021; days since becoming fully vaccinated, and primary series manufacturer yielded similar results (aOR: 0.35, 95% CI: 0.30–0.40, p-value: <0.0001). In an additional multivariable sub-analysis restricted to fully vaccinated persons with a prior documented SARS-CoV-2 infection (241 test-positive cases and 469 test-negative controls; Table), the odds of being boosted among cases was about 0.63 times the odds of being boosted among controls (95% CI: 0.43–0.92, p-value: 0.02).

Discussion

The results of this test-negative case-control analysis indicate that during the Omicron wave in Alaska, the odds of having symptomatic COVID-19 was nearly three times higher in persons who were eligible to receive a COVID-19 vaccine booster dose but had not yet done so, compared to persons who had received a booster dose. While this analysis includes only a subset of all recent SARS-CoV-2 cases from Alaska, vaccine effectiveness is likely comparable between communities. A similar analysis based on data from SARS-CoV-2 community testing sites across the United States found a nearly identical result.⁵

This analysis also found that COVID-19 booster vaccination increased protection against reinfection. Previously infected and booster-eligible but un-boosted persons had 1.6-times the odds of having COVID-19 compared to previously infected and boosted persons.

Data were not available to conduct a test-negative analysis of booster dose effectiveness against COVID-19 hospitalizations in Alaska. However, an analysis of data from a network of hospitals across the United States found that while receipt of the primary series of a COVID-19 mRNA vaccine continues to confer some protection against hospitalization during the Omicron era (57% vaccine effectiveness among persons vaccinated ≥180 days ago), persons who had received 3 doses were better protected (90% vaccine effectiveness).⁶

The primary advantage of a test-negative case-control analysis is that because all persons in the analysis sought testing, compared to other types of vaccine effectiveness studies, it is less affected by differences in likelihood of getting tested, which may be correlated with vaccination status.⁴ This is the most likely reason the results of this analysis differ from comparisons of population-wide per-capita incidence rates by vaccination status.

Staying up to date on COVID-19 vaccination, which includes receiving a booster dose when eligible, increases protection against COVID-19 during the Omicron wave, including among previously infected persons.

References

- Alaska Coronavirus Variants Dashboard. Available at: <https://akvariants.github.io/>
- Rössler A, et al. SARS-CoV-2 Omicron variant neutralization in serum from vaccinated and convalescent persons. *NEJM*. 2022 Jan 12;NEJMc2119236.
- Mbaeyi S, et al. The Advisory Committee on Immunization Practices’ interim recommendations for additional primary and booster doses of COVID-19 vaccines — United States, 2021. *MMWR* 2021;70:1545–52.
- Lewnard JA, et al. Theoretical framework for retrospective studies of the effectiveness of SARS-CoV-2 vaccines. *Epidemiology* 2021;32(4):508–17.
- Accorsi EK, et al. Association between 3 doses of mRNA COVID-19 vaccine and symptomatic infection caused by the SARS-CoV-2 Omicron and Delta variants. *JAMA*. 2022. doi:10.1001/jama.2022.0470
- Thompson MG, et al. Effectiveness of a third dose of mRNA vaccines against COVID-19–associated emergency department and urgent care encounters and hospitalizations among adults during periods of Delta and Omicron variant predominance — VISION Network, 10 States, August 2021–January 2022. *MMWR* 2022;71(4):139–45.