Summer 2022

# Effect of Vaccination on the Case Fatality Rate for Coronavirus Disease (COVID-19) Injections

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Abstract: Objectives:
To evaluate the benefits of vaccination on the case fatality rate (CFR) for COVID-19 infections.

Design, setting, and participants:
The United States Department of Veterans Affairs has one hundred and thirty medical centers. We created multivariate models from these data -339,772 patients with coronaviral disease (COVID-19)-as of September 30, 2021 Outcome measures:
The primary outcome for all models was death within 60 days of the diagnosis. Logistic regression derived adjusted odds ratios (OR) for vaccination and infection with delta versus earlier variants. Models were adjusted for demographic traits, standard comorbidity indices, and three novel parameters representing all prior diagnoses, all prior vital signs/ baseline laboratory tests, and current outpatient treatment.
Eight cohorts of delta variant-infected patients were defined based on the time from vaccination to diagnosis (in 4-week blocks). A common model was used to estimate the odds of death associated with vaccination for each cohort relative to all unvaccinated patients.
Results:
9.1% of subjects were fully vaccinated, and 21.5% had the delta variant. 18,120 patients (5.33%) died within 60 days of their diagnoses. The adjusted OR for a delta variant infection was 1.87 +/- 0.05 which corresponds to a relative risk of 1.78. The overall adjusted OR for prior vaccination was 0.280 +/- 0.011 corresponding to a relative risk of 0.291. The study of vaccine cohorts with a delta infection showed that the raw CFR rose steadily after 10-14 weeks. However, the OR for vaccination remained stable for 10-34 weeks.
Conclusions:
Our study confirms that delta is substantially more lethal than earlier variants and that vaccination effectively prevents COVID death. After adjusting for major selection biases, we found no evidence that the benefits of vaccination on CFR declined over 34 weeks.