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Covid-19: Moderna and Pfizer vaccines prevent infections as well as symptoms, CDC study finds

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Vaccination with the Pfizer or Moderna vaccine reduces infections by 90%, while a single dose confers 80% protection, shows a study led by the US Centers for Disease Control and Prevention (CDC) that followed essential workers through the worst months of the pandemic.¹

The study is one of a small number that employ regular testing to measure vaccines' impact on infection rates rather than counting cases of symptomatic disease, hospital admission, or death.

The participants were 3950 essential workers, with no documented history of SARS-CoV-2 infection, in eight largely urban US locations. Of these people, 2479 (63%) received both vaccine doses, 477 (12%) received only one dose, and 994 (25%) were unvaccinated.

The study opened on the same day as the US vaccination programme, 14 December 2020, and most of the people vaccinated received their first shot within two weeks. The first week of January 2021 saw the highest rate of daily new infections yet seen in the US, about 250 000 a day. Researchers stopped collecting data on 13 March.

Participants were taught to swab themselves once a week and also when they felt any symptoms, shipping the swabs on cold packs for laboratory polymerase chain reaction assay. Most infections (58%) were detected by weekly testing, but 87% of detected infections did ultimately produce covid-19 symptoms.

Of 172 infections detected, 161 occurred in the unvaccinated arm of the trial, which saw a rate of 1.38 infections per 1000 person days. Among participants who had received only one shot at least 14 days previously, the rate was 0.19 infections per 1000 person days. Among those who had received a second shot at least 14 days previously, it was 0.04 per 1000 person days.

This translated to an adjusted vaccine effectiveness of 90% with full immunisation (95% confidence interval 68% to 97%) and of 80% with partial immunisation (59% to 90%). Adjustment for age, sex, race, or study location barely changed these results.

The study was not adequately powered to differentiate between Moderna's vaccine and Pfizer's, which accounted for two thirds of the doses given.

Categories of workers

The majority of participants were white, female, and aged 18-49, making this a younger study population than in the phase III clinical trials of these two vaccines.

Infection rates were largely unaffected by race, age, or sex, but they varied sharply among different

categories of workers, primarily owing to different rates of vaccine uptake. Vaccination rates among doctors were 92%, nurses 82%, and first responders 64%, and the infection rates in these categories were 1.9% (doctors), 5.0% (nurses), and 8.8% (first responders).

The results are in line with those seen in two other recent studies of the Pfizer vaccine's impact on infection rates, in the UK¹ and Israel.²

The CDC study is reported in the agency's *Morbidity and Mortality Weekly Report (MMWR)*. Whistleblowers at the CDC warned last year that this mainstay of US epidemiology was being pressured by Trump administration officials who sought to water down its reports on the pandemic and its advice on infection hazards.³

Robert Redfield, a Trump appointee who recently left his role as CDC director, told a CNN news special this week that the interference had come from the former health secretary Alex Azar. "[What] I was the most offended by was the calls that wanted me to pressure and change the *MMWR*," said Redfield. "He may deny that, but it's true."⁴

Azar replied in a statement, "Any suggestion that I pressured or otherwise asked Dr Redfield to change the content of a single scientific, peer reviewed *MMWR* article is false."

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