COVID Vaccine Boosters Protect People With Immune Dysfunction

Boosters reduced the risk of hospitalization and death by about 80% for people with HIV, cancer, autoimmune conditions or organ transplants.

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Receiving an additional COVID-19 vaccine dose provided more protection for people with compromised immunity, according to research presented at the Conference on Retroviruses and Opportunistic Infections 2022 (CROI 2022). While the study did not analyze booster effectiveness based on the specific type of immune dysfunction, it does offer reassurance that this population can benefit from keeping up to date on vaccination.

Immunocompromised people are at risk for more severe COVID-19 complications and death, and they may have slower and weaker responses to vaccination. This group includes organ transplant recipients and people with cancer or autoimmune conditions who take medications that suppress their immune system. Some drugs, for example, interfere with the activity of antibody-producing B cells. While most people with HIV respond well to COVID vaccines, those who are not on antiretroviral treatment, have a detectable viral load or have a low current or nadir (lowest-ever) CD4 T-cell count may not fare as well.

But receiving additional vaccine doses could help. In August 2021, the Centers for Disease Control (CDC) and Prevention recommended an additional dose of the Pfizer-BioNTech or Moderna vaccine for immunocompromised people. The agency later went further, recommending boosters for all adults, which was later extended to those ages 12 to 17, and advising immunocompromised adolescents and adults that they could get one more dose. (Health officials make a distinction between “additional doses” needed to achieve full protection for people with a poor initial response and “boosters” intended to shore up waning immunity; see the CDC’s latest recommendations for immunocompromised people here.)

Jing Sun, MD, of Johns Hopkins Bloomberg School of Public Health, and colleagues conducted a study of the real-world effectiveness of an additional vaccine dose for people with and without compromised immunity. The analysis included 784,555 people from more than 60 U.S. centers participating in the National COVID Cohort Collaborative.

All were fully vaccinated, having received two doses of the Pfizer-BioNTech vaccine (71%) or Moderna vaccine (25%) or one dose of the Johnson & Johnson vaccine (5%). Of these, 174,042 had

received a booster, which this study defined as one additional dose of any of the authorized vaccines after the initial one (J&J) or two (Pfizer-BioNTech or Moderna) shots.

More than half of the study cohort (57%) were women, and the median ages were 57 for people who had received boosters and 49 for those who had not. Overall, 55% were white, 18% were Latino, 11% were Black and 5% were Asian, but whites and Asians were more likely to have received a booster. Almost half had at least one underlying health condition, and nearly 15% had three or more comorbidities. Older people and those with more comorbidities were more likely to have received a booster.

The researchers compared breakthrough SARS-CoV-2 infections and outcomes among people with and without immune dysfunction. One in five participants were considered to have immune dysfunction, defined as solid organ or bone marrow transplant recipients and people with HIV, cancer or autoimmune diseases. Unfortunately, the analysis did not break down participants by the type of immune dysfunction or by CD4 count and viral suppression among people with HIV or by the type of malignancy or treatment among those with cancer.

During the follow-up period (through January 2022), there were 48,893 breakthrough infections. Starting in June 2021, a majority of cases involved the delta SARS-CoV-2 variant, until December 2021, when a majority involved the omicron variant. Breakthroughs increased after delta become the dominant variant and again after it was overtaken by omicron.

Looking first at people without immune dysfunction, booster effectiveness against breakthrough infection ranged from 77% at seven months after full vaccination to 52% at nine months post-vaccination. Compared with unboosted people, those who received a booster were 67% less likely to have a breakthrough infection at five months or less after full vaccination, 77% less likely at seven months and 55% less likely at nine months.

Immunocompromised people saw a smaller benefit, with booster effectiveness ranging from 60% at seven months post-vaccination to 40% at nine months after full vaccination.

Compared with unboosted people, those who received a booster were 16% less likely to have a breakthrough at five months or less, 61% less likely at seven months and 44% less likely at nine months.

But boosters provided greater protection against severe outcomes. For people without immune dysfunction, the risk of hospitalization, invasive ventilation and death fell by 87%, 91% and 87%, respectively. For immunocompromised people, the corresponding reductions were 79%, 75%, and 83%, respectively.

“While booster vaccine effectiveness against breakthrough infection among patients with immune dysfunction is moderate, the booster vaccine is highly effective against severe outcomes regardless of patients’ immune status,” Sun said.

During a question-and-answer period, Sun fielded several queries about people living with HIV in

particular. She acknowledged that the data registry didn't include enough information to analyze the effect of antiretroviral treatment, HIV viral load or CD4 count, but she noted that in this hospitalized population, nearly 70% had viral suppression and only a small fraction had a low CD4 count.

Speaking at the same session, Glenda Gray, MBBCh, of the South Africa Medical Research Council, who conducted a study of COVID-19 vaccination in South Africa, where a substantial proportion of the population is living with HIV, stressed that the best protection against severe COVID outcomes and poor vaccine response for people with HIV is to be on effective antiretroviral treatment.

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