

# Severe breakthrough COVID-19 cases drives urgency of boosters

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Breakthrough SARS-CoV-2 infections tend to be mild, but new Yale research shows that more older adults have developed severe breakthrough cases during the delta variant phase of the pandemic,

particularly after a longer period of time had elapsed since their last vaccination.

The findings, published Dec. 3 in *The Lancet Microbe*, reveal the importance of booster vaccinations.

For the study, researchers monitored the disease severity among [patients](#) hospitalized at the Yale New Haven Health System who tested positive for SARS-CoV-2. Between August and mid-October 2021—when the delta variant accounted for more than 95% of infections in the region—371 admitted patients tested positive for SARS-CoV-2, among whom 82 patients (22%), who were fully vaccinated, were severely or critically ill with breakthrough COVID-19 infections. This marks a significant rise in severe breakthrough infections as a percent of total number of patients hospitalized with COVID-19 (which was 1.4% in the same health system between March and July 2021). The current study was conducted before the emergence of the SARS-CoV-2 omicron variant.

The researchers also compared vaccinated patients with severe breakthrough cases of COVID-19 to unvaccinated patients. The patients with severe breakthrough cases tended to be older (their average age was 71.6 compared with 55.2 for unvaccinated patients with severe COVID-19 infections), and risk factors including underlying cardiovascular disease and type 2 diabetes were more prevalent among those who were vaccinated. Despite finding that the former had more underlying [risk factors](#) for worse clinical outcomes with COVID-19, the vaccinated patients with severe COVID-19 infections had better clinical courses, including shorter hospitalization length, decreased use of advanced oxygen support, and tended to have lower mortality rates.

"Even with the increasing number of fully vaccinated patients developing severe COVID-19 infections," said Hyung Chun, associate

professor of medicine (cardiology) at Yale and senior author of the study, "their overall clinical outcomes were better than unvaccinated patients admitted during the same time period, highlighting the efficacy of the vaccines especially in the vulnerable population."

How long patients had been vaccinated also appeared to play a key role in the emergence of breakthrough infections. "There was a clear trend in increasing number of severe breakthrough cases the further out from the time of vaccination," said Chun. "This highlights the importance of booster doses, as the efficacy of the vaccines appear to wane over time."

The Centers for Disease Control and Prevention report that around 19% of fully vaccinated people in the United States have received a booster shot as of Nov. 28. Over 42% of fully vaccinated people aged 65 or older have received a booster dose.

Chun notes that breakthrough cases are to be expected and they do not mean that the vaccines aren't working. "The vaccines clearly improve clinical outcomes, even if you are sick enough to be hospitalized with COVID-19," he said.

A key takeaway from these findings is that the vaccines are highly effective—and that everyone should take booster doses seriously, Chun said. "Emerging data show that people who received the vaccines in the early stages shouldn't be going about their lives thinking they're fully protected against COVID-19," he said. "Especially with the emergence of the omicron variant, we need to reconsider our definition of being 'fully vaccinated' to include the [booster](#) vaccinations."

**More information:** Stephen Y Wang et al, Severe breakthrough COVID-19 cases in the SARS-CoV-2 delta (B.1.617.2) variant era, *The Lancet Microbe* (2021). [DOI: 10.1016/S2666-5247\(21\)00306-2](https://doi.org/10.1016/S2666-5247(21)00306-2)

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