What doctors wish patients knew about breakthrough COVID infections

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Some fully vaccinated people—and those who have received boosters—have acquired SARS-CoV-2 and developed COVID-19. That is expected. One Mayo Clinic intensivist explains what to know about COVID-19 vaccination, boosters and breakthrough infections.

The three COVID-19 vaccines available in the United States—from Moderna, Pfizer-BioNTech and Johnson & Johnson (J&J)—are doing exactly what they were meant to do: protect against severe illness and hospitalization. But with the highly transmissible Omicron variant of SARS-CoV-2 spreading rapidly, the U.S. is seeing more COVID-19 vaccine breakthrough infections.

Nevertheless, the fact remains that getting vaccinated is effective in preventing people from getting severely ill or dying from the disease. Even as new COVID-19 variants appear, vaccines continue to hold their ground. But since no vaccine is perfect, it is expected that we will see COVID-19 breakthrough infections.

The agency defines a breakthrough COVID-19 infection as “a small percentage of fully vaccinated persons” who “will still get COVID-19 if they are exposed to the virus that causes it.” To that end, these vaccine breakthrough cases mean that “while people who have been vaccinated are much less likely to get sick, it will still happen in some cases.”

A breakthrough case is defined as “detection of SARS-CoV-2 RNA or antigen in respiratory specimen collected from a person 14 days after receipt of all recommended doses” of one of the three vaccines authorized in the U.S., said AMA member Devang Sanghavi, MD. That means two weeks after the second shot of Moderna or Pfizer mRNA vaccines, or two weeks after the one-shot J&J COVID-19 vaccine.

While there is still more that physicians and scientists have to learn about this fast-moving topic, Dr. Sanghavi—medical director of the medical intensivist unit at Mayo Clinic in Jacksonville, Florida—took

time to discuss what doctors wish patients knew about COVID-19 breakthrough infections.

Booster breakthroughs happen too

“When we defined breakthrough early on, it was two doses of an mRNA vaccine or one dose of the J&J vaccine and 14 days past that you develop COVID-19,” said Dr. Sanghavi, an intensivist. “With the booster being a mainstay, we need to also talk about booster breakthrough infections.

“Booster breakthrough is a term that is similar in that after you get boosted, if you have a positive PCR test 14 days later, it is defined as booster breakthrough,” he added. “For mRNA vaccines—Moderna and Pfizer—it's 14 days past the boosted date and for J&J, it’s 14 days past the second shot.”

Breakthrough infections are common

With the Delta variant, breakthrough COVID-19 infections were not very common. But with the fast-spreading Omicron variant, “it is not uncommon to see breakthrough infections,” said Dr. Sanghavi. “A factor that leads to that is the time from the initial vaccination.

“As more time passes, the immunity against infection wanes and the antibodies in a person’s body are low,” he added. “Then, obviously, these vaccines were created for a different strain, so the efficacy of the vaccine itself may not be as good for Omicron as compared to say Delta as compared to Alpha, which was what it was originally designed for.”

Most breakthrough infections are mild

“Because people who are vaccinated have had some immunity, some antibodies, a majority of these breakthrough cases are going to be asymptomatic or mild,” said Dr. Sanghavi. “According to the data, reported by CDC and other publications, it seems like around 25% to 30% of the patients who have had breakthrough infections are completely asymptomatic.

“There are about 50% to 60% of the patients who would have some symptoms, but are mild and still may not need hospitalization,” he added. “The severity of the symptoms of these COVID breakthrough infection cases would be milder, but in certain patients you may still need all the aggressive care that we provide to a person who is unimmunized who gets a COVID infection.”

“For 90% of the patients, the breakthrough infection would be mild, but for 10% of the patients, they would still require hospitalization,” said Dr. Sanghavi. But then “1% to 2% of those hospitalized from breakthrough infections may still die, unfortunately. So, it’s still a concern.”

Additionally, “what you’re seeing predominantly is 80% of the patients who have the Omicron variant are unvaccinated and are needing hospitalization,” he said. “That is the reason why everybody should get vaccinated—because even if you are immunosuppressed and get a breakthrough infection, that infection would be mild as compared to a regular infection.”

Breakthrough infections are not new

While the term might be unfamiliar to most people, breakthrough infections have been seen many times before with other vaccines that protect against other diseases, said Dr. Sanghavi.

“It’s kind of more mainstream now because of COVID, the pandemic and how it’s created global attention ... but traditional vaccines in the past also have had their breakthrough infections, so this isn’t new.”

No vaccine is perfect

One reason why fully vaccinated people might develop breakthrough COVID-19 infections “is the characteristics of the vaccine itself and how efficacious the vaccine is, because there is not a single vaccine that we know of that is 100% effective,” explained Dr. Sanghavi. “We know from initial trials from both mRNA vaccines that the effectiveness was somewhere around 94% and 95%—slightly lower in the Johnson & Johnson vaccine.”

“The study environment is different because these are patients who were carefully selected when the trial rolled out. After the FDA gave its EUA [emergency use authorization], and it was given to a lot of the general population, we found that the real-world effectiveness of the vaccine is lower at around 90%,” he said. “That means that there are inherent characteristics of the vaccine itself when it reacts with the patient and the comorbidities of the patient that would itself lead to ineffective immunization in certain populations.”

“The virus is mutating and there are new variants trying to escape the antibodies,” Dr. Sanghavi said. “They're going to find a host and mutate to a point where they can survive, so we are always going to be behind the curve, and that's why no vaccine is going to be perfect.

“But our hope is—and what we are seeing is—that there is some cross-reactivity between the vaccine variant and the variant of concern at that point in time,” he added.

Discover what to tell your patients when they ask which COVID-19 vaccine to get.

Efficacy depends on the individual

“To add to the vaccine characteristics, you also add patient characteristics,” Dr. Sanghavi explained. Patients with immunosuppressed status after organ transplantation, those who are post-hematologic malignancy, or those who are older “have higher chances of getting COVID-19 despite being fully vaccinated,” noting that “we see a lot of these patients in our practice.”

High-risk cases also include “patients who are immunosuppressed for other medical conditions such as liver disease, cirrhosis and end-stage renal disease,” he said, adding that “all those factors make the patient who gets the vaccine react in a different way, and they may not find the antibodies as compared to other healthy individuals who got the vaccine—that leads to a fully vaccinated person getting COVID.”

New variants play a leading role

Apart from the vaccine and patient characteristics, breakthrough COVID-19 infections can occur because of the “virus itself,” said Dr. Sanghavi. “What you’re seeing right now is there are reports about newer variants such as the Omicron variant, which is rampant and is a predominant feature in a lot of the world right now.”

Compared to the Delta variant, “the Omicron variant is three to four times more infectious,” he said, adding that “we have some reports that suggest that the sera of immunized patients—when it reacts to the Omicron variant—that antibody is not as effective as it is in the original virus.”

“The challenge with this virus, since the beginning of the pandemic in 2020, is that it is evolving and adapting and some of these variants are more viral and spreading faster,” Dr. Sanghavi said. “And so far, at least, what we know is that the three vaccines that we have in America are protecting against the Delta variant.

“This is good news, but the concern always is that if there is another variant and the current vaccines that we have don’t provide that immunity that we have right now,” he added.

Read about what doctors wish patients knew about new coronavirus variants.

SARS-CoV-2 is still easily transmitted

With breakthrough infections, the viral loads are similar to those who are unvaccinated. That means such infections among fully immunized patients could be transmitted to others who are unvaccinated or have compromised immune systems.

“If you compare Alpha and Beta to Delta, Delta was more transmissible. But Omicron is three to five times more transmissible than even Delta,” he said. “It’s going to spread and knowing that you have that is why it is important to test, quarantine and isolate if that happens—and wearing masks and taking those precautions—because you would pass it on to others.

“Unvaccinated and your elderly parents or people who have compromised immune systems are at further risk for severe disease or transmission,” Dr. Sanghavi added.

If suspected, get tested

Everyone who suspects any SARS-CoV-2 infection should get tested, but those patients who are at high risk, those who have had transplants, are on active chemotherapy, have liver issues, kidney disease, on dialysis, are older, or immunosuppressed for some other reason—should “look out for those symptoms of COVID-19,” he said. “If someone has been exposed to a person with COVID-19 or suspect they might have the disease, it is important to get tested.”

Discover what doctors wish patients knew about which COVID-19 test is best.

Seek care from your physician

For people with a breakthrough infection, their symptoms will likely be mild. But, if they are not, it is important to contact your doctor.

“If someone has symptoms of COVID, which is cough, fever, shortness of breath, loss of taste, smell or sensations, they should seek care from their primary care physician,” said Dr. Sanghavi, adding that “they should also get tested.”

Additionally, “they should let the experts guide the next step of care,” he said. “Depending on how severe the disease is, that would determine whether they need oxygen or not, whether they would need steroids or not, whether they would need remdesivir or not, and all the other algorithms would all

depend on the clinical severity of that disease in the breakthrough case."

You should absolutely still get vaccinated

"As long as there are people who are not vaccinated, as long as this virus is around in any part of this world, and as long as those variants exist—whether that would be Omicron, Delta or any other variant—this will spread and that can lead to resurgence and more waves of this pandemic or disease," Dr. Sanghavi explained. "That's why I would strongly insist and request everybody out there who's not vaccinated to get vaccinated at least—that would be them doing their part."

"That is the only way out of this pandemic," he said, adding that "otherwise there will be new variants and strands that would test our immunity against the vaccines that we have."

Make sure to get boosted too

"If you are not boosted, get boosted," said Dr. Sanghavi. "Even if you have a breakthrough infection, getting a booster can prevent severe disease, and that is very, very important.

"That would be a difference between getting yourself in the hospital and the ICU compared to being at home, having a very mild disease and recovering quickly," he added.

The AMA has developed frequently-asked-questions documents on COVID-19 vaccination covering safety, allocation and distribution, administration and more. There are two FAQs, one designed to answer patients' questions, and another to address physicians' COVID-19 vaccine questions.

To learn more about COVID-19 vaccine developments, visit the AMA vaccine resource guide.