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MONTHLY UPDATES ABOUT
VACCINES ACROSS THE LIFESPAN

FEATURE ARTICLE: PEOPLE ARE ASKING, "SHOULD I GET A COVID-19 VACCINE THIS FALL?"

September 2024

Since bursting onto our collective radar in early 2020, SARS-CoV-2, the virus that causes COVID-19, has remained a steadfast member of our communities. While most respiratory viruses occur in the winter, SARS-CoV-2 has not done so — at least not yet. We have seen periods of greater or lesser spread, so maybe over time, we will see more of a seasonality emerge. But, for now, SARS-CoV-2 occurs year-round and continues to evolve (see "N-what? KP-what? Unscrambling the COVID-19 vaccine story" for a diagram and info). The good news is that as more of us have gained immunity, the incidence of hospitalizations and deaths from COVID-19 are nowhere near what we experienced in 2020 and 2021.

However, with continued circulation, ongoing viral changes, and periods of increased transmission, a pattern of annual updates to vaccines and annual recommendations for vaccination has emerged. Although we are used to annual influenza vaccines, some have wondered whether we really need annual COVID-19 vaccines as well. While the vaccine recommendations include virtually everyone, individuals need to evaluate the personal benefits and risks for themselves and their family members. Since people sometimes ask our opinion, we wanted to share what we think are important general considerations when making decisions about whether to get the updated COVID-19 vaccine. ***However, as always, it is important to talk with your healthcare providers for personalized guidance, particularly since they have the benefit of your COVID-19 vaccination and infection history, overall medical history, family situation, and risk factors related to your age, occupation, geographic area and activities.***

Does the vaccine work? Understanding population immunity

To estimate how many people in the U.S. have been infected with COVID-19, studies of samples obtained from blood donations were evaluated for antibodies against a different part of the virus (nucleocapsid) than that used in vaccines (spike protein). Based on these studies, it's estimated that about 8 or 9 of every 10 adults between 18 and 64 years of age has been infected with the virus that causes COVID-19. The number was slightly lower for those 65 years and older, with about 7 of every 10 having evidence of previous infection.

What does this mean for me?

This finding has two important implications when thinking about COVID-19 vaccination:

1. We know that people who have been both infected and vaccinated tend to have better protection than those who were either only infected or only vaccinated. So, people who have not received any COVID-19 vaccine can still benefit from vaccination despite the high infection-based immunity in the population because some (1-3 of every 10) do not have evidence of previous infection, and among those who were infected, we know that a vaccine can bolster their protection.
2. When vaccine effectiveness, meaning how well the vaccine works, is calculated, this high level of infection-induced immunity complicates the calculations. To account for this, vaccine effectiveness reports for last year (2023-2024) compared people who got the 2023-2024 vaccine against people who did not get it. As a result, the control group (those who did not get last year's vaccine) included a diverse group ranging from people who never received a COVID-19 vaccine to people who got several doses during the pandemic but did not receive the most recent version. This makes it difficult to know how effective the vaccine would be for you individually based on your vaccination history. Said another way, the vaccine effectiveness estimate does not mean much to an individual regardless of whether it is high or low. What we do know, however, is that the vaccines offer what has been termed "an incremental benefit," meaning the vaccines work even if a person has some immunity already.

How does the vaccine work? Understanding vaccine-induced protection

When we are infected with a pathogen, a few things happen. Cells known as B cells and T cells develop and drive our immune response. B cells reproduce and make antibodies that can bind to and stop the pathogen, and T cells regulate the immune response by releasing chemical signals, supporting B cells and in some cases killing pathogen-infected cells.

After the immediate threat is over, most of these cells die and the antibodies and chemical signals go away, but a small number of B and T cells remain as long-term monitors watching for the same pathogen in the future. Called memory B and T cells, if these monitors detect the pathogen, they activate and coordinate an immune response that is stronger and more efficient than the first time the pathogen was identified. Vaccines take advantage of this efficiency by introducing a pathogen in a controlled manner, so a person develops immunologic memory without experiencing symptoms of an infection.

Whether memory cells are developed from a previous infection or a vaccination, it takes a few days for the immune system to become sufficiently activated and stop the pathogen during a second (or third or fourth) encounter. In the case of SARS-CoV-2, antibodies from vaccination or infection last about four to six months, and both memory B and T cells form. Upon subsequent exposure, memory cells activate and coordinate an immune response, which develops over a period of a few days. During this period, people can experience mild symptoms of disease, and because SARS-CoV-2 is replicating in their nasal cavity, they can spread the virus to others during this period of immune system activation.

Not surprisingly, evidence suggests that while memory immunity following COVID-19 vaccination, particularly memory T cells, works to decrease severe disease, the best protection against mild illness is to have antibodies present at the time of exposure. This understanding of the importance of antibodies has been part of the reasoning behind annual COVID-19 vaccine recommendations.

What does this mean for me?

Understanding the role of antibodies and memory immunity can help you think strategically about COVID-19 vaccination.

First, it is important to understand that when we get vaccinated, even though memory cells are durable and will protect most people against severe infection for long periods of time, antibodies, which offer the best protection against mild infection, will only last about four to six months.

- If you are at high risk for severe disease or if you care for someone at high risk for severe disease, realize that over time the protection against mild infection wanes. This antibody waning is why people 65 years and older were allowed to get a second COVID-19 vaccine last year if they wanted to do so.
- This also means that you probably want to time receipt of your vaccine so that you have protection during periods of higher risk, like during the holidays when you might be around more people or before travel to areas with high rates of COVID-19 infection.
- Like for other vaccines, it will take a week or two for your antibody response to develop after receipt of the vaccine.

Second, if you have a COVID-19 infection, you may want to delay getting a dose of vaccine for four to six months afterward.

- During that time, you will have antibodies from your infection, so you will likely be protected against another infection.
- If you get a vaccine during this period, antibodies from your recent infection will work to mitigate the perceived exposure (after all, antibodies don't know the source of the spike protein was a vaccine). As a result, you may have a lower immune response to the vaccine and, therefore, less protection.

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Is the vaccine safe? Understanding what we know about vaccine safety

Billions of doses of COVID-19 vaccines have been given to people around the world. Given that millions of people received doses during a relatively contracted period (months to a year), it is not surprising that some people experienced a diagnosis of a disease unrelated to COVID-19 shortly after being vaccinated. As a result, the safety of COVID-19 vaccines has been questioned repeatedly.

However, when two things happen close in time, the coincident timing does not prove they are related. As such, we need to take occurrences like this into consideration and evaluate them scientifically.

Recently, a committee of 15 scientists with diverse expertise was tasked with assessing the safety of COVID-19 vaccines on behalf of the National Academies of Sciences, Engineering and Medicine. This group reviewed the literature and held two forums open to the public as they sought to evaluate the likelihood that receipt of a COVID-19 vaccine was causally associated with reported concerns. The result was a 237-page review.

The committee confirmed the most troublesome side effect previously reported. Specifically, that mRNA vaccines are causally associated with myocarditis. From previous work of others, we know these rates are low, but vary by age and gender, with older teens and young males (under 30 years of age) being most likely to experience this adverse event (Watch this video of Dr. Offit discussing myocarditis after COVID-19 vaccination.

Conversely, mRNA vaccines were NOT associated with the following: thrombosis with thrombocytopenia syndrome (TTS), infertility, Guillain-Barré syndrome (GBS), Bell's palsy or heart attack (myocardial infarction). Stroke caused by blockage of blood flow in the brain was not associated with the Pfizer vaccine and is unlikely following receipt of the Moderna version as well, but data were lacking for the latter vaccine.

What does this mean for me?

While many stories related to COVID-19 vaccine safety have been circulating, it is important to realize that billions of doses have been administered, and to date, the only severe side effect causally associated with the COVID-19 mRNA vaccines is myocarditis. While concerning, myocarditis (inflammation of the heart muscle) is rare and mild compared with the form of myocarditis that follows COVID-19 infection, but vaccine recipients should watch for concerning symptoms in the first few days after vaccination.

While the vaccines are safe, it is conceivable that a young, healthy adult, particularly one who has been previously vaccinated and infected, may opt out of getting annual boosters. However, as described in other sections of this story, this decision should consider a variety of factors to ensure an open-minded consideration of the relative risks and benefits for each individual.

Who is getting severe illness? Understanding COVID-19 disease and individual factors that increase risk

Any assessment of benefits and risks should consider what we know about who is most likely to experience severe COVID-19 if infected.

Age

Between October 2023 and May 2024, the three age groups most often hospitalized with COVID-19 included (in order):

- Those 75 years and older
- Infants younger than 6 months of age
- Adults 65-74 years of age

About 2 of every 3 people hospitalized for COVID-19 during this period were adults 65 years and older. About 1 of 5 of these adults (65 years and older) who were hospitalized lived in long-term care facilities. Among all adults (those 18 years and older), more than 8 of every 10 deaths were in those 65 years and older; half of the deaths (5 of every 10) were among those 75 years and older.

Of those 17 years and younger, after infants less than 6 months of age (who are not eligible for vaccination), the second most hospitalized age group was children between 6 months and 4 years of age. (See more on this in the "Medical conditions, activities and vaccination status" section.)

Race and ethnicity

Between October 2023 and May 2024, American Indian, Alaskan Native, and Black, non-Hispanic individuals were the most likely to be hospitalized with COVID-19.

Medical conditions, activities and vaccination status

Adults with chronic diseases of the lungs, heart, arteries (cardiovascular disease) or kidneys as well as those with diabetes, neurological conditions, immune-compromising conditions, severe obesity, asthma and history of stroke are all at increased risk for hospitalization if infected. Likewise, pregnancy and smoking increase the risk for being hospitalized with COVID-19.

Among children, 5 of every 10 children hospitalized with COVID-19 do not have underlying medical conditions. However, this likelihood varies by age. For example, 7 or 8 of every 10 infants less than 6 months of age have no underlying conditions. The same is true for:

- 6 of every 10 infants and toddlers between 6 months and under 2 years of age
- 4 of every 10 children between 2 and 4 years of age
- 2 of every 10 children and teens between 5 and 17 years of age

These data offer us a window into the fact that a virus will seek out the susceptible people in a population because the youngest children are the least likely to have immunity from vaccination or previous infection, and they are also the most likely to be hospitalized and admitted to the intensive care unit even without any underlying health conditions that increase their risk for severe disease.

Of children with underlying health conditions who are hospitalized with COVID-19, the most common conditions include asthma/reactive airway disease and neurologic disorders. Other children at increased risk include those who rely on feeding tubes and those with similar chronic conditions as high-risk adults, including chronic disease of the lungs, heart or blood; obesity; and immune-compromising conditions. Those less than 2 years of age are also at increased risk if born prematurely.

Vaccination status

As described previously, vaccination status in the highly immune population was determined based on recent vaccination history. When evaluating hospitalizations among children or adults between October 2023 and March 2024, people who had received one or more doses since August 2022 (either bivalent booster or 2023-2024 vaccine) were considered vaccinated.

Among hospitalized adults, almost two-thirds had not received the newer vaccines, but hospitalizations of this unvaccinated or under-vaccinated group varied by age:

- 18-49 years old: 8 of 10 did not receive a dose since August 2022
- 50-64 years old: 6 or 7 of 10 did not receive a recent dose
- 65-74 years old: 6 of 10 did not receive a recent dose
- 75 years and older: 5 of 10 did not receive a recent dose

Among children 17 years of age or younger, about 8 or 9 of every 10 had not received a recent COVID-19 vaccine (either bivalent booster or 2023-2024 vaccine).

What does this mean for me?

If you or your family member is in a high-risk category based on age, race, ethnicity, health or vaccination status, getting an updated vaccine and taking other precautions to decrease the chance for a COVID-19 infection is important.

Likewise, even if you are not among the categories at increased risk, realize that anyone can get severe COVID-19 that leads to hospitalization or death, and often, we are around others that may be at high risk even if we don't know it. So, vaccinated or not, taking steps to reduce your chance of infection, and therefore your chance of spreading this virus, is the right thing to do for yourself and those around you.

For links to resources in the Feature Article, please visit *bit.ly/Sept2024FA*.