Updated COVID-19 boosters and XBB.1.5: What you need to know

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Although mRNA vaccines and traditional vaccines are manufactured differently, both are designed to promote specific and protective immune responses in the host. Credit: CDC

As the world marches toward the completion of its fourth year with COVID-19, data from the U.S. Centers for Disease Control and Prevention (CDC) show that the majority of those infected, hospitalized or dying from the SARS-CoV-2 virus in the U.S. are older adults.

The study was conducted with data from the COVID-19–Associated Hospitalization Surveillance Network (COVID-NET) and showed that adults aged ≥65 years have increased risk for COVID-19–associated hospitalization and other severe outcomes, compared to younger age groups. From Jan.–Aug. 2023, almost 63% of COVID-19–associated hospitalizations occurred in adults 65 years and older, many of whom had multiple underlying conditions. In comparison, the World Health Organization (WHO) shares that more than 80% of global COVID-19-related deaths between 2020-2021 have occurred among people aged 60 years or older.

Unfortunately, only 23.5% of those who were hospitalized in the U.S. had received the recommended COVID-19 bivalent vaccine, and only 58.6% had received the original vaccines rolled out at the end of 2020 and beginning of 2021. Globally, it may appear that there is a better vaccination rate achieved, with more than 5.55 billion people worldwide receiving a dose of a COVID-19 vaccine, equal to about 72.3% of the world population. However, more in-depth research reveals a stark gap exists between vaccination programs in different countries.

Additionally, while COVID-19 most frequently has severe outcomes in older and immunocompromised people, respiratory illnesses (including

COVID-19, RSV and influenza) have contributed to over 200,000 deaths since Jan. 2022, 600 of which occurred in people 19 years of age or younger. Like influenza, it is likely that SARS-CoV-2, which causes COVID-19, is here to stay. Vaccination remains the best protection against COVID-19-related hospitalization and death. It also reduces the effects of Long COVID, which can develop during or following acute infection and last for an extended duration of time.

How is the updated vaccine different from previous vaccines? Who should get vaccinated? Will the current version provide protection against recent COVID-19 variants? When should one get vaccinated, and can other seasonal vaccinations be administered simultaneously?

How is the updated COVID-19 vaccine different from previous versions?

In fall 2022, the available version of the COVID-19 vaccine was a bivalent booster, which targeted the BA.4 and BA.5 omicron subvariants, as well as the original SARS-CoV-2 variant. In vaccine technology, bivalent means 2 different antigens are introduced in the vaccine, and the goal of vaccination is to confer protection against both parts.

Updated COVID-19 vaccines by Pfizer-BioNTech and Moderna were approved (mid-Sept. 2023) by the Food and Drug Administration (FDA) and recommended by the CDC. The updated vaccine is, once again, a monovalent version, which was created to protect people from the omicron XBB.1.5 subvariant. While this specific variant is currently responsible for only about 3% of all U.S. cases, the dominant variants that are currently circulating are closely related to it. In other words, the current COVID-19 virus is so close to the vaccine version that it will protect us.

Prior to mRNA vaccine development, many vaccines were created to challenge the immune system with a microbe against which they're meant to protect—either the entire pathogen or some crucial component. Meaning, in the past the world relied on making vaccines by using weakened or inactivated versions of a virus, which would be injected into eggs (flu), humans or other host cells. This was a lengthy process, and often by the time the vaccine was available, the circulating viruses had already changed genetically, rendering the vaccines less effective.

mRNA vaccines have completely turned vaccine creation on its head. The mRNA vaccines work differently because now they present a genetic code (nucleic acid language) that human cells can translate into proteins. Thus, mRNA in the vaccine is used to prompt host cells to produce viral proteins that stimulate an immune response upon future exposure/infection to that particular pathogen—usually by helping neutralize the virus with antibodies. Additionally, existing COVID-19 vaccines offer a resilient cell-mediated immune response.

The amazing power of mRNA vaccines is that the turnaround time required to produce them can be lifesaving in real time. In other words, vaccine makers can simply adapt the nucleic acid code found in the most current versions of circulating COVID-19 variants (or other viruses like the flu) to contain codes for the "spike" protein found jutting from the outer surface of the virus, and within weeks to a month, our bodies can be immunized to ultimately make copies of a current variant's spike protein, which the immune system learns to subsequently recognize.

Who should get vaccinated?

For the first time, these updated vaccines are approved for everyone ages 6 months and older. The Novavax COVID-19 vaccine was also approved for use in individuals 12 and older in early Oct. 2023. An analysis by the CDC suggested that making a vaccine that is universally recommended

could prevent 400,000 hospitalizations and 40,000 deaths in the U.S. over the next 2 years.

Will the current version of the COVID-19 vaccine provide protection against recent variants?

The short answer is yes, there will be protection with the current version. At the end of Sept. 2023, the Omicron subvariant EG.5 made up roughly 29% of cases (making it the dominantly circulating SARS-CoV-2 strain at that time), with FL 1.51 (another XBB descendant) making up almost 14% of cases. Notably, the XBB version found in the current vaccine is similar to EG.5, which will help provide protection. Additionally, according to CDC, the newest variant, BA.2.86, which appeared in Aug. 2023, should also be covered by the new COVID-19 vaccine.

Importantly, RNA viruses, including SARS, RSV and influenza, make it very difficult to produce a long-lasting vaccine since these viruses are constantly evolving. In other words, SARS-CoV-2 is a moving target at the molecular level. As with flu vaccination and others, these new versions of the COVID-19 vaccine will not prevent all COVID-19 infections, but unless there is a major genetic shift in the virus, like we saw with Delta to Omicron in the winter of 2021, the current COVID-19 vaccines will offer partial-to-full protection from circulating variants.

Furthermore, these newer versions are expected to have an immediate impact for preventing severe illness, hospitalization and death from a COVID-19 infection, and the release of this vaccine is well-timed to coincide with the winter season in the Northern Hemisphere, when respiratory infections, hospitalizations and mortality rates tend to rise.

When is the best time to get the COVID-19 vaccine?

According to the CDC and WHO, the new COVID-19 vaccine should be taken in the fall, around the Sept.-Oct. timeframe (Northern Hemisphere) for best protection in the winter season. There may be a need for some individuals to receive the vaccine sooner (e.g., immunocompromised).

Can the COVID-19 vaccine be administered with other seasonal vaccinations?

The COVID-19 vaccine is safe to receive at the same time as your annual influenza (e.g., flu) vaccine. The new respiratory syncytial virus (RSV) vaccine may be administered at the same time as well.

How long after COVID-19 infection should one wait to get vaccinated?

The CDC states that individuals who recently had a COVID-19 infection may wait up to 3 months before being vaccinated. And although experts collectively agree that people should wait until symptoms of an active COVID-19 infection resolve before getting vaccinated, there may be pros and cons to waiting for natural immunity to wane (~3 months) before boosting. On one hand, getting boosted before the 3 months have passed may produce higher levels of SARS-CoV-2 antibodies than what would be produced from COVID-19 infection alone, a factor that could make this a more desirable option, especially for those with high risk of SARS-CoV-2 exposure. However, waiting 3 months for natural immunity to wane, may generate a more robust antibody response upon boosting, which may be desirable for those who have a lower risk of day-to-day exposure.

In any case, it is important to stay up to date on vaccination, as people who do not get vaccinated after recovery from COVID-19 infection are

more likely to get COVID-19 again than those who get vaccinated after their recovery.

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