Issue Brief

COVID-19 Vaccine Comparison

Last Updated: April 8, 2022

Three COVID-19 vaccines, Pfizer-BioNTech, Moderna, and Johnson & Johnson (J&J) are available in the United States. A listing of key details for each vaccine can be found below, which has evolved over time. This list is not exhaustive.

Vaccine Administration for Primary Series and Additional Doses

Pfizer-BioNTech/COMIRNATY Vaccine		Moderna/SPIKEVAX Vaccine		Janssen (J&J) Vaccine	
Primary Series		**Primary Series**		**Primary Series**	
5-11 years old	Emergency Use Authorization (EUA). Administered by intramuscular (IM) injection using 0.2 mL (10 µg), mixed with a 0.9% sodium chloride diluent, with a maximum of 10 doses per vial, using a vial with an orange cap. Two shots are required, separated by three weeks (21 days).	No Moderna vaccine authorized for this age group.		No J&J vaccine authorized for this age group.	
12-15 years old	EUA. Administered by IM injection using: Purple cap vial: A 0.3 mL dose (30 µg), mixed with a 0.9% sodium chloride diluent, with a maximum of six doses per vial, OR Gray cap vial: A 0.3 mL dose (30 µg) with a maximum of six doses per vial (Do not dilute this formulation). Two shots are required, separated by three to eight weeks (21 days).	No Moderna vaccine authorized for this age group.		No J&J vaccine authorized for this age group.	
16 years and older	Fully licensed (Biologics License Application) **under the name Comirnaty.** Administered by IM injection using either: Purple cap vial: A 0.3 mL dose (30 µg), mixed with a 0.9% sodium chloride diluent, with	18 years and older	Fully licensed (Biologics License Application) under the name SPIKEVAX. Administered by IM injection using a 0.5 mL (100 µg) dose, not mixed with a diluent, with a maximum of 15 doses	18 years and older	EUA. Administered by IM injection using a 0.5 mL dose with a maximum of five doses per vial, using a vial with

a maximum of six doses per vial, OR Gray cap vial: A 0.3 mL dose (30 µg) with a maximum of six doses per vial (Do not dilute this formulation). Two shots are required, separated by three to eight weeks.	per vial, using a vial with a **red cap** (Moderna/SPIKEVAX). Two shots are required, separated by four to eight weeks.		a **blue cap**. One shot is required.
Additional Dose for People with Moderate to Severe Immunocompromise			
People ages five years and older should get an additional (third) primary shot of Pfizer-BioNTech COVID-19 vaccine given 28 days after the second dose using the vial and cap colors referenced above, for the appropriate age group.	People ages 18 years and older should receive an additional primary dose (third dose) of Moderna vaccine (0.5 mL) at least 28 days after the second dose using a vial with a **red cap** (Moderna/SPIKEVAX).	People ages 18 years and older who received J&J for their first dose should receive an additional primary dose of mRNA vaccine* at least 28 days later. If Moderna COVID-19 vaccine is used for the second dose, administer a 0.5 ml (100 µg) dose using a vial with a red cap. See Clinical Guidance for COVID-19 Vaccination for more information.	

Vaccine Administration of Booster, Second Booster, and Heterologous Booster Doses

Pfizer-BioNTech/COMIRNATY Vaccine	Moderna/SPIKEVAX Vaccine	Janssen (J&J) Vaccine
First Booster Dose	**First Booster Dose**	**First Booster Dose**
5-11 years old: Booster dose not authorized for this age group.		
12 years and older: A single booster dose should be administered to **all individuals 12 and older**,+** at least five months after completion of the primary (two-dose) series. • **Ages 12 to 17 years with moderate to severe immunocompromise** who received an additional primary Pfizer-BioNTech dose (third dose), should also receive a booster dose (fourth dose) (0.3 ml) of Pfizer-BioNTech vaccine with a **Purple cap vial** or **Gray cap vial** at least three months after completing their primary series.	**18 years and older:** A single booster dose* (mRNA preferred) should be administered to **all individuals ages 18 years and older,**+ at least five months after completion of the primary (two dose) series. • **Ages 18 years and older with moderate to severe immunocompromise** who received a two-dose mRNA primary series and an additional primary dose (three total mRNA doses) can receive a single COVID-	**18 years and older:** A single booster dose* (mRNA preferred) should be administered to **persons ages 18 years and older** at least two months after primary vaccination (one-dose) with the J&J COVID-19 vaccine. mRNA vaccine is preferred.+

• **Ages 18 years and older with moderate to severe immunocompromise** who received a two-dose mRNA primary series, and an additional primary dose (three total mRNA doses) should receive a single COVID-19 booster dose (Pfizer-BioNTech, Moderna, or J&J) at least three months after completing their third mRNA vaccine dose.	19 booster dose* (mRNA preferred) at least three months after completing their third mRNA vaccine dose.	
Second Booster Dose	**Second Booster Dose**	**Second Booster Dose**
Update: Adults 50 years and older may choose to receive a second booster dose using an mRNA COVID-19 vaccine at least four months after the first booster dose. **Update:** People ages 12 years** and older who are moderately or severely immunocompromised may choose to receive a second booster dose using an mRNA COVID-19 vaccine at least four months after the first booster dose.*	**Update:** Adults 50 years and older may choose to receive a second booster dose using an mRNA COVID-19 vaccine at least four months after the first booster dose. **Update:** People ages 18 years and older who are moderately or severely immunocompromised may choose to receive a second booster dose of mRNA vaccine, at least four months after their first booster dose.	**Update:** Adults ages 18-49 years who received J&J COVID-19 vaccine as both their primary series dose and booster dose, may receive a second booster dose of an mRNA COVID-19 vaccine at least four months after the first J&J booster dose. **Update:** Adults 50 years and older who first received J&J, regardless of what type of booster they received, may choose to receive a second booster dose using an mRNA COVID-19 vaccine at least four months after the first booster dose. See Clinical Guidance for COVID-19 Vaccination for more information.

** Although mRNA vaccines are preferred, J&J/Janssen COVID-19 vaccine may be considered in some situations.*
*** For 12–17-year-olds, only the Pfizer-BioNTech COVID-19 vaccine is authorized and recommended for use.*
[+] CDC recommendations allow a person to choose which vaccine booster product they receive (mix and match). Pfizer-BioNTech or Moderna (mRNA COVID-19 vaccines) are preferred in most situations.

Side Effects

The benefits of vaccine outweigh the risks. However, side effects have been reported. Serious health events after COVID-19 vaccination are rare. Common side effects include pain, redness and swelling at the injection site, tiredness, headache, muscle pain, chills, nausea, joint pain, and fever. Less common severe side effects include severe allergic reactions. See additional information on vaccine side effects for Pfizer-BioNTech, Moderna, and J&J.

Since April 2021, FDA has investigated rare but severe side effects associated with the COVID-19 vaccines. The mRNA vaccines (Pfizer-BioNTech and Moderna) were found to have a suggested increased risk of myocarditis and pericarditis. The J&J vaccine was found to have a suggested increased risk of thrombosis with

thrombocytopenia syndrome and Guillain-Barré Syndrome. All events were found to be uncommon, and the vaccines' benefits continue to outweigh the risks found.

Coadministration of Vaccine

Following an emergency Advisory Committee for Immunization Practices (ACIP) meeting on May 12, 2021, CDC revised vaccine administration guidance indicating that COVID-19 vaccines can be co-administered with other vaccines without regard to timing. Coadministration information is summarized in CDC's Interim Clinical Considerations guidance.

Variants

Update: The Omicron variant was first detected in the United States in 4December 2021 and quickly became the dominant variant, accounting for over 90% of cases across the country and over 80% in nearly every region. As of April 1, 2022, subvariant BA.2, part of the Omicron lineage, accounts for over 50% of COVID-19 cases nationwide. Current COVID-19 vaccines are expected to protect against severe illness, hospitalizations, and deaths from infection with the Omicron variant. However, breakthrough infections in people who are fully vaccinated are likely. CDC and WHO continue to monitor other variants of interest, concern, and high consequence.

CDC and ACIP Recommend mRNA Vaccines to Combat COVID-19

On Dec. 16, CDC endorsed ACIP's updated COVID-19 vaccine recommendations. ACIP unanimously voted to say mRNA vaccines are preferred over the use of the Johnson & Johnson vaccine for all persons 18 years and older in the United States.

Considerations for an Eight-Week Interval Between the First and Second Doses of a Primary mRNA Vaccine

Following a thorough evaluation of the latest safety and effectiveness data, CDC is providing new information to help healthcare providers recommend the optimal COVID-19 vaccination schedule based on the individual patient. This updated guidance is specific to the mRNA (Pfizer-BioNTech or Moderna) COVID-19 vaccine primary series and is only for some patients who are not yet vaccinated. Specifically, people ages 12-64 years old who are not moderately or severely immunocompromised—and particularly males ages 12-39 years—may benefit from getting their second mRNA COVID-19 vaccine dose eight weeks after their first dose, instead of after the FDA-approved or FDA-authorized three-week (Pfizer-BioNTech) or four-week (Moderna) interval.

Extending the time interval between primary mRNA COVID-19 vaccine doses from the FDA-approved or authorized three weeks (Pfizer-BioNTech) or four weeks (Moderna) to eight weeks may help increase how long protection lasts against COVID-19. It may also help lower the (small) risk of myocarditis (inflammation of the heart muscle) and pericarditis (swelling of tissue around the heart), which has been associated—mostly among adolescent and young adult males—with mRNA COVID-19 vaccination.

Population Specific Considerations

Pregnant and Lactating People

The American College of Obstetricians and Gynecologists, the Society for Maternal-Fetal Medicine, and CDC recommend that all pregnant and lactating people should be vaccinated against COVID-19 in response to growing evidence of safe and effective use of COVID-19 vaccines during pregnancy and breastfeeding. Safety monitoring systems from FDA and CDC have not identified any safety concerns among pregnant or lactating people. Additionally, completed data from animal studies show no issues. Pregnant and lactating people should discuss the risks and benefits with their provider.

Children

On Nov. 2, the Pfizer-BioNTech COVID-19 vaccine was authorized for children 5-11 years of age. On Jan. 3, FDA expanded eligibility for the Pfizer-BioNTech COVID-19 vaccine to include the use of a single booster dose in individuals 12 years and older at least five months after primary vaccination with the Pfizer-BioNTech COVID-19 vaccine, and to allow for a third primary series dose of Pfizer-BioNTech COVID-19 vaccine for certain immunocompromised children ages 5-11 years. More information can be found on CDC's website.