### Issue Brief
**COVID-19 Vaccine Comparison**

Last Updated: March 1, 2022

Three COVID-19 vaccines, [Pfizer-BioNTech](https://www.pfizerbiotech.com), [Moderna](https://www.modernatx.com), and [Johnson & Johnson](https://www.janssen.com) (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 the Primary Series in the General Population

<table>
<thead>
<tr>
<th>Age</th>
<th>Pfizer-BioNTech Vaccine</th>
<th>Moderna Vaccine</th>
<th>J&amp;J Vaccine</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-11 years old</td>
<td>Emergency Use Authorized. 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. <strong>Two shots</strong> are required, separated by three weeks (21 days).</td>
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<tr>
<td>12-15 years old</td>
<td>Emergency Use Authorized. Administered by IM injection using:</td>
<td></td>
<td></td>
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<tr>
<td>• Purple cap vial</td>
<td>A 0.3 mL dose (30 µg), mixed with a 0.9% sodium chloride diluent, with a maximum of six doses per vial, OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Gray cap vial</td>
<td>A 0.3 mL dose (30 µg) with a maximum of six doses per vial (do not dilute this formulation). *Update: <strong>Two shots</strong> are required, separated by three to eight weeks (21 days).</td>
<td></td>
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</tr>
<tr>
<td>16 years and older</td>
<td>Fully licensed (Biologics License Application). Administered by IM injection either:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Purple cap vial</td>
<td>A 0.3 mL dose (30 µg), mixed with a 0.9% sodium chloride diluent, with a maximum of six doses per vial, OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Gray cap vial</td>
<td>A 0.3 mL dose (30 µg) with a maximum of six doses per vial (do not dilute this formulation). *Update: <strong>Two shots</strong> are required, separated by three to eight weeks.</td>
<td></td>
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</tr>
<tr>
<td>18 years and older</td>
<td>Fully licensed (Biologics License Application). Administered by IM injection using a 0.5 mL (100 µg) dose, not mixed with a diluent, with a maximum of 15 doses per vial. <strong>Update:</strong> Two shots are required, separated by four to eight weeks.</td>
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<tr>
<td>18 years and older</td>
<td>Emergency Use Authorized. Administered by IM injection using a 0.5 mL dose with a maximum of five doses per vial. <strong>One shot</strong> is required.</td>
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<td></td>
</tr>
</tbody>
</table>

*See page 4: Considerations for an 8-week Interval Between the First and Second Doses of a Primary mRNA Vaccine*
Administration of an Additional Dose for People with Compromised Immune Systems

<table>
<thead>
<tr>
<th>Pfizer-BioNTech Vaccine</th>
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<th>J&amp;J Vaccine</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Update:</strong> People ages 5 and older who are moderately or severely immunocompromised should get an additional (third) primary shot of Pfizer-BioNTech COVID-19 vaccine given 28 days after the second dose.</td>
<td><strong>Update:</strong> People ages 18 years and older with moderately to severely compromised immune systems should receive an additional primary dose (third dose) of Moderna vaccine at least 28 days after the second dose.</td>
<td><strong>Update:</strong> People ages 18 years and older with moderately to severely compromised immune systems who received J&amp;J for their first dose should receive an additional primary dose of mRNA vaccine (Pfizer or Moderna) at least 28 days later.</td>
</tr>
</tbody>
</table>

Vaccine Administration of Booster Doses and Heterologous Booster Doses

<table>
<thead>
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<th>Pfizer-BioNTech Vaccine</th>
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<th>J&amp;J Vaccine</th>
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</table>
| **Update:** A single booster dose (0.3 mL) should be administered at least five months after completion of the primary (two-dose) series to all individuals 12 and older.  
- For 12–17-year-olds, only the Pfizer-BioNTech COVID-19 vaccine is authorized and recommended for use.  
- For ages 18 and older, 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. | **Update:** A single half booster dose (0.25 mL) should be administered at least five months after completion of the primary (two dose) series to all individuals ages 18 years and older.  
- **Update:** 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. | **Update:** A single booster dose can be administered to persons ages 18 years and older at least two months after primary vaccination (1 dose) with the J&J COVID-19 vaccine.  
- **Update:** 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. |

Moderately or severely immunocompromised people:  
- **Update:** People ages 12 to 17 years should receive a booster dose (fourth dose) at least three months after completing their additional primary Pfizer-BioNTech dose (third dose). The booster dose can only be Pfizer-BioNTech vaccine.  
- Ages 18 and older 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 Janssen) at least three months after primary vaccination.  
- People ages 18 and older who received a two-dose mRNA primary series and an additional primary dose (three total mRNA doses) can receive a single COVID-19 booster dose (Pfizer-BioNTech, Moderna, or Janssen) at least three months after primary vaccination.  
- People ages 18 and older who received an additional primary dose of mRNA...
least three months after completing their third mRNA vaccine dose. | completing their third mRNA vaccine dose. | vaccine can receive a single COVID-19 booster dose (Pfizer-BioNTech or Moderna preferred) at least two months after completing their second vaccine dose.

*Although mRNA vaccines are preferred, J&J/Janssen COVID-19 vaccine may be considered in some 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 Dec. 2021 and quickly became the dominant variant accounting for over 90% of cases across the country, and over 80% in nearly every region. 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. In addition to the Delta and Omicron variants, 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 and older in the United States.

**Considerations for an 8-week Interval Between the First and Second Doses of a Primary mRNA Vaccine**

**Update:** 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 through 64 years who are not are not moderately or severely immunocompromised—and particularly males ages 12 through 39 years—may benefit from getting their second mRNA COVID-19 vaccine dose 8 weeks after their first dose, instead of after the FDA-approved or FDA-authorized 3-week (Pfizer-BioNTech) or 4-week (Moderna) interval.

Extending the time interval between primary mRNA COVID-19 vaccine doses from the FDA-approved or authorized 3 weeks (Pfizer-BioNTech) or 4 weeks (Moderna) to 8 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 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.