COVID-19 Vaccines
Second Booster and the Future of COVID-19 Vaccine Boosters

Sarah Meyer, MD MPH
Chief Medical Officer (acting)
National Center for Immunization and Respiratory Diseases
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cdc.gov/coronavirus

COVID-19 vaccine recommendations

- A COVID-19 vaccine primary series is recommended for everyone ages 5 years and older
- A COVID-19 vaccine booster dose is recommended for everyone ages 12 years and older
- In most situations, an mRNA COVID-19 vaccine (Pfizer-BioNTech or Moderna) is preferred over the Janssen COVID-19 Vaccine for primary and booster vaccination
2\textsuperscript{nd} COVID-19 Vaccine Booster Doses

- Following FDA’s regulatory action on March 29, 2022, CDC updated its COVID-19 vaccination guidance that some people may receive a second booster dose using an mRNA COVID-19 vaccine at least 4 months after the first booster dose.

People ages 50 years and older

People ages 12 years and older who are moderately or severely immunocompromised

People ages 18 years and older who received Janssen as both primary and booster dose

Today’s presentation

- Review vaccine effectiveness of the 1\textsuperscript{st} booster dose
- Discuss evidence and considerations for receiving 2\textsuperscript{nd} booster dose
- Discuss future considerations for COVID-19 booster doses
Rates of COVID-19 cases & deaths by vaccination status and receipt of booster dose*

Cases**
- Unvaccinated
- Vaccinated with a primary series only
- Vaccinated with a primary series and booster dose*

Deaths*
- Unvaccinated people aged 12 years and older had:

3.1X
Risk of Testing Positive for COVID-19

AND

20X
Risk of Dying from COVID-19

*This includes people who received booster doses and people who received additional doses.
** Data from September 19, 2021 – March 19, 2022 (24 U.S. jurisdictions)
+ Data from September 19, 2021 – February 26, 2022 (23 U.S. jurisdictions)
CDC COVID Data Tracker. https://covid.cdc.gov/covid data-tracker/#rates-by-vaccine-status
Accessed April 19, 2022

Vaccine effectiveness (VE) against COVID-19-associated hospitalizations during Omicron in adults aged ≥18 years

Dec 16, 2021-Mar 7, 2022

<table>
<thead>
<tr>
<th>Medical event/vaccination status</th>
<th>Total</th>
<th>SARS-CoV-2 Positive</th>
<th>Row %</th>
<th>VE % (CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitalizations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unvaccinated (referent)</td>
<td>12377</td>
<td>6134</td>
<td>49.6</td>
<td></td>
</tr>
<tr>
<td>1 Janssen vaccine dose (14 - 150 + days)</td>
<td>1194</td>
<td>440</td>
<td>36.9</td>
<td>37 (27-45)</td>
</tr>
<tr>
<td>2 Janssen vaccine doses (7-120 days)</td>
<td>135</td>
<td>43</td>
<td>31.9</td>
<td>64 (47-76)</td>
</tr>
<tr>
<td>1 Janssen/ 1 mRNA vaccine dose (7-120 days)</td>
<td>252</td>
<td>47</td>
<td>18.7</td>
<td>78 (69-85)</td>
</tr>
<tr>
<td>3 mRNA vaccine doses (7 -120 days)</td>
<td>5994</td>
<td>613</td>
<td>10.2</td>
<td>90 (89-91)</td>
</tr>
</tbody>
</table>

- VE of any booster dose is significantly higher than VE for 1 Janssen dose only
- VE of 3 mRNA doses is significantly higher than Janssen plus booster

Vaccine effectiveness (VE) against COVID-19-associated hospitalizations during Omicron in adults aged ≥18 years

Dec 16, 2021–Mar 7, 2022

- VE of any booster dose is significantly higher than VE for 1 Janssen dose only
- VE of 3 mRNA doses is significantly higher than Janssen plus booster

mRNA vaccine effectiveness (VE) for hospitalization by number of doses and time since last dose receipt for adults ≥50 years, Dec 2021–Mar 2022, by immunocompromised status

CDC, preliminary unpublished data from VISION network. Individuals with prior infections excluded. Logistic regression conditioned on calendar week and geographic area, and adjusted for age, sex, race, ethnicity, local virus circulation, respiratory or nonrespiratory underlying medical conditions, and propensity to be vaccinated.
mRNA vaccine effectiveness (VE) for hospitalization by number of doses and time since last dose receipt for adults ≥50 years, Dec 2021–Mar 2022, by immunocompromised status

<table>
<thead>
<tr>
<th>Status</th>
<th>Immunocompromised</th>
<th>Not immunocompromised</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 doses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14-59 days</td>
<td>38 (25-71)</td>
<td>81 (70-88)</td>
</tr>
<tr>
<td>60-119 days</td>
<td>27 (7-51)</td>
<td>74 (66-80)</td>
</tr>
<tr>
<td>120-179 days</td>
<td>33 (6-52)</td>
<td>64 (56-71)</td>
</tr>
<tr>
<td>180-239 days</td>
<td>35 (13-51)</td>
<td>60 (53-61)</td>
</tr>
<tr>
<td>240-299 days</td>
<td>39 (27-50)</td>
<td>57 (53-61)</td>
</tr>
<tr>
<td>300+ days</td>
<td>42 (29-52)</td>
<td>66 (62-69)</td>
</tr>
<tr>
<td>3 doses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14-59 days</td>
<td>81 (75-85)</td>
<td>93 (91-94)</td>
</tr>
<tr>
<td>60-119 days</td>
<td>74 (68-78)</td>
<td>91 (90-92)</td>
</tr>
<tr>
<td>120-179 days</td>
<td>49 (37-58)</td>
<td>84 (81-87)</td>
</tr>
</tbody>
</table>

CDC, preliminary unpublished data from VISION network. Individuals with prior infections excluded. Logistic regression conditioned on calendar week and geographic area, and adjusted for age, sex, race, ethnicity, local virus circulation, respiratory or nonrespiratory underlying medical conditions, and propensity to be vaccinated.

Effectiveness of a fourth dose of COVID-19 mRNA vaccine against Omicron among persons ages ≥60 years – Israel

- On January 2, 2022, began administering a 4th dose of Pfizer-BioNTech COVID-19 vaccine to people ages ≥60 years, who had received a 3rd dose of vaccine at least 4 months earlier
- Follow-up from January 10-March 2 for confirmed infection and February 18 for severe illness

<table>
<thead>
<tr>
<th></th>
<th>Cases (person-days at risk)</th>
<th>Rate Ratio (95% CI)</th>
<th>Adjusted rate difference per 100,000 person-days at risk (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3rd dose only</td>
<td>Week 4 after 4th dose</td>
<td>3rd dose only vs week 4 after 4th dose</td>
</tr>
<tr>
<td>Confirmed infections</td>
<td>111,780 (31,000,299)</td>
<td>7,225 (3,883,824)</td>
<td>2.0 (1.9, 2.1)</td>
</tr>
<tr>
<td>Severe illness</td>
<td>1210 (24,857,976)</td>
<td>66 (3,639,393)</td>
<td>3.5 (2.7, 4.6)</td>
</tr>
</tbody>
</table>

4th dose estimated to prevent additional 3-4 cases of severe disease per 100,000 person-days compared to 3 doses

Effectiveness of a fourth dose of COVID-19 mRNA vaccine against Omicron among persons ages ≥60 years – Israel

- Rapid waning of additional protection against infection

Effectiveness of a fourth dose of COVID-19 mRNA vaccine against Omicron among persons ages ≥60 in a large healthcare organization – Israel

- COVID-19-Related Hospitalization
  Day 14 to 30 Relative VE: 72% (95% CI: 63% – 79%)

- Death from COVID-19
  Day 14 to 30 Relative VE: 76% (95% CI: 48% – 91%)

**Summary: People eligible for a 2\textsuperscript{nd} booster dose in the United States**

- People ages 50 years and older
- People ages 12 years and older who are moderately or severely immunocompromised
- People ages 18 years and older who received Janssen as both primary and booster dose

**Considerations for Eligible People on Getting a 2\textsuperscript{nd} Booster Dose As Soon As Possible**

- Certain underlying medical conditions that increase the risk of severe COVID-19 illness
- Moderate or severe immunocompromise
- Living with someone who is immunocompromised, at increased risk for severe disease, or who cannot be vaccinated due to age or contraindication
- Increased risk of exposure to SARS-CoV-2 through occupational, institutional, or other activities (e.g., travel or large gatherings)
- Living or working in an area where the COVID-19 community level is medium or high
Considerations for Eligible People on Waiting to Receive a 2\textsuperscript{nd} Booster Dose

- Recent SARS-CoV-2 infection within the past 3 months
- Hesitancy about getting another recommended booster dose in the future, as a booster dose may be more important in the fall and/or if a variant-specific vaccine is needed.

For more information:

Staying Up to Date on COVID-19 Vaccines

- CDC recommends everyone get up to date with their COVID-19 vaccinations.
- Being up to date means a person has received all recommended doses in their primary vaccine series, and a booster dose, when eligible.
- Receipt of a second booster dose is not necessary to be considered up to date at this time.


Future doses of COVID-19 vaccines

- COVID-19 epidemiology unpredictable to date, without defined seasonality
- Winter surges noted in the two prior years
  - 2020 surge began in October/November
  - 2021 surge began in December/January
- Likely difficult to predict timing of future surges, but booster dose may be needed in the Fall prior to next winter surge

https://covid.cdc.gov/covid-data-tracker/#trends_dailycases
Future doses of COVID-19 vaccines

- Policy around future doses require **continued evaluation** of COVID-19 epidemiology and vaccine effectiveness, including the impact of both **time** and **variants**, and the ability of doses to **improve** protection.

- Evolution of COVID-19 vaccines will be important as SARS-CoV-2 virus evolves
  - May include evolution of strains included in the vaccines as well as vaccine platform.

Future doses of COVID-19 vaccines

**Next Steps**

- FDA and CDC will continue to partner for future discussions.
- ACIP will continue to review additional data:
  - COVID-19 epidemiology, genomic surveillance and vaccine effectiveness
  - Manufacturer data on safety, immunogenicity and possible efficacy of variant-specific vaccines
- Further discussions around feasibility, implementation, and balance of benefit and risks by age group and population to inform the timing and populations for future doses of COVID-19 vaccines.
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- ACIP COVID-19 Vaccines Work Group
- Vaccine Task Force
- Epi Task Force
- Data Analytics and Visualization Task Force
- Respiratory Viruses Branch

For more information, contact CDC
1-800-CDC-INFO (232-4636)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.