Considerations for booster doses of COVID-19 vaccines

Sara Oliver MD, MSPH
ACIP Meeting
August 13, 2021
Policy questions:
Recommendations for booster doses of COVID-19 vaccines

- **Main policy question**: Are booster doses of COVID-19 vaccines needed for those previously vaccinated with a primary series?

- Policy on booster doses coordinated with **FDA** for regulatory allowance, and **ACIP** for recommendations around use in specific populations.
There are two distinct potential uses for an additional dose:

- **Additional dose after an initial primary vaccine series**: administration of an additional vaccine dose when the initial immune response following a primary vaccine series is likely to be insufficient.

- **Booster dose**: a dose of vaccine administered when the initial sufficient immune response to a primary vaccine series is likely to have waned over time. The need for and timing of a COVID-19 booster dose have not been established.
Roles of an Additional Dose

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- **Additional dose after an initial primary vaccine series**: administration of an additional vaccine dose when the initial immune response following a primary vaccine series is likely to be insufficient.

- **Booster dose**: a dose of vaccine administered when the initial sufficient immune response to a primary vaccine series is likely to have waned over time.
COVID-19 vaccines administered
As of August 11, 2021

Total Vaccine Doses Administered:
353,205,544

% of Population Fully Vaccinated:
≥12 years of age: 58.9%
≥18 years of age: 61.3%
≥65 years of age: 80.5%

CDC. https://covid.cdc.gov/covid-data-tracker
COVID-19 vaccines administered
As of August 11, 2021

A person is considered fully vaccinated against COVID-19 ≥2 weeks after receipt of the second dose in a two-dose series (Pfizer-BioNTech and Moderna) or ≥2 weeks after receipt of the single dose of the Janssen vaccine; CDC. https://covid.cdc.gov/covid-data-tracker
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Booster doses of COVID-19 vaccines

What are the **key considerations** for decision making?

What **data** are available for decision making?

Does ACIP **recommend** booster doses of COVID-19 vaccines in any populations?
Booster doses of COVID-19 vaccines

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Booster doses of COVID-19 vaccines: Data to inform recommendations

- Risk of COVID-19 complications
- Risk of COVID-19 exposure
- Risk of waning immunity
- Risk of COVID-19 variants
Booster doses of COVID-19 vaccines

Do we need them?

Public Health Problem

Do they work?

Benefits and Harms
Booster doses of COVID-19 vaccines

**Public Health Problem**

- Is vaccine effectiveness (VE) waning over time?
- Is VE reduced for the Delta variant?
- Does the data vary by sub-population?

**Benefits and Harms**

- Are booster doses of COVID-19 vaccines safe and immunogenic?
- Will booster doses of COVID-19 vaccines reduce COVID-19 incidence, hospitalization and/or mortality?
- Do booster doses improve VE against the Delta variant?
Is vaccine effectiveness (VE) waning over time?

- Is VE at **6-8 months** similar to what was noted at **2 months** after vaccination?

- How does this data vary by **severity** of disease?

- What data on **waning VE** would identify a need for **booster dose** of COVID-19 vaccines?
Booster doses of COVID-19 vaccines: Data to inform recommendations

Is VE reduced for the Delta variant?

How does this vary by severity of disease?

How would this information impact VE for future variants?
Booster doses of COVID-19 vaccines: Data to inform recommendations

Does the data vary by sub-population?

- Residents of long-term care facilities
- Adults $\geq 65$ years of age
- Healthcare personnel
Booster doses of COVID-19 vaccines: Data to inform recommendations

Does the data vary by sub-population?

LTCF residents, adults ≥65 years of age
- Vaccinated in early phase of COVID-19 vaccine roll-out
- Needed special considerations for other vaccines (boosters, higher-dose vaccines)

Healthcare personnel
- Vaccinated in early phase of COVID-19 vaccine roll-out
- Continued exposure to SARS-CoV-2
- Additional considerations include continuity of healthcare systems
  - May have need to prevent asymptomatic or mild infections in healthcare personnel
Booster doses of COVID-19 vaccines: Data to inform recommendations

Are booster doses of COVID-19 vaccines **safe** and **immunogenic**?

Do COVID-19 vaccines provide a **boost** in neutralizing antibody response?

How do neutralizing antibodies correlate to **clinical protection** from COVID-19?
Booster doses of COVID-19 vaccines: Data to inform recommendations

Will booster doses of COVID-19 vaccines reduce COVID-19 incidence, hospitalization and/or mortality?
Booster doses of COVID-19 vaccines: Data to inform recommendations

Do boosters improve VE against the Delta variant and other variants of concern?

How can we use this data to inform VE for future variants?
Booster doses of COVID-19 vaccines:
Work Group interpretation

- Receipt of **COVID-19 vaccine primary series** will continue to have the largest public health impact.

- Decisions for boosters need to focus on prevention of **severe disease, hospitalization** and **death**.

- Important to ensure **global vaccine availability**: new variants could emerge from regions with **low** vaccine coverage and **high** community transmission.
Booster doses of COVID-19 vaccines:
Work Group interpretation

- **Neutralizing antibody** data will be important for booster dose discussions, but may not represent the entire immune response to COVID-19 vaccines
  - Cellular immune response can be difficult to measure, but important
  - Commercial antibody testing **not authorized** or **recommended** to evaluate post-vaccination immune response

- Based on available data and timing of vaccine roll-out, initial booster vaccine policy focused on at-risk **adult** populations
  - At-risk populations could include: Adults ≥65 years of age, LTCF residents, healthcare personnel
Booster doses of COVID-19 vaccines

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Does ACIP **recommend** booster doses of COVID-19 vaccines in any populations?
Booster doses of COVID-19 vaccines

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Does ACIP **recommend** booster doses of COVID-19 vaccines in any populations?
Booster doses of COVID-19 vaccines: Remaining questions

- How does VE vary by specific COVID-19 vaccine in each sub-population?
- What is the VE for booster doses of COVID-19 vaccines, and how does it vary by sub-population?
- How will the need for booster doses of COVID-19 vaccines evolve as the pandemic evolves?
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- Vaccine Task Force
- Epi Task Force
- Respiratory Viruses Branch
Questions for ACIP

1. Does ACIP agree with the framework laid out to address COVID-19 booster dose recommendations?

2. What other questions would be important for ACIP to address?
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.
Additional Slides
COVID-19 vaccines administered

As of August 10, 2021

Daily Count of Fully Vaccinated People

CDC. https://covid.cdc.gov/covid-data-tracker
Upcoming studies:
NIH or manufacturer studies

Data from Phase I/II/III trials
- Monitor kinetics of antibody response, efficacy from early phase clinical trials
- BLA submission: Include efficacy for ~6 months

Heterologous boost
- Primary series followed by different boost vaccine
- NIH-sponsored study: 150 individuals, 12-20 weeks following initial series (any series)
  Results expected late summer 2021

Booster studies
- Moderna: Preliminary results for mRNA-1273 (50µg) published May 2021;
  Additional data on mRNA-1273 and other variants as boosters expected July-Sept 2021
- Pfizer: Data on BNT162b2 (30µg) and variant booster studies expected July-Sept 2021

Upcoming studies:
CDC studies

Vaccine breakthrough cases
- Track breakthrough infections
- Monitor severity of disease and genomic sequence (specifically for variants of concern)

Vaccine effectiveness studies
- Continue to monitor VE studies over time:
  - Stratify by age, time since vaccination, setting and medical condition
- Ability to track any waning VE could be impacted by declining incidence, changes in variant prevalence
- Over time, individuals who are vaccinated may become increasingly less comparable to the unvaccinated population
Vaccine effectiveness: Select upcoming studies

HEROES-RECOVER Cohort
- Following ~5,000 essential workers with weekly SARS-CoV-2 testing and quarterly serology
- To date, fully vaccinated populations followed for ~130 days (~4 months) post-vaccination
- Assess neutralizing antibodies 6-months post-vaccination

VISION VE Network
- Multi-state network of 8 integrated care systems and research centers; assess COVID-19 confirmed by molecular assays and vaccination documented by EHR and registries
- Network assesses waning effectiveness using test-negative VE design

IVY VE Network
- Collaborative of hospital-based investigators, through 18 tertiary academic medical centers in 16 states
- Plans to assess duration of protection by adapting prior methods used for influenza

EHR=Electronic Health Registries
Timeline for additional data

**Summer:**
July-September

- **Manufacturer data**
  Safety and Immunogenicity of booster doses

- **Manufacturer data**
  Phase I/II/III follow-up

- **Mix-and-match studies**
  Heterologous prime-boost

**Early Fall:**
September-October

- **COVID-19 epi**
  Incidence of cases, hospitalizations, deaths

- **COVID-19 variants**
  Variant proportions, VE by variant

- **VE studies**
  VE by age, setting, time since vaccination

- **Breakthrough cases**
  Comparison of variants and clinical outcomes
### Timeline for additional data

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### ACIP meetings

Continue to provide updates. Vote could occur whenever data support updating policy.