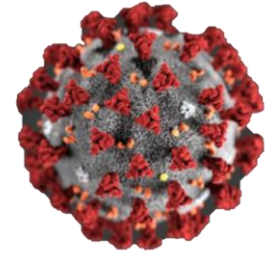


# New Hampshire Coronavirus Disease 2019 Weekly Partner Call



October 28, 2021

*Ben Chan  
Elizabeth Talbot  
Beth Daly  
Lindsay Pierce*

Thursday noon-time partner calls will focus on science, medical, and vaccine updates with time for Q&A

# Healthcare Provider & Public Health Partner Calls are Being **Re-Scheduled** (to Avoid Holidays)

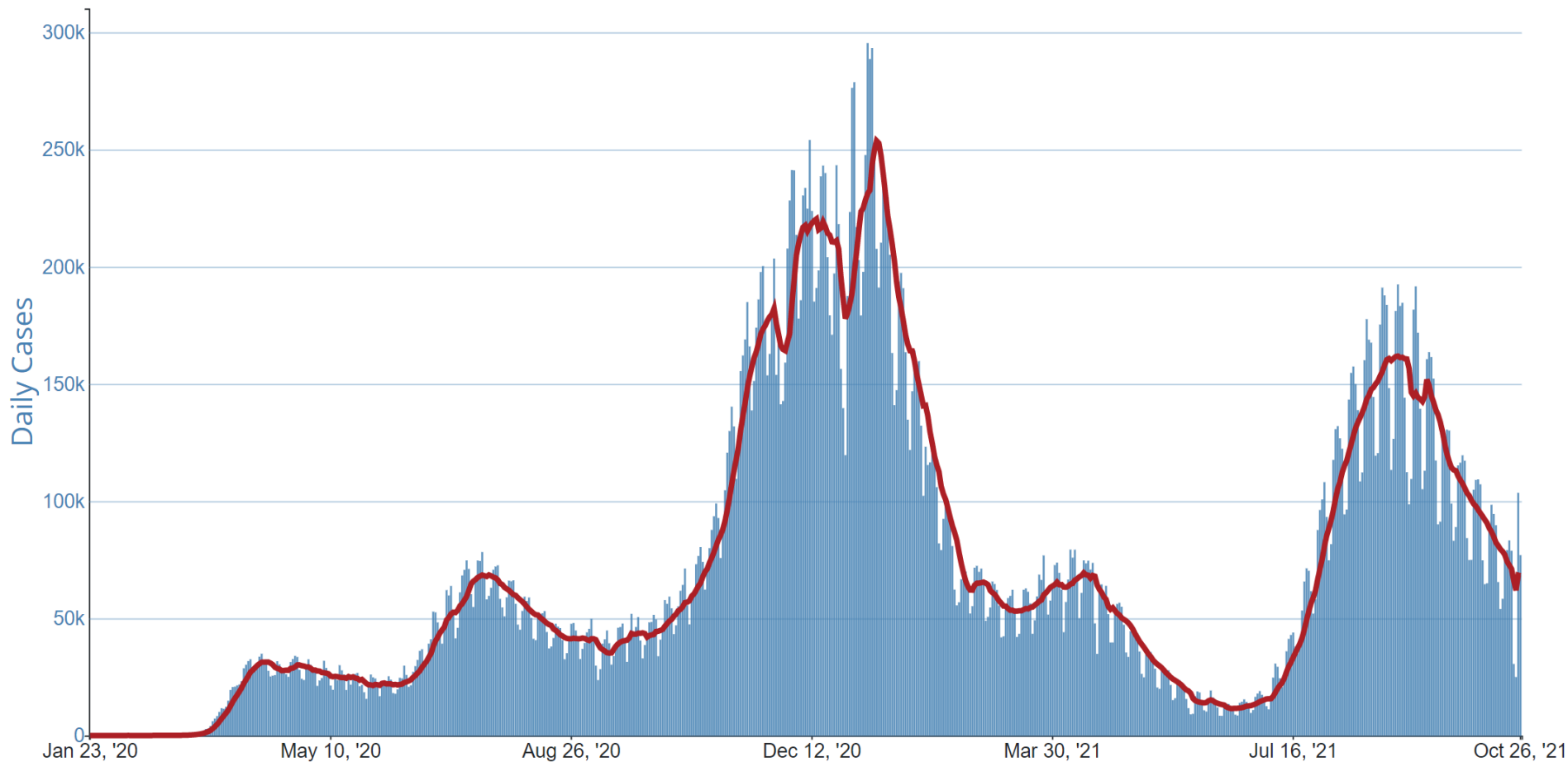
- Moving to the **1<sup>st</sup> and 3<sup>rd</sup> Thursday** of each month from 12:00-1:00 pm (Next call will be November 4<sup>th</sup>)
- Webinar/call information (stays the same):
  - Zoom link: <https://nh-dhhs.zoom.us/s/94059287404>
  - Webinar ID: 940 5928 7404
  - Passcode: 353809
  - Telephone: 646-558-8656

# Agenda

- Epidemiology Update
- CDC's Updated Recommendations for Use of COVID-19 Vaccines (Focus on Booster Doses)
- Heterologous Booster Dosing
- Questions & Answers (Q&A)

# Epidemiology Update

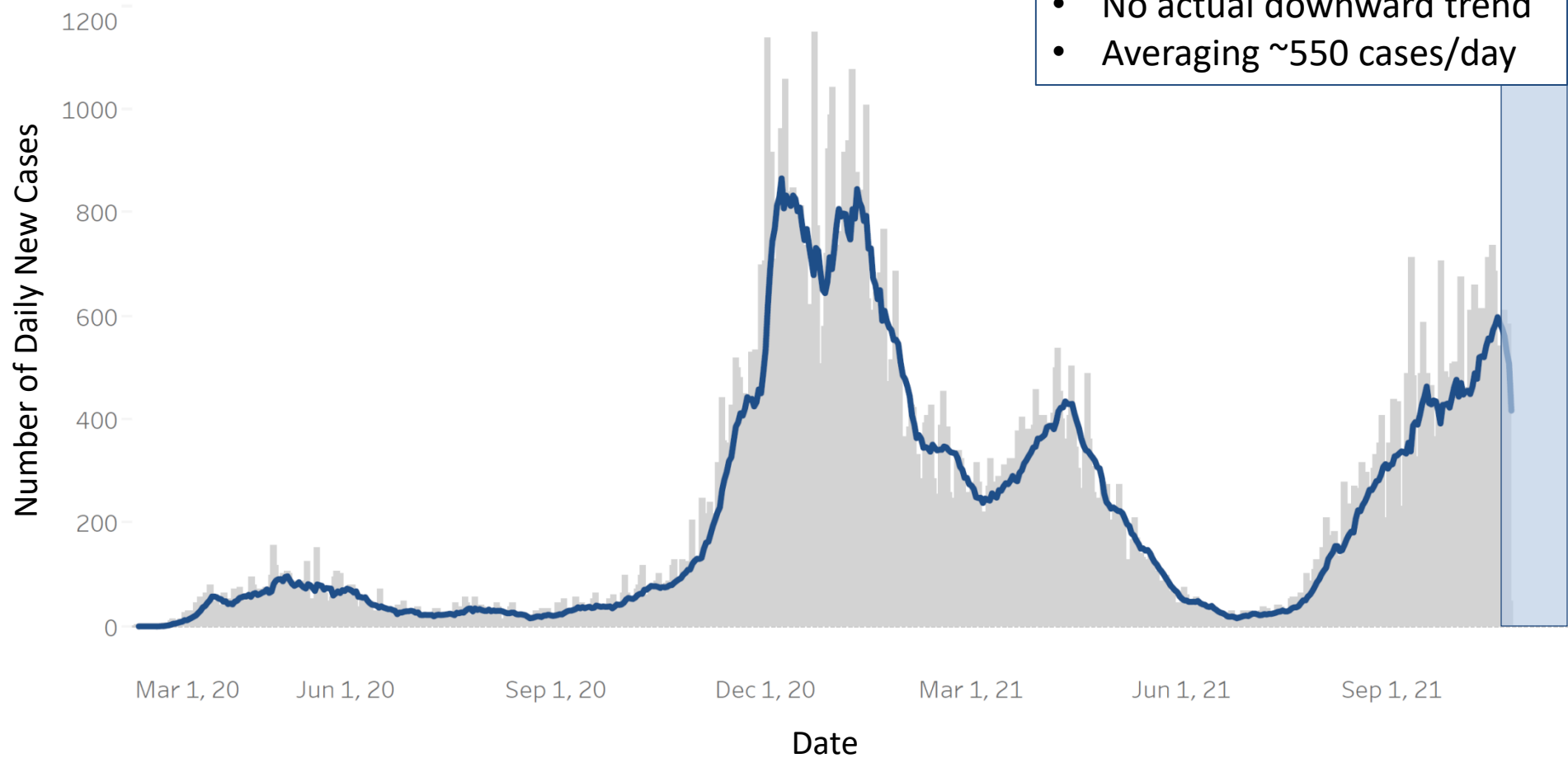
# U.S. National Daily Incidence of COVID-19



[https://covid.cdc.gov/covid-data-tracker/#trends\\_dailytrendscases](https://covid.cdc.gov/covid-data-tracker/#trends_dailytrendscases)

# Number of New COVID-19 Cases per Day in NH

- Data is incomplete
- No actual downward trend
- Averaging ~550 cases/day



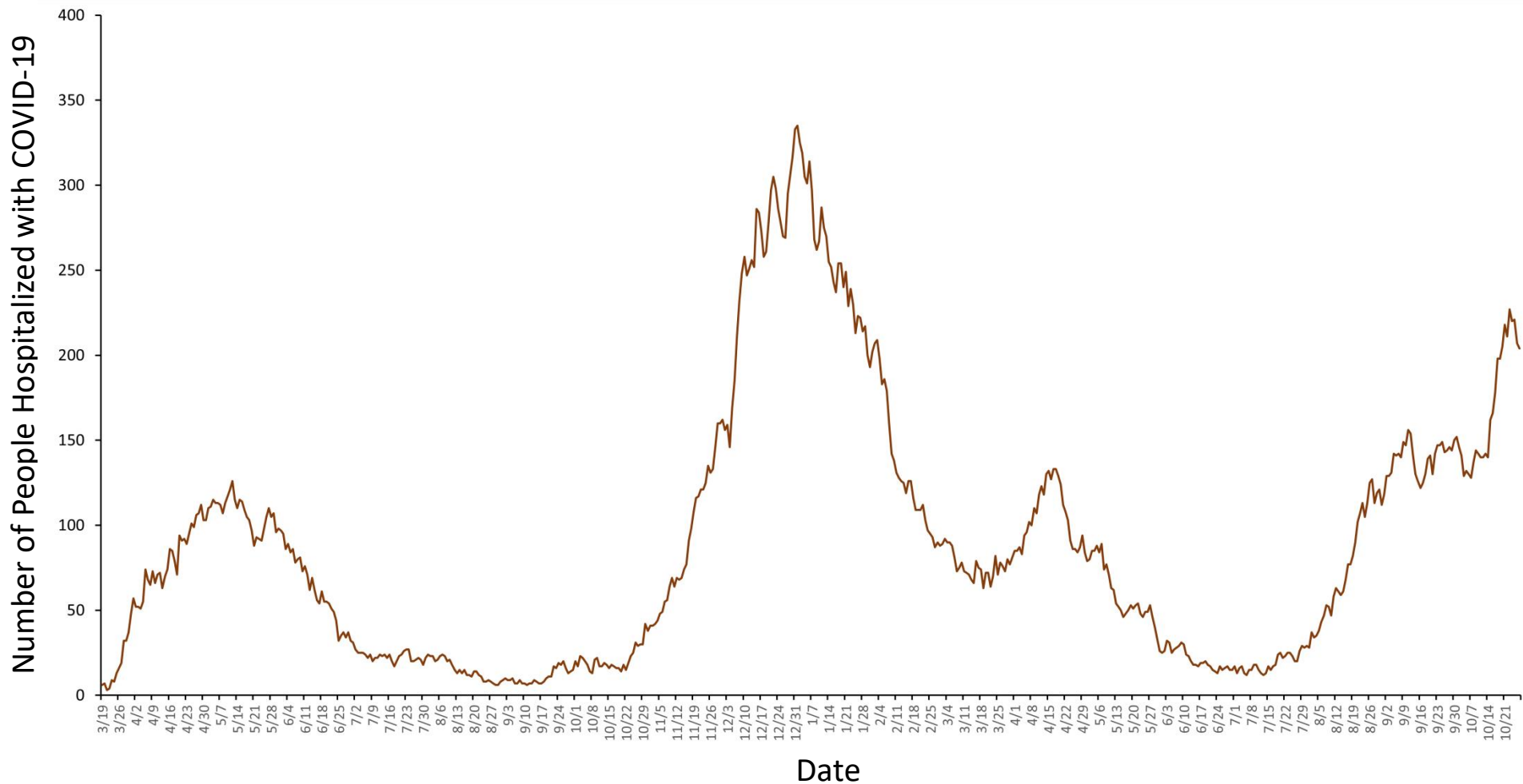
# % of Tests (Antigen and PCR) Positive for COVID-19 (7-Day Average)

- Data is incomplete
- No actual downward trend
- Test positivity is ~6%



Date Laboratory Test Completed

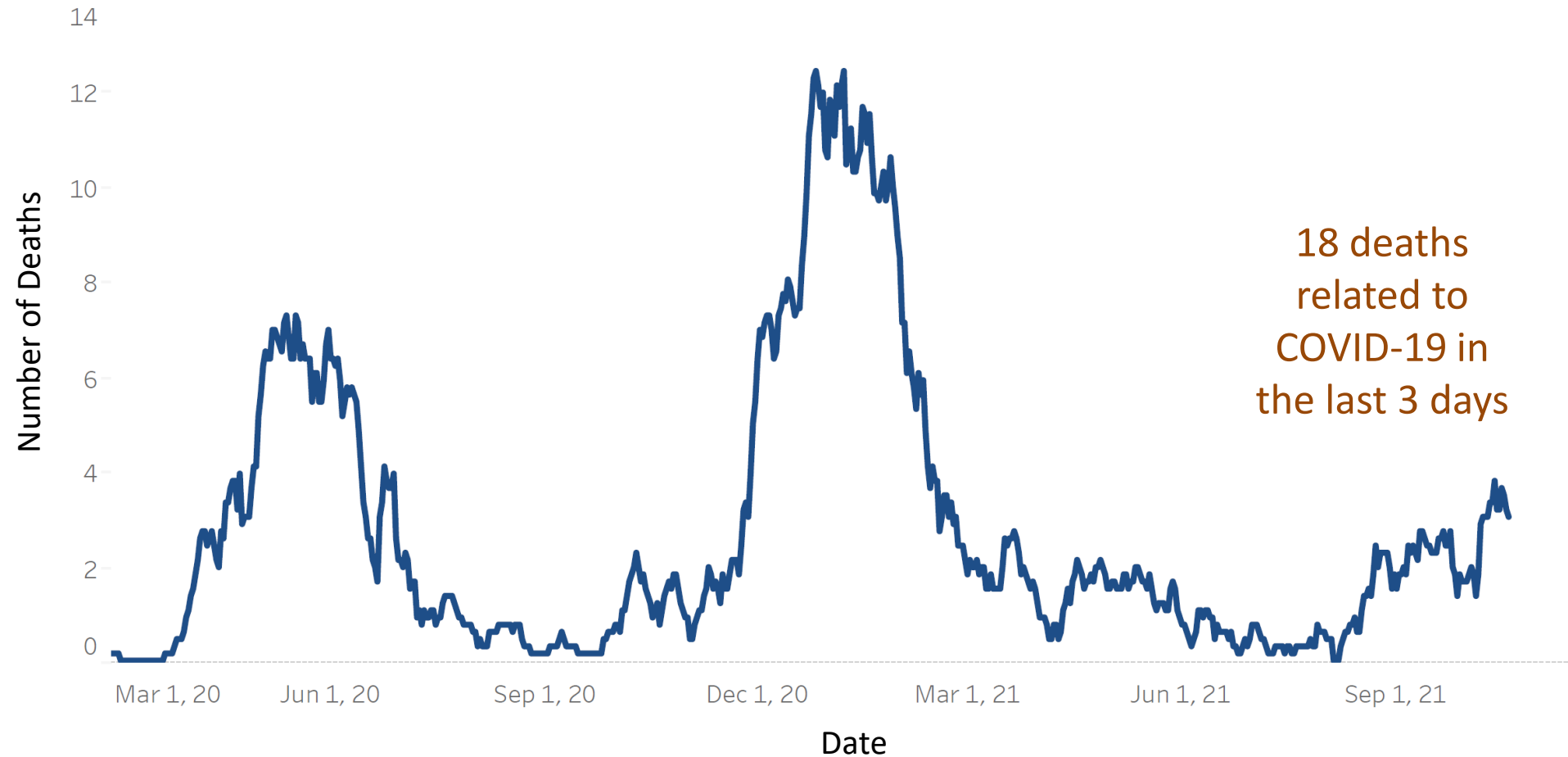
# Number of People Hospitalized with COVID-19 Each Day in NH (Hospital Census)



<https://www.nh.gov/covid19/dashboard/overview.htm#dash>



# Average Number of COVID-19 Deaths per Day in NH (Based on Date of Death)



# CDC's Updated Recommendations for Use of COVID-19 Vaccines (Booster Doses)

# Review the Following

- NH DPHS [COVID-19 HAN, Update #47](#) about COVID-19 vaccine booster dose recommendations
- CDC's [Interim Clinical Considerations for Use of COVID-19 Vaccines](#) (updated October 25<sup>th</sup>)

# Booster Dose Update: Key Points

- Any person 18+ years of age is now eligible for a booster dose as long as the person is either:
  - At least 6 months beyond completion of a primary COVID-19 vaccine series with the Pfizer-BioNTech or Moderna vaccine (including any 3<sup>rd</sup> dose administered because a person is moderate-severely immunocompromised)**OR**
  - At least 2 months beyond completion of the single-dose J&J/Janssen COVID-19 vaccine
- Heterologous (mix-and-match) dosing is now allowed – any of the COVID-19 vaccines can be used for a booster dose regardless of the vaccine product used for the primary series
- Recommendations on who should receive a booster dose and the timing of booster administration depends on the primary series

# Recommendations Based on Primary Series

- If a person completed their primary COVID-19 vaccine series with the Janssen vaccine, a booster dose is recommended starting at least **2 months** after receiving the single-dose Janssen vaccine (regardless of risk factors or underlying medical conditions)
- If a person completed their primary COVID-19 vaccine series with the Pfizer-BioNTech or Moderna vaccine, a booster dose is permitted or recommended (based on age and risk factors – see next slide) starting at least **6 months** after completing a primary mRNA COVID-19 vaccine series

# Recommendations for Persons Who Completed a Primary Series with the Pfizer-BioNTech or Moderna COVID-19 Vaccine

Persons who **should** receive a booster dose:

- 65 years of age or older
- 18 years of age or older who reside in a long-term care setting
- 50-64 years of age with certain [underlying medical conditions](#)

Persons who **may** receive a booster dose:

- 18-49 years of age with certain [underlying medical conditions](#)
- 18-64 years of age who are at [increased risk](#) for SARS-CoV-2 exposure and transmission because of an occupational or institutional setting

- The “**may** receive” recommendation is based on an individual’s own assessment of their risks/benefits from a booster
- Any of the following COVID-19 vaccines can be used as a booster: Pfizer-BioNTech, Moderna, or J&J/Janssen
- **The Moderna booster dose is a half-dose (50 mcg)**

# CDC's Summary Table of Vaccine Recommendations (Primary Series & Booster)

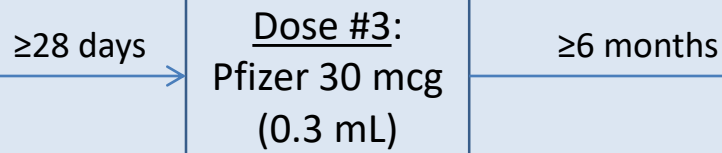
Vaccine	Primary series/dose				Booster dose	
	Dose (volume)	No. doses (interval)	Age (yrs)	Interval from primary to booster dose	Dose (volume)	Age (yrs)
<b>Pfizer-BioNTech</b>	30 µg (0.3 ml)	2 (21 days)	≥12	≥6 months	30 µg (0.3 ml)	≥18
<b>Moderna</b>	100 µg (0.5 ml)	2 (28 days)	≥18	≥6 months	<b>50 µg (0.25 ml)</b>	≥18
<b>Janssen</b>	5 × 10 <sup>10</sup> VP (0.5 ml)	1 (N/A)	≥18	≥2 months	5 × 10 <sup>10</sup> VP (0.5 ml)	≥18

- Table does not include recommendations for a 3<sup>rd</sup> additional mRNA vaccine dose for people who are moderate-severely immunocompromised
- Any of the COVID-19 vaccines (Pfizer-BioNTech, Moderna, Janssen) can be used for booster vaccination, regardless of the vaccine product used for primary vaccination

## Pfizer-BioNTech (“Pfizer”):

- Primary series: 12+ years
- 3<sup>rd</sup> additional dose: 12+ years
- Booster: 18+ years

### Moderate-Severely Immunocompromised



**Dose #1:**  
Pfizer 30 mcg  
(0.3 mL)

21 days

**Dose #2:**  
Pfizer 30 mcg  
(0.3 mL)

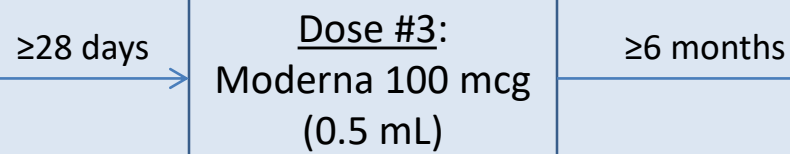
≥6 months

**Booster Dose (choose one):**  
Pfizer 30 mcg (0.3 mL)  
Moderna **50 mcg (0.25 mL)**  
Janssen  $5 \times 10^{10}$  vp (0.5 mL)

## Moderna (“Moderna”):

- Primary series: 18+ years
- 3<sup>rd</sup> additional dose: 18+ years
- Booster: 18+ years

### Moderate-Severely Immunocompromised



**Dose #1:**  
Moderna 100 mcg  
(0.5 mL)

28 days

**Dose #2:**  
Moderna 100 mcg  
(0.5 mL)

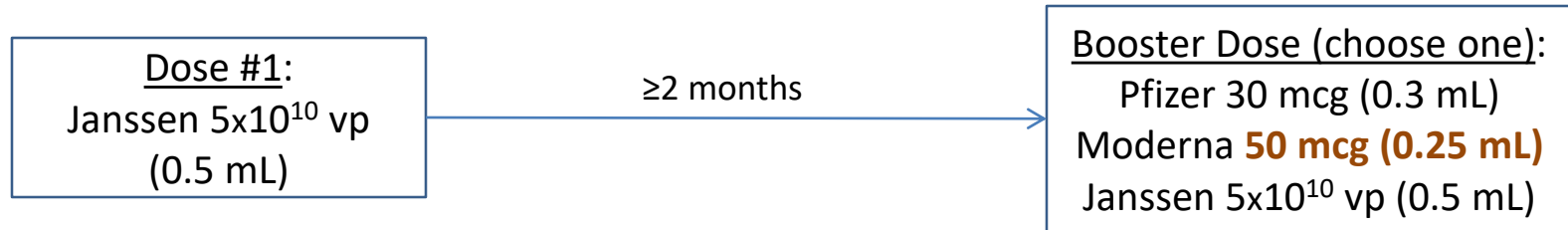
≥6 months

**Booster Dose (choose one):**  
Pfizer 30 mcg (0.3 mL)  
Moderna **50 mcg (0.25 mL)**  
Janssen  $5 \times 10^{10}$  vp (0.5 mL)



## Johnson & Johnson/Janssen (“J&J/Janssen”):

- Primary “series” (single dose): 18+ years
- Additional dose for moderate-severely immunocompromised: N/A
- Booster: 18+ years



For persons who completed their primary vaccine series with the single-dose Janssen vaccine, studies are showing higher antibody boosting when the Pfizer or Moderna vaccines are used for a booster...

# Heterologous Booster Dosing

# Mixing Vaccine Presentations

---

Are heterologous prime-boost schedules safe and effective?

# Heterologous vs Homologous Boosters

- Would ease logistical problems inherent in vaccine programs
- May induce enhanced or more durable immune response

# CDC Oct 21 2021

- The same product that was used for the primary regimen should be used for the booster
  - If that is not available or another product is preferred, heterologous boosting with a single dose of any of the authorized COVID-19 vaccine boosters is acceptable
- Heterologous dosing may be considered for the booster dose only
  - All doses of the primary series and additional dose (if indicated for moderately to severely immunocompromised people who received 2 doses of mRNA vaccine) should utilize the same vaccine product
- Individual benefit-risk assessment may inform which booster product to use
  - Availability of booster product
  - Risk profile of vaccine boosters, including rare events

# Additional Detailing Re Interval

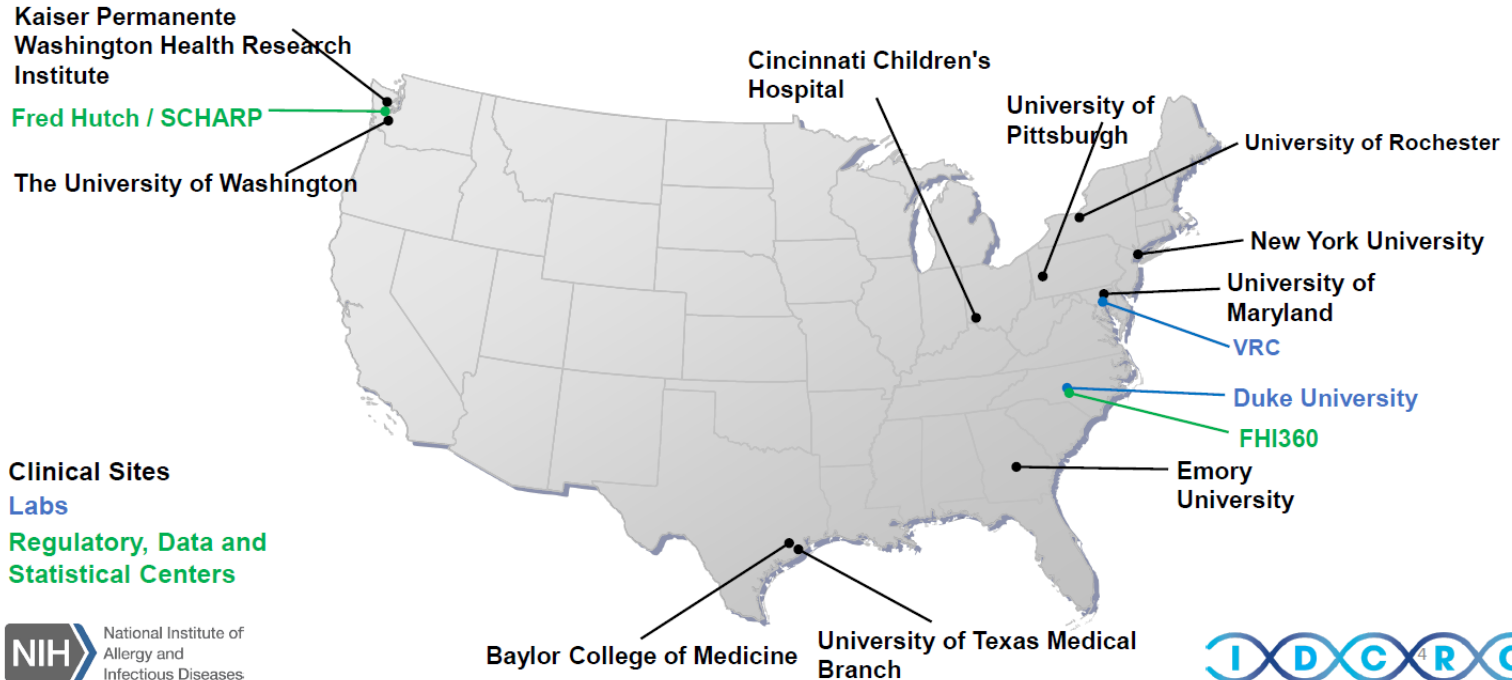
- Interval should follow the interval recommended by the primary series
  - People who received a single dose Janssen primary series can receive a mRNA COVID-19 booster dose at least 2 months after completing primary series
  - If Moderna vaccine booster is used, the booster dose and volume should be utilized (50µg in 0.25ml)

Vaccine	Primary series/dose			Additional dose in immunocompromised <sup>+</sup>			Booster dose <sup>+</sup>		
	Dose (volume)	N doses (interval)	Age (y)	Dose (volume)	N doses (interval since primary series)	Age (y)	Dose (volume)	N doses (interval since primary series <sup>‡</sup> )	Age (y)
<b>Pfizer-BioNTech</b>	30 µg (0.3 ml)	2 (21 d)	≥12	30 µg (0.3 ml)	1 (≥28 d)	≥12	30 µg (0.3 ml)	1 (≥6 m)	≥18 <sup>§</sup>
<b>Moderna</b>	100 µg (0.5 ml)	2 (28 d)	≥18	100 µg (0.5 ml)	1 (≥28 d)	≥18	50 µg (0.25 ml)	1 (≥6 m)	≥18 <sup>§</sup>
<b>Janssen</b>	5 × 10 <sup>10</sup> VP (0.5 ml)	1 (N/A)	≥18	(see booster dose)			5 × 10 <sup>10</sup> VP (0.5 ml)	1 (≥2 m)	≥18

# VRBBPAC Oct 14-15










## The "Mix and Match" Study Team

Co-Chairs: *Kirsten E. Lyke, MD and Robert L. Atmar, MD*



# Design

- Phase 1/2 volunteers  $\geq 18$ y received EUA approved vaccine as booster (Moderna at 100ug dose) at least 12w after primary
- Studied safety, immunogenicity and reactogenicity

		Group	Sample Size*	EUA Vaccine	Interval (weeks)	Delayed Booster Vaccination	Strategy Tested
Booster Vaccination	Moderna (100 mcg)	1	50	Previously dosed Janssen – Ad26.COVID-S	$\geq 12$	Moderna- mRNA-1273	 Same Strain Heterologous platform
		2	50	Previously dosed Moderna – mRNA-1273	$\geq 12$	Moderna- mRNA-1273	 Control - Same Strain & platform
		3	50	Previously dosed Pfizer/BioNTech – BNT162b2	$\geq 12$	Moderna- mRNA-1273	 Same Strain Similar platform
	Janssen (5x10 <sup>10</sup> vp)	4	50	Previously dosed Janssen – Ad26.COVID-S	$\geq 12$	Janssen – Ad26.COVID.S	 Control - Same Strain & platform
		5	50	Previously dosed Moderna – mRNA-1273	$\geq 12$	Janssen – Ad26.COVID.S	 Same Strain Heterologous platform
		6	50	Previously dosed Pfizer/BioNTech – BNT162b2	$\geq 12$	Janssen – Ad26.COVID.S	 Same Strain Heterologous platform
	Pfizer (30 mcg)	7	50	Previously dosed Janssen – Ad26.COVID-S	$\geq 12$	Pfizer/BioNTech – BNT162b2	 Same Strain Heterologous platform
		8	50	Previously dosed Moderna – mRNA-1273	$\geq 12$	Pfizer/BioNTech- BNT162b2	 Same Strain Similar platform
		9	50	Previously dosed Pfizer/BioNTech – BNT162b2	$\geq 12$	Pfizer/BioNTech – BNT162b2	 Control - Same Strain & platform

Study Visits: Days 1, 8 (call), 15, 29, Months 3, 6, 12



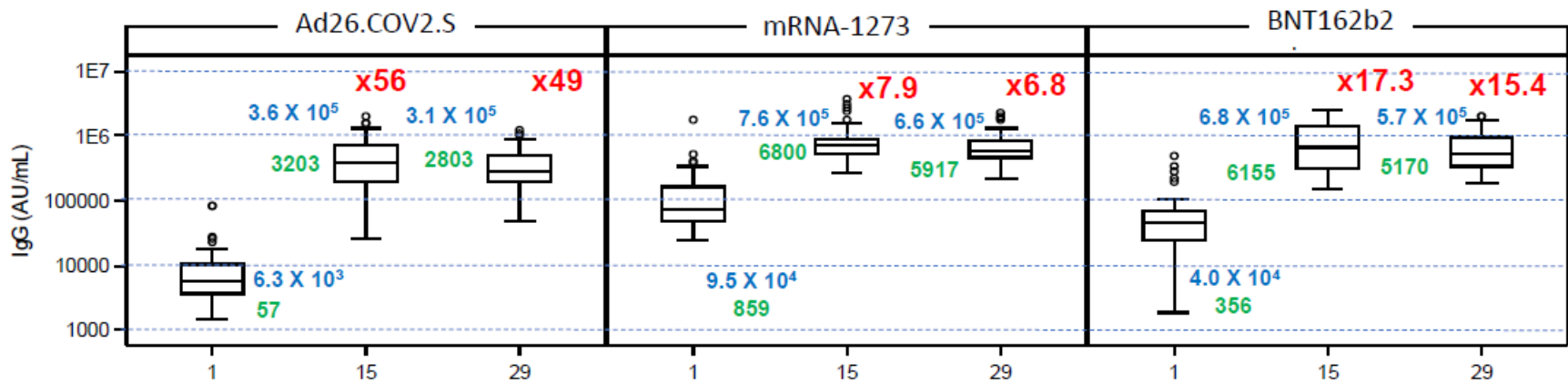
# N=458

**Table 1. Characteristics of the Participants at Enrollment**

Group	1	2	3	4	5	6	7	8	9
<b>Primary EUA Immunization Vaccine</b>	Janssen Ad26.COVS-2 5x10 <sup>10</sup> vp	Moderna mRNA-1273 100-mcg	Pfizer/BioNTech BNT162b2 30-mcg	Janssen Ad26.COVS-2 5x10 <sup>10</sup> vp	Moderna mRNA-1273 100-mcg	Pfizer/BioNTech BNT162b2 30-mcg	Janssen Ad26.COVS-2 5x10 <sup>10</sup> vp	Moderna mRNA-1273 100-mcg	Pfizer/BioNTech BNT162b2 30-mcg
<b>Booster</b>	Moderna mRNA-1273 100-mcg			Janssen Ad26.COVS-2 5x10 <sup>10</sup> vp			Pfizer/BioNTech BNT162b2 30-mcg		
<b>Total Number</b>	53	51	50	50	49	51	53	51	50
<b>Sex – no. (%)</b>									
Female	26 (49.1)	32 (62.7)	29 (58.0)	27 (46.0)	16 (32.7)	23 (45.1)	29 (54.7)	26 (51.0)	23 (46.0)
Male	27 (50.9)	19 (37.3)	21 (42.0)	23 (54.0)	33 (67.3)	28 (54.9)	24 (45.3)	25 (49.0)	27 (54.0)
<b>Age – years</b>									
Mean (s.d.)	56.8 (14.5)	53.1 (16.2)	54.8 (17.4)	50.1 (13.9)	49.9 (16.8)	50.3 (15.4)	47.7 (14.5)	54.3 (16.8)	50.4 (17.9)
Range	24-81	24-76	22-85	24-77	20-75	20-76	22-74	23-75	19-80
<b>Race – no. (%)</b>									
Asian	4 (7.5)	5 (9.8)	4 (8.0)	3 (6.0)	5 (10.2)	6 (11.8)	1 (1.9)	2 (3.9)	1 (2.0)
Hawaiian or Pacific Islander	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.9)	0 (0.0)	0 (0.0)
Black/African American	1 (1.9)	2 (3.9)	3 (6.0)	0 (0.0)	0 (0.0)	2 (3.9)	0 (0.0)	2 (3.9)	1 (2.0)
White	46 (86.8)	41 (80.4)	43 (86.0)	44 (88.0)	43 (87.8)	40 (78.4)	50 (94.3)	47 (92.2)	43 (86.0)
Multi-racial	1 (1.9)	3 (5.9)	0 (0.0)	3 (6.0)	1 (2.0)	2 (3.9)	1 (1.9)	0 (0.0)	4 (8.0)
Other	1 (1.9%)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.0%)	0 (0.0)	0 (0.0)	1 (2.0%)
<b>Ethnicity – no (%)</b>									
Non-Hispanic	49 (92.5)	46 (90.2)	47 (94.0)	47 (94.0)	49 (100.0)	48 (94.1)	51 (96.2)	49 (96.1)	45 (90.0)
Hispanic/Latino	4 (7.5)	4 (7.8)	3 (6.0)	2 (4.0)	0 (0.0)	3 (5.9)	2 (3.8)	2 (3.9)	5 (10.0)
Unknown/Not reported	0 (0.0)	1 (2.0)	0 (0.0)	1 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
<b>Boost Interval weeks</b>									
Mean (s.d.)	13.7 (1.0)	16.4 (1.9)	16.8 (2.2)	17.7 (2.0)	19.3 (4.2)	20.6 (5.8)	19.9 (2.5)	22.9 (4.6)	24.1 (5.2)
Range	12.0-15.9	12.4-20.0	12.0-20.9	13.9-21.0	12.6-26.0	12.3-41.3	10.9-23.0	12.6-28.7	14.3-31.9

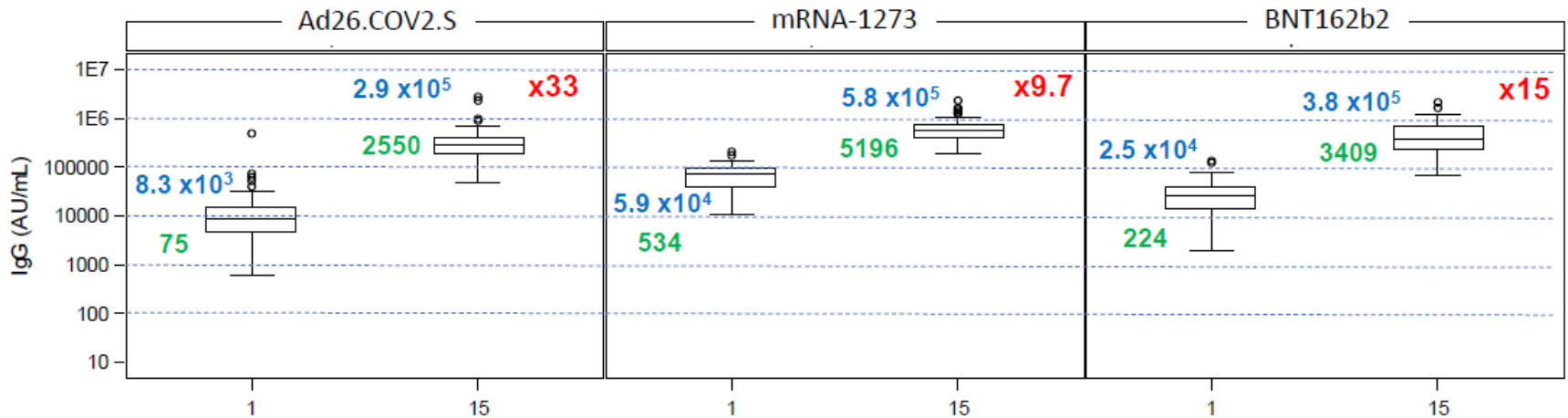


# Moderna As Booster: IgG



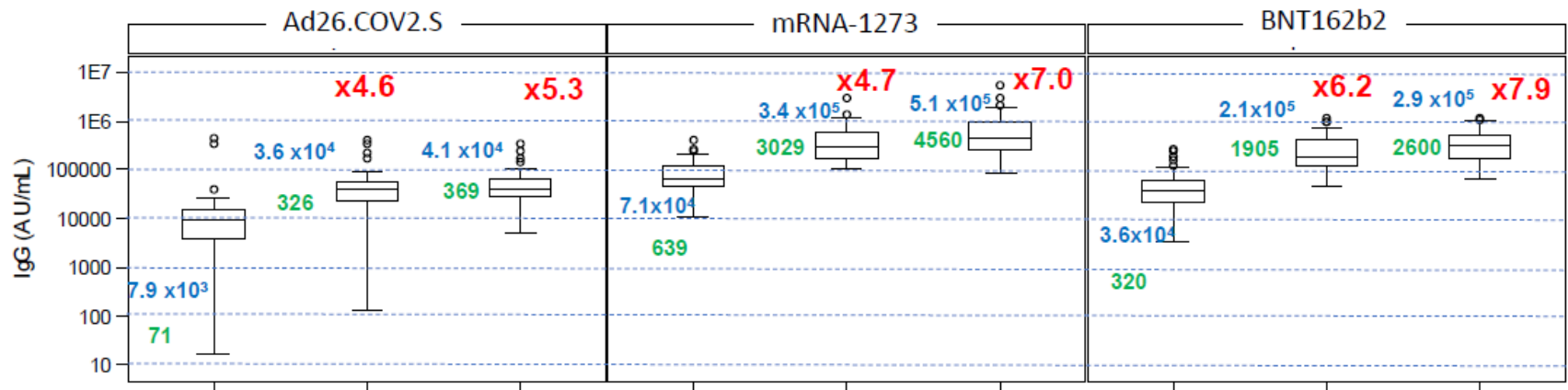
Appeared similar in age groups 18-55 and 56+  
 NA Ab to Spike D614G showed similar patterns

# Pfizer As Booster: IgG



Appeared similar in age groups 18-55 and 56+  
NA Ab to Spike D614G showed similar patterns

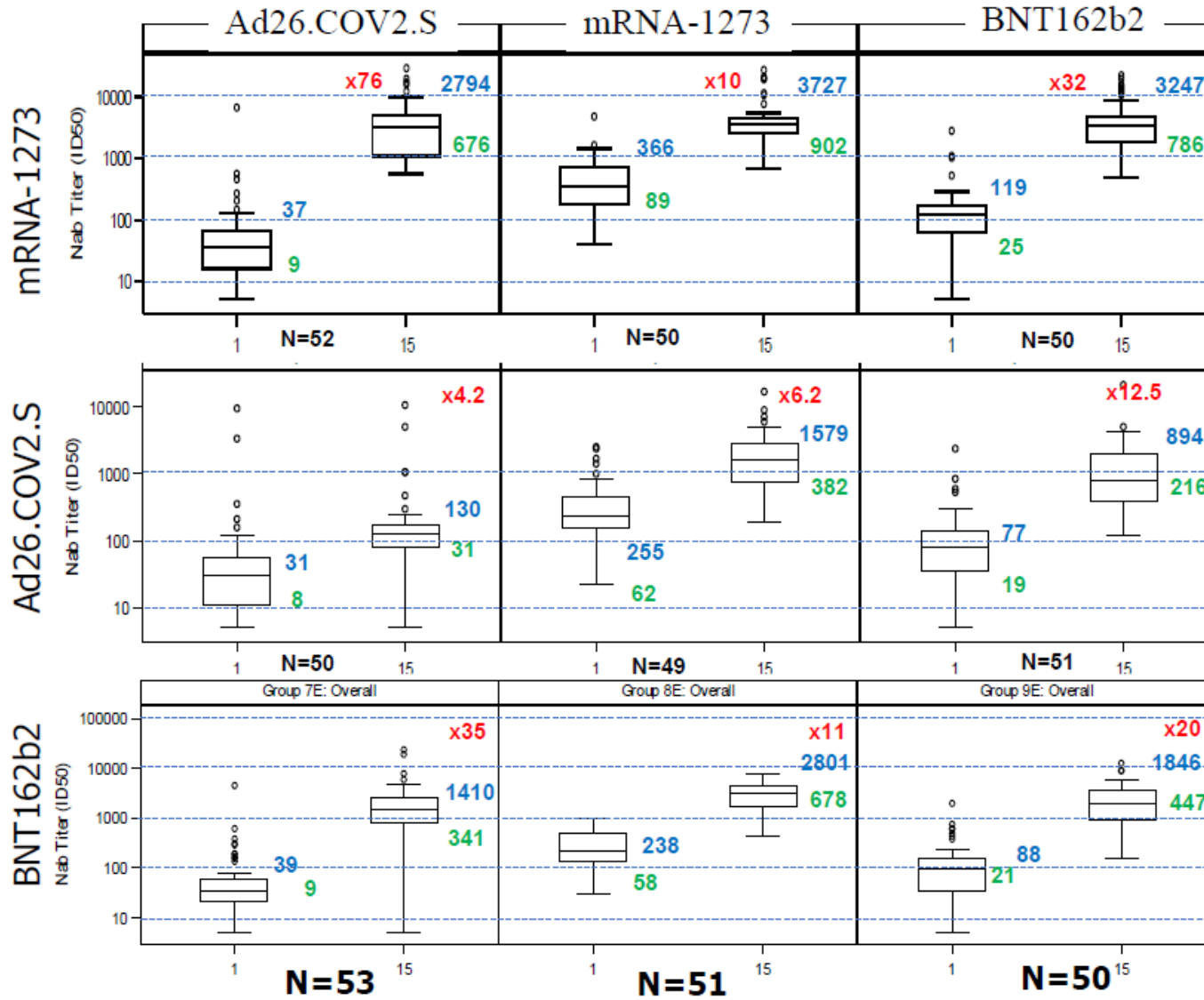
# Janssen As Booster: IgG



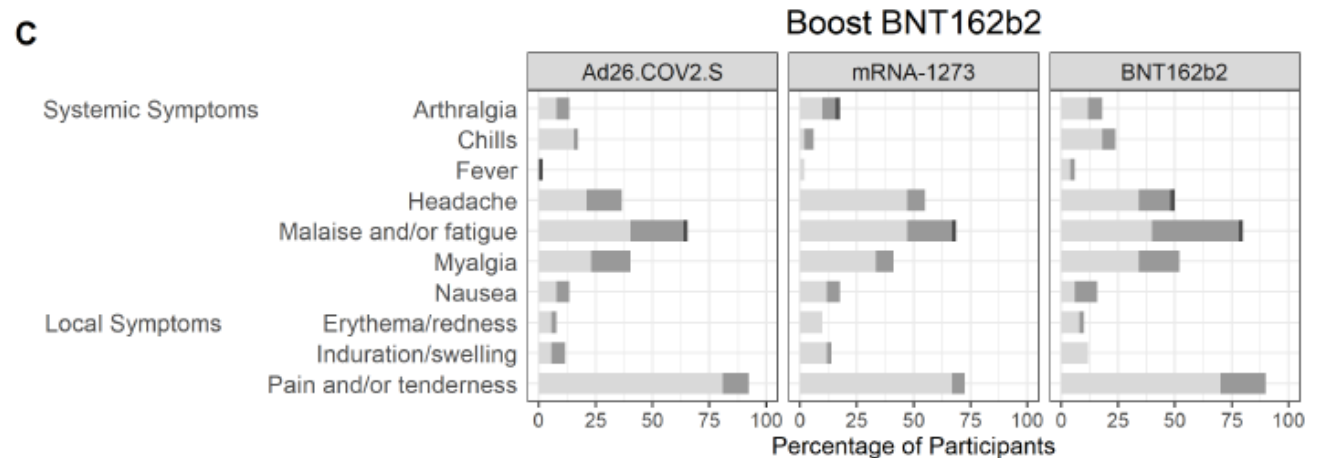
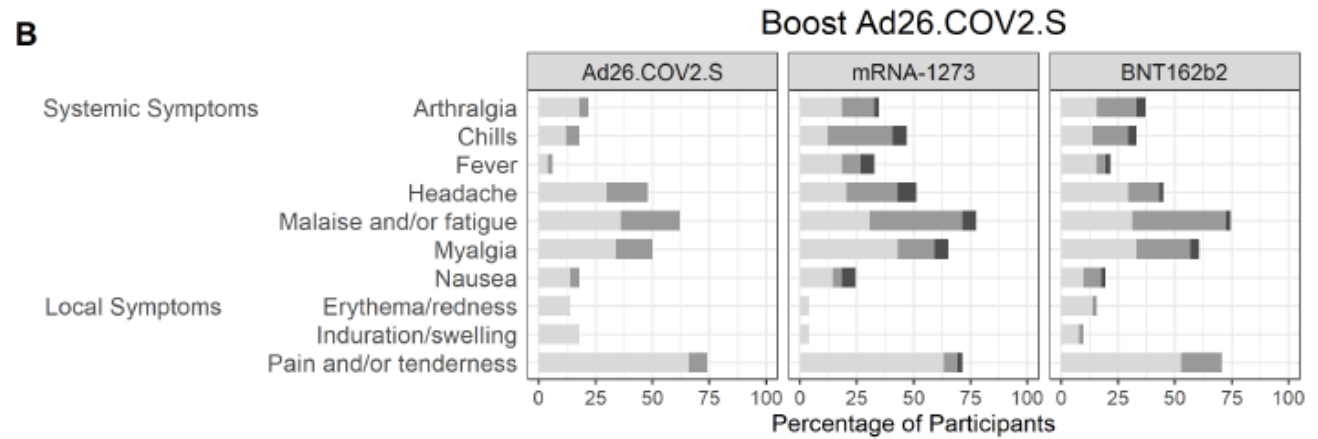
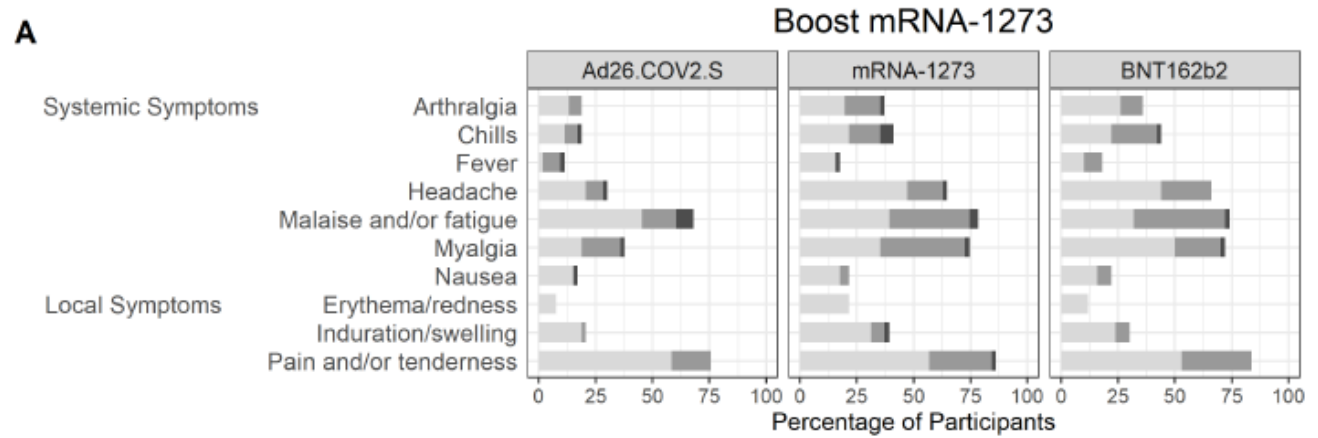
Appeared similar in age groups 18-55 and 56+

# Booster Vaccination

## EUA Primary Vaccination(s)



# Solicited Adverse Reactions At D8



Maximum Severity Grade: Mild Moderate Severe

# Safety

## Unsolicited AEs (deemed related to boost) of any severity grade

- mRNA-1273: 24/154 (15.6%)
- Ad26.COVS.S: 18/150 (12.0%)
- BNT162b2: 22/154 (14.3%)

Most related AEs were Grade 1 or 2 severity

## Four related Grade 3 AEs:

- Vomiting in one participant - mRNA-1273 booster group
- Vomiting in one participant - Ad26.COVS.S booster group
- Fatigue in one participant - Ad26.COVS.S booster group
- Insomnia in one participant - Ad26.COVS.S booster group

# Limitations

- Non-randomized, open label design
- Study not designed to compare between boosts
  - Didn't control for intervals between primary vaccine and boosts
- Correlates of protection are not completely elucidated.
- Correlates for severe disease and death are even less well understood.
- This is only antibody data.
  - Cellular immune responses are still being analyzed
- These data represent only early timepoints from the trial
  - Vaccines may differ in time to reach peak responses, and may have different durability of the responses
- Healthy volunteers, short follow up
- Used 100ug Moderna boost dose



# Conclusions

1. Use of mRNA-1273, Ad26.COVS and BNT162b2 as booster vaccines led to anamnestic serologic responses in all 3 EUA-dose vaccine groups
2. For a given primary EUA Covid-19 vaccine, heterologous boosts elicited similar or higher serologic responses as compared to their respective homologous booster responses
3. mRNA vaccines resulted in higher antibody titers in the first 28 days after the boost
4. No safety concerns identified

If you got Janssen, 15 days after boost with:

- Moderna increased Ab levels 76-fold in 15d following
- Pfizer increased Ab levels 35-fold in 15d following
- Janssen raised antibody levels 4-fold in 15d following

# Singapore Study of Heterologous Boost

medRxiv

THE PREPRINT SERVER FOR HEALTH SCIENCES



Cold  
Spring  
Harbor  
Laboratory




BMJ Yale

HOME | AE

Search

[Comment on this paper](#)

## Differential immunogenicity of homologous versus heterologous boost in Ad26.COV2.S vaccine recipients

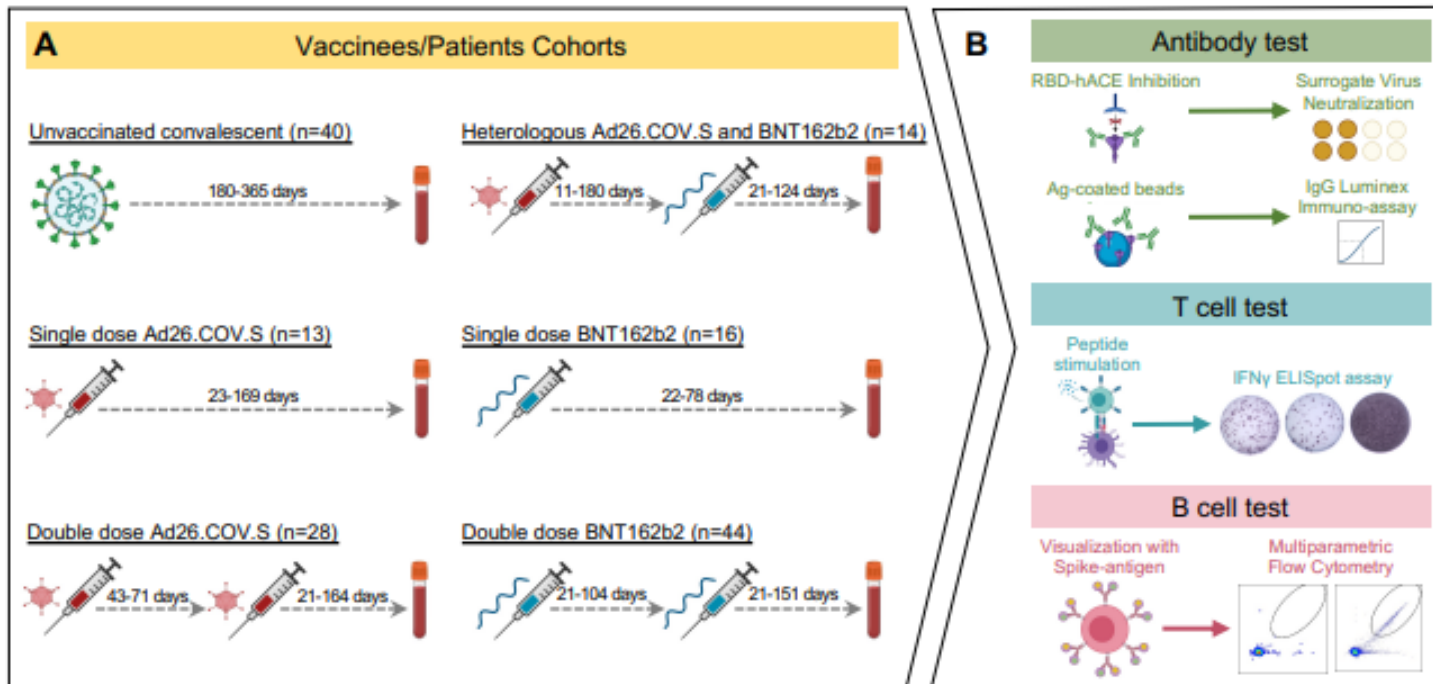
Nicholas Khoo Kim Huat, Joey Ming Er Lim, Upkar S. Gill, Ruklanthi de Alwis, Nicole Tan, Justin Zhen Nan Toh, Jane E. Abbott, Carla Usai,  Eng Eong Ooi, Jenny Guek Hong Low,  Nina Le Bert, Patrick T. F. Kennedy,  Antonio Bertoletti

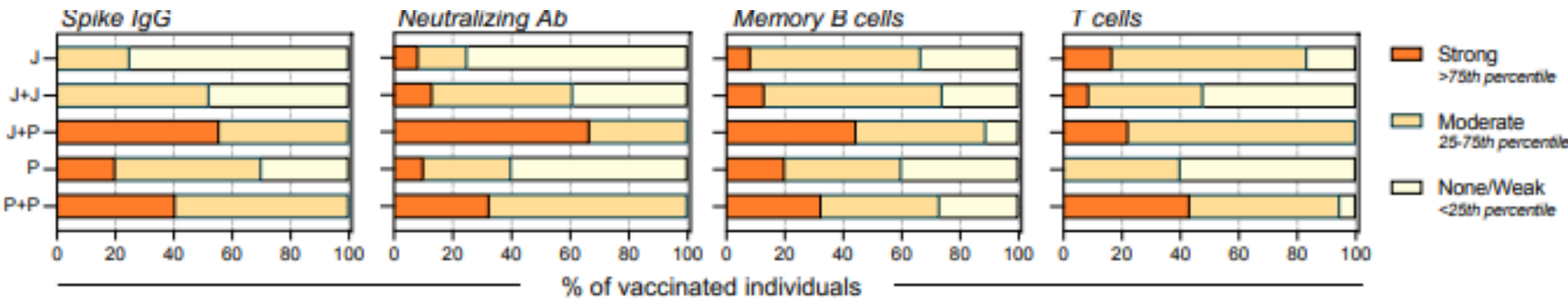
doi: <https://doi.org/10.1101/2021.10.14.21264981>

**This article is a preprint and has not been peer-reviewed [what does this mean?]. It reports new medical research that has yet to be evaluated and so should not be used to guide clinical practice.**

# Small Singapore Study

- Strategy of boosting Ad26.COVS with heterologous was superior to homologous





## Cov-Boost Heterologous Booster Study

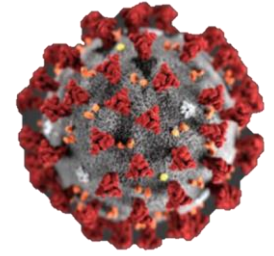
- UK study at 18 sites to inform UK's booster program
  - 7 vaccines as booster doses for people  $\geq 30$ yo who are already fully vaccinated with 2 doses of different authorized vaccine
    - AztraZeneca, Pfizer, Moderna, Novavax, Valneva, Curevac, Janssen plus control formulation
- May 19 began enrolling
  - Initial safety and immunologic results September
  - Follow up 1y

# Q&A

# Healthcare Provider & Public Health Partner Calls are Being **Re-Scheduled** (to Avoid Holidays)

- Moving to the **1<sup>st</sup> and 3<sup>rd</sup> Thursday** of each month from 12:00-1:00 pm (Next call will be November 4<sup>th</sup>)
- Webinar/call information (stays the same):
  - Zoom link: <https://nh-dhhs.zoom.us/s/94059287404>
  - Webinar ID: 940 5928 7404
  - Passcode: 353809
  - Telephone: 646-558-8656

# New Hampshire Coronavirus Disease 2019 Weekly Partner Call



October 28, 2021

*Ben Chan  
Elizabeth Talbot  
Beth Daly  
Lindsay Pierce*

Thursday noon-time partner calls will focus on science, medical, and vaccine updates with time for Q&A