Pediatric COVID-19 Vaccination Update

Indian Country COVID-19 ECHO Presentation

June 15, 2022

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Objectives for Today's Presentation

1) Become familiar with new request by Moderna for EUA for vaccine for children 6 mo through 17 years old
2) Become familiar with new request by Pfizer-BioNTech for EUA for vaccine for children 6 mo through 4 years old

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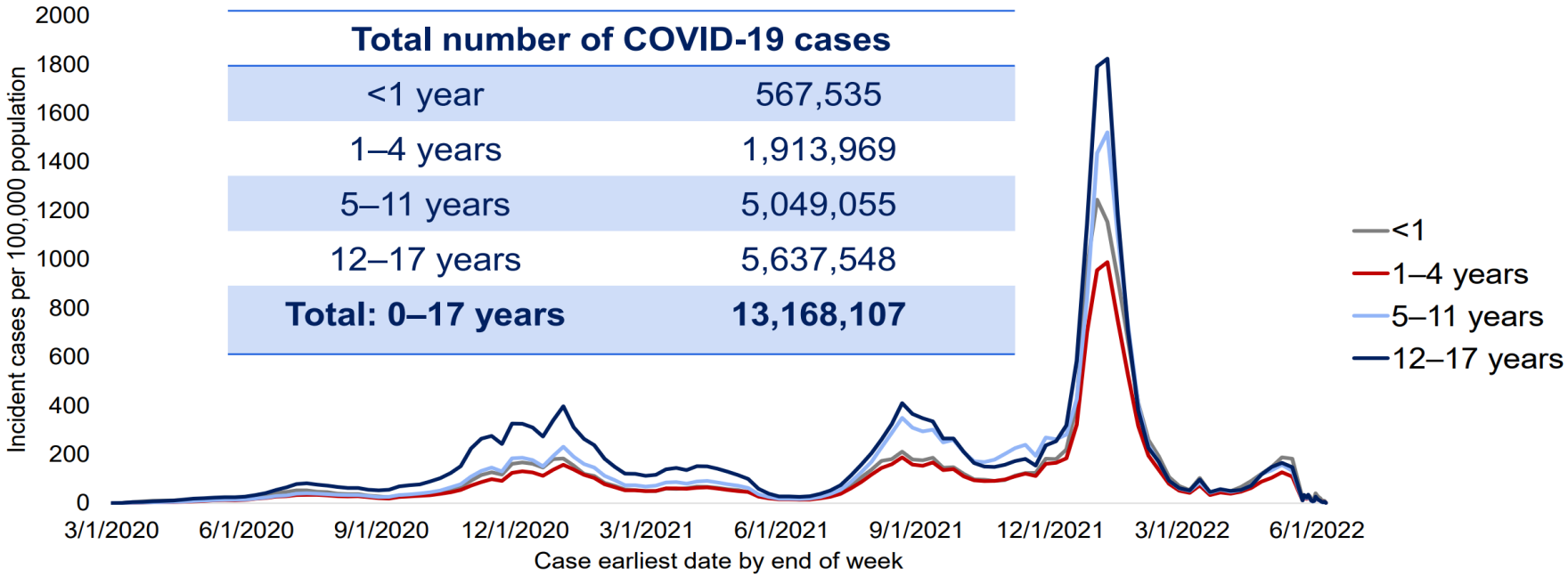
Epidemiology of COVID-19 in Children

COVID-19 weekly cases per 100,000 population among children ages 0–17 years by age group — United States

March 1, 2020–June 7, 2022

Total number of COVID-19 cases	
<1 year	567,535
1–4 years	1,913,969
5–11 years	5,049,055
12–17 years	5,637,548
Total: 0–17 years	**13,168,107**



Source: COVID Data Tracker, https://covid.cdc.gov/covid-data-tracker/#demographicsovertime. Accessed June 8, 2022

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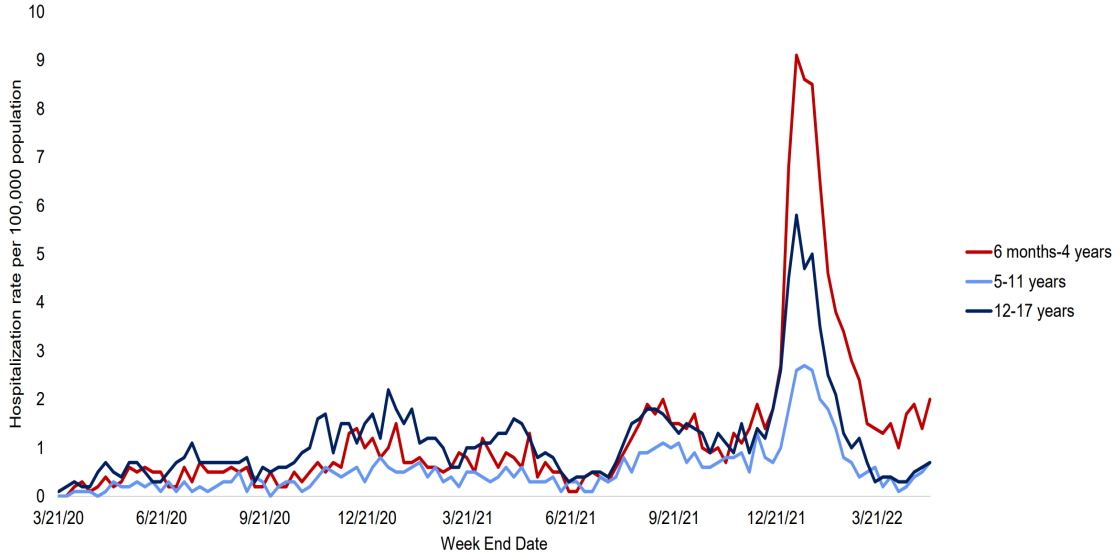
Epidemiology of COVID-19 in Children

COVID-19-associated hospitalizations among children and adolescents 6 months–17 years, COVID-NET

March 2020 – March 2022



Source: COVID-NET, https://gis.cdc.gov/grasp/COVIDNet/COVID19_3.html. Accessed May 21, 2022.

- 17.5% of reported cases

Usually mild, BUT

- 8396 hospitalizations
- 1524 deaths
- About half of hospitalized patients have no known risk factors

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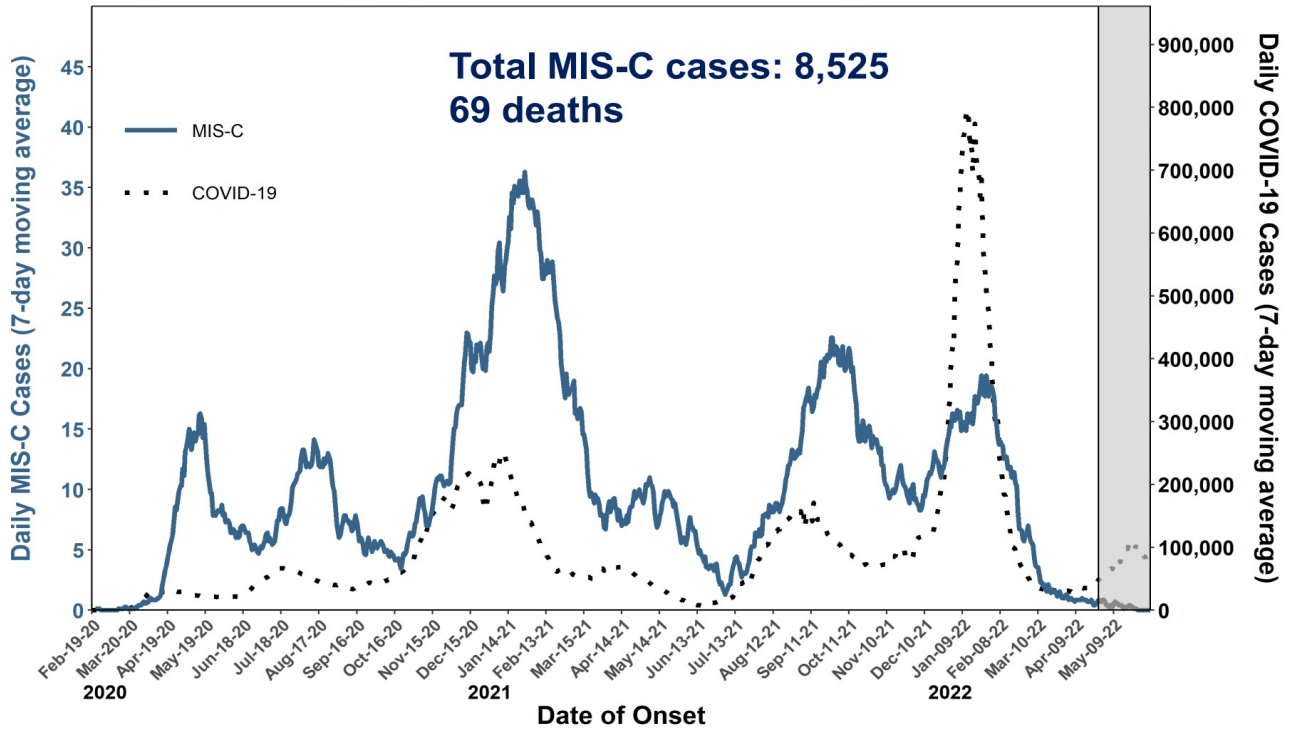
Multisystem Inflammatory Syndrome in Children (MIS-C)

Daily MIS-C and COVID-19 cases reported to CDC (7-day moving average), onset February 19, 2020–May 21, 2022



MIS-C cases are among individuals ages <21 years. COVID-19 cases reflect all cases reported to CDC (among individuals of all ages). The grayed-out area on the right side of the figure represents the most recent 6 weeks of data, for which reporting of MIS-C cases is still incomplete. Date of onset was missing for 1 of the 8,525 cases.

https://covid.cdc.gov/covid-data-tracker/#mis-national-surveillance. Accessed June 7, 2022.

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Epidemiology of COVID-19 in Children

COVID-19 is a leading cause of death among children and adolescents ages 1–19 years

March 1, 2020–April 30, 2022

Age group	Rank of COVID-19 among causes of death
1–4 years	5
5–9 years	5
10–14 years	4
15–19 years	4

Based on death certificate data from the National Center for Health Statistics. COVID-19 based on cumulative total incidence of COVID-19 deaths from March 1, 2020-April 30, 2022.
Source: Flaxman S, Whittaker C, Semenova E et al. Covid-19 is a leading cause of death in children and young people ages 0-19 years in the United States. medRxiv 2022.05.23.22275458; doi: https://doi.org/10.1101/2022.05.23.22275458

Moderna COVID-19 Vaccine for Children

- EUA for Moderna's COVID-19 vaccine granted December 2020 for 18 years of age and older
- Fully licensed for use in 18+ in January 2022
- Conducted 2 clinical trials in pediatric age group:
- US and Canada, ~14,000 subjects, mostly white (65 to 84%)
  - 12 through 17 years old (June 9, 2021; updated May 9, 2022)
  - 6 months through 11 years
    - 6 – 11 year olds (March 8, 2022; updated May 4, 2022)
    - 2 – 5 year olds (April 18, 2022)
    - 6 mo – 23 months old (April 18, 2022)

Vaccines and Related Biological Products Advisory Committee June 14-15, 2022 Meeting Briefing Document- FDA- COVID19 Moderna Vaccine For Use in Pediatrics

Moderna Trial Results

- Vaccine Efficacy inferred by immunobridging
- Compared neutralizing antibody levels to comparable group of young adults from adult trial (18 – 25 yr old)
- All groups met goals for antibody levels
- Seroresponse was 98 – 99% in 4 age groups
- Also calculated traditional vaccine efficacy for prevention of COVID-19 infection 14 days after 2nd dose

Moderna Trial Results

Age Group	Number of participants, Dose (Vaccine / Placebo)	Calculated VE [95% Confidence Interval]	Predominant Variant
12 – 17 yrs	3726 (2486 / 1240) 100 mcg	93% [48 – 99%]	Original Strain and Alpha
6 – 11 yrs	4002 (3007 / 995) 50 mcg	77% [-37 – 97%]	Delta
2 – 5 yrs	4038 (3031 / 1007) 25 mcg	37% [13 – 54%]	Omicron
6 – 23 months	2350 (1761 / 589) 25 mcg	51% [21 – 69%]	Omicron

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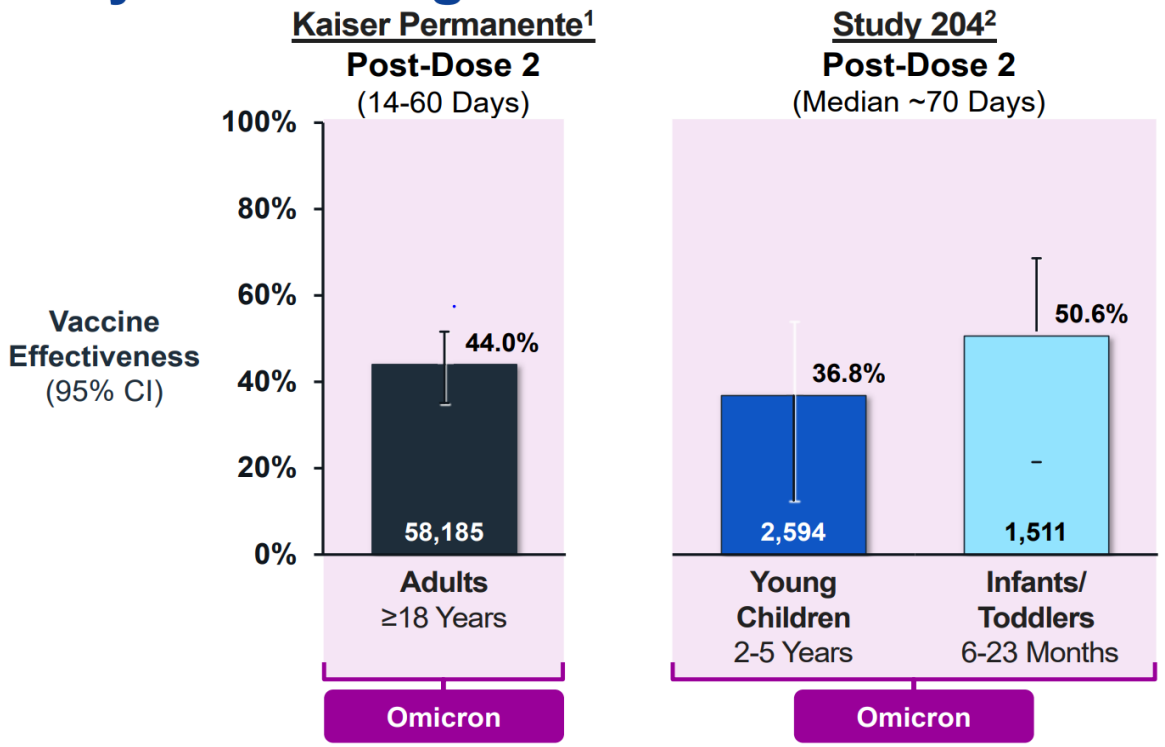
Moderna Trial Results

CR-53

Real-World Effectiveness (Kaiser Permanente) Compared to Study 204 During Omicron Period



1. Tseng HF et al, 2022; Vaccine Effectiveness against infection
2. Study 204 – Vaccine Efficacy based on CDC Definition

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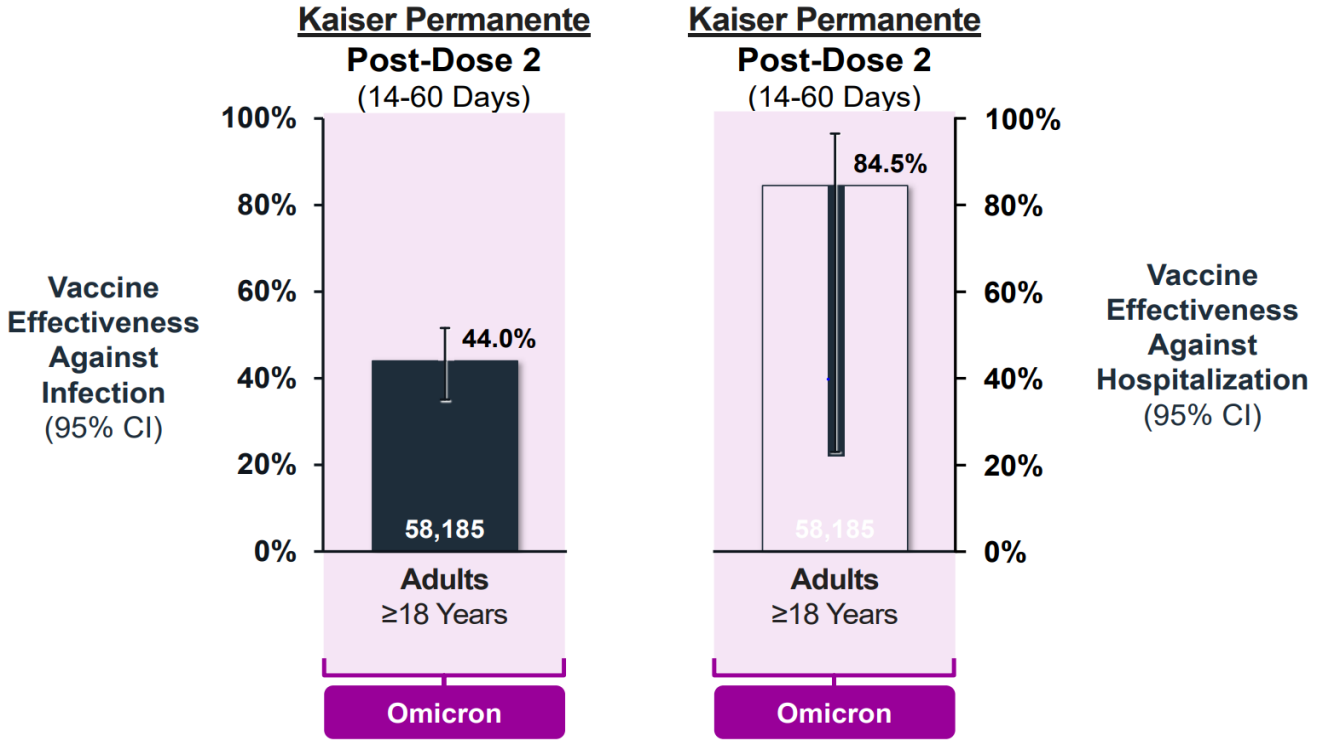
Moderna Trial Results

CR-54

mRNA-1273 Remains Highly Effective Against Hospitalization During Omicron Period in Adults



Tseng HF et al, 2022

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Moderna Trial Results - Safety

- Most adverse reactions were mild to moderate and short duration
- More common after 2nd dose, lower in younger age group
- Fever more common in 6 mo – 5 yr (21 – 26%)
- Injection site pain most common side effect (58 – 98%)
- 6 – 36 mo: irritability/crying (82%), sleepiness (51%)
- Fatigue, headache most common in 3 – 17 year olds
- No deaths, no myocarditis/pericarditis (2 possible cases in 12 – 17?)
- 1 febrile seizure temporaly related to vaccination

Myocarditis and Pericarditis

- Rare but serious side effect of mRNA vaccines
- Most common in males 12 to 25 years old
- Early data appeared that Moderna more likely to cause than Pfizer (data from Canada and Europe)
- Later US data shows less difference
- “As of May 2022, US surveillance data do not support a statistically significant higher myocarditis/pericarditis risk of Moderna as compared to Pfizer-BioNTech” (presented June 14, 2022 in FDA VRBPAC meeting)
- COVID-19 infection more likely to cause myocarditis than vaccine

Pfizer-BioNTech COVID-19 Vaccine for Children

- Pfizer-BioNTech vaccine granted EUA December 2020 for 16 years and older; fully licensed Aug 2021 for 16+ (30 mcg dose)
- EUA for 12 – 15 yr in May 2021 (30 mcg dose)
- EUA for 5 – 11 yr in Oct 2021 (10 mcg dose)
- Very similar to Moderna vaccine: mRNA in lipid particles
- Recent randomized controlled trial in 6 months – 4 years using 3 doses of a 3 mcg vaccine
- 4526 participants (almost 80% white)

Vaccines and Related Biological Products Advisory Committee June 14-15, 2022
Meeting Briefing Document- FDA- Pfizer- COVID19 Vaccine for Pediatrics

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Pfizer-BioNTech Trial Results

- Used immunobridging end points to establish efficacy
- Initial 2 dose trial failed to obtain results with 2 to 4 year olds
- 3rd dose given at least 8 weeks after 2nd dose
- Antibody production and seroresponse goals achieved with 3rd dose
- VE also calculated to be ~80% from small number of cases, but wide confidence interval
- Omicron was predominant variant during trial

Pfizer-BioNTech Trial Results - Safety

- 6 to 23 months
  - Irritability 68%
  - Drowsiness 41%
  - Decreased appetite 39%
  - Injection site tenderness 26%
- 2 to 4 years
  - Injection site pain 47%
  - Fatigue 45%
  - Injection site redness 19%
- No anaphylaxis, myocarditis/pericarditis, deaths

Why Vaccinate this Age Group?

- Usually a mild disease; risk of hospitalization lower than adults
- Estimates of asymptomatic cases 15 to 50%
- However, some have serious outcomes
  - MIS-C
  - Long COVID
  - 36-fold increase in incidence of myocarditis in <16 yrs of age
- Effect on schooling and other activities
- Decrease transmission to older, more vulnerable individuals

Why Vaccinate This Age Group?

Other Pediatric Vaccine Preventable Diseases:

Hospitalizations per Year Prior to Recommended Vaccines

	Hepatitis A[1]	Varicella[2] (Chickenpox)	Vaccine-type Invasive Pneumococcal Disease[3]	COVID-19[4]
Age	**5–14 years**	**0–4 years**	**0–4 years**	**6 months–4 years**
Time period	2005	1993–1995	1998–1999	Year 1: April 2020–March 2021 Year 2: April 2021–March 2022
Hospitalization Burden (Annual rate per 100,000 population)	**<1**	**29-42**	**40** [5]	Year 1: **29.8** Year 2: **89.3**

[1] https://www.cdc.gov/mmwr/preview/mmwrhtml/ss5603a1.htm

[2] Davis MM, Patel MS, Gebremariam A. Decline in varicella-related hospitalizations and expenditures for children and adults after introduction of varicella vaccine in the United States. Pediatrics. 2004;114(3):786-792. doi:10.1542/peds.2004-0012

[3] Centers for Disease Control and Prevention (CDC). Direct and indirect effects of routine vaccination of children with 7-valent pneumococcal conjugate vaccine on incidence of invasive pneumococcal disease--United States, 1998-2003. MMWR Morb Mortal Wkly Rep. 2005 Sep 16;54(36):893-7. PMID: 16163262.

[4] COVID-NET data, Accessed May 21, 2022.

[5] Vaccine-type invasive pneumococcal disease annual rate for children <5 years in 1998-1999 was 80 per 100,000, of which about 50% were hospitalized.

Why Vaccinate This Age Group?

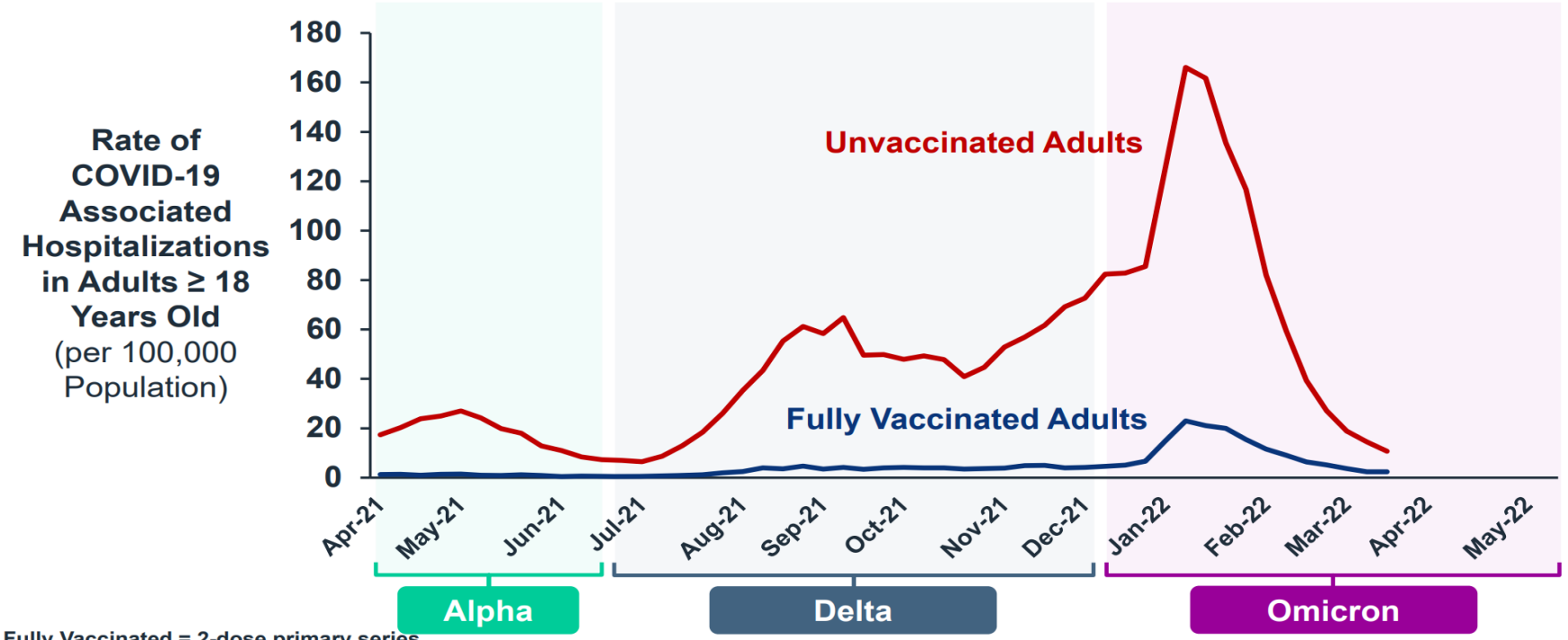
Pediatric vaccine preventable diseases: Deaths per year in the United States prior to recommended vaccines

	Hepatitis A[1]	Meningococcal (ACWY)[2]	Varicella[3]	Rubella[4]	Rotavirus[5]	COVID-19[6]
Age	**<20 years**	**11–18 years**	**5–9 years**	**All ages**	**<5 years**	**6 months – 4 years**
Time period	1990–1995	2000–2004	1990–1994	1966–1968	1985–1991	Jan 2020–May 2022
Average deaths per year	**3**	**8**	**16**	**17**	**20**	**86**

[1]Vogt TM , Wise ME, Bell BP, Finelli L. Declining hepatitis A mortality in the United States during the era of hepatitis A vaccination. J Infect Dis2008; 197:1282–8.
[2]National Notifiable Diseases Surveillance System with additional serogroup and outcome data from Enhanced Meningococcal Disease Surveillance for 2015-2019.
[3]Meyer PA, Seward JF, Jumaan AO, Wharton M. Varicella mortality: trends before vaccine licensure in the United States, 1970-1994. J Infect Dis. 2000;182(2):383-390. doi:10.1086/315714
[4]Roush SW , Murphy TV; Historical comparisons of morbidity and mortality for vaccine-preventable diseases in the United States. JAMA 2007; 298:2155–63.
[5] Glass RI, Kilgore PE, Holman RC, et al. The epidemiology of rotavirus diarrhea in the United States: surveillance and estimates of disease burden. J Infect Dis. 1996 Sep;174 Suppl 1:S5-11.
[6] https://data.cdc.gov/NCHS/Provisional-COVID-19-Deaths-Counts-by-Age-in-Years/3apk-4u4f/data. Accessed May 14, 2022

Why Vaccinate This Age Group?

COVID-19 Vaccines Offer Protection Against Severe Disease and Reduce Hospitalizations in Adults ≥ 18



Fully Vaccinated = 2-dose primary series
Data as of May 14, 2022 - https://covid.cdc.gov/covid-data-tracker/#covidnet-hospitalizations-vaccination

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CAUTION! Be Aware!

- There are differences in the vaccines in terms of age groups, dosage, volume of vaccine given, and reconstitution of vials
- Both require cold storage

Unknown Today…

- Durability – effectiveness wanes over time in adults
- Need for a booster dose? (planning for boosters underway)
- Need for an additional dose in immunocompromised?
- What is the benefit in those already infected?
- Does it prevent “long Covid”?
- How effective against asymptomatic infection?
- Rare adverse effects – how common?

Some Thoughts More Than 2 Years In…

- The COVID-19 Pandemic has been enormously challenging
- About 1 in 330 Americans has DIED from COVID-19
- Many, many people have contributed to trying to help mitigate the overwhelming negative effects of the Pandemic
- I am grateful to all those who have participated in vaccine trials

Thanks for your time and attention

Gulf Coast Box Turtle

Questions?

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