PROVIDENCE
Children's Health

COVID Pediatric Vaccine Update

Pediatric Grand Rounds
December 17, 2021
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Pediatric Infectious Disease
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Conflicts of interest

- The Planning Committee and Faculty have no relevant financial relationships with commercial interests to disclose.
- The Speaker receives a grant from Gilead Foundation for hepatitis C research.

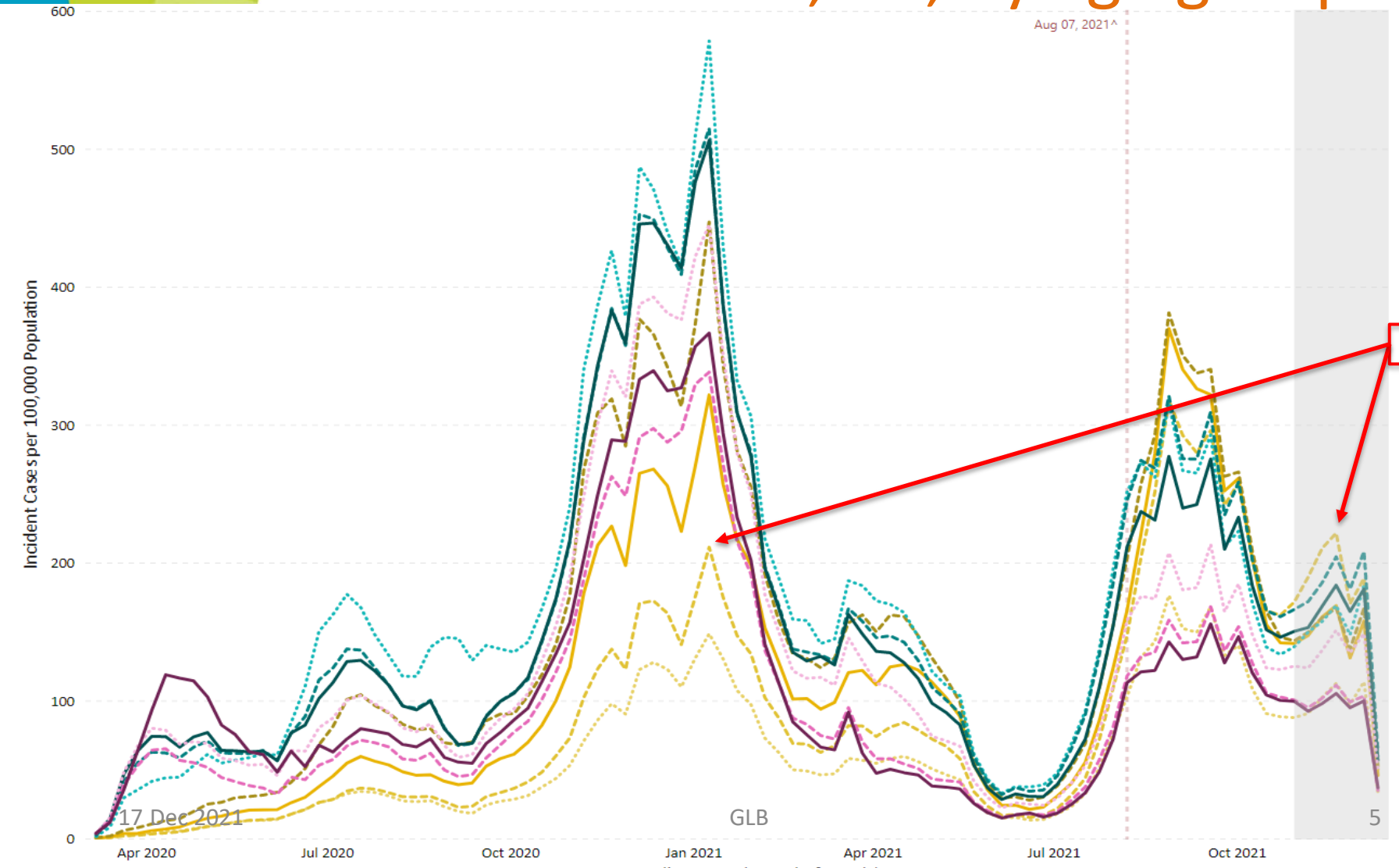
Objectives

- Pediatric COVID epidemiology
- Pediatric COVID vaccine options and indications
- Risks/Benefits/Safety

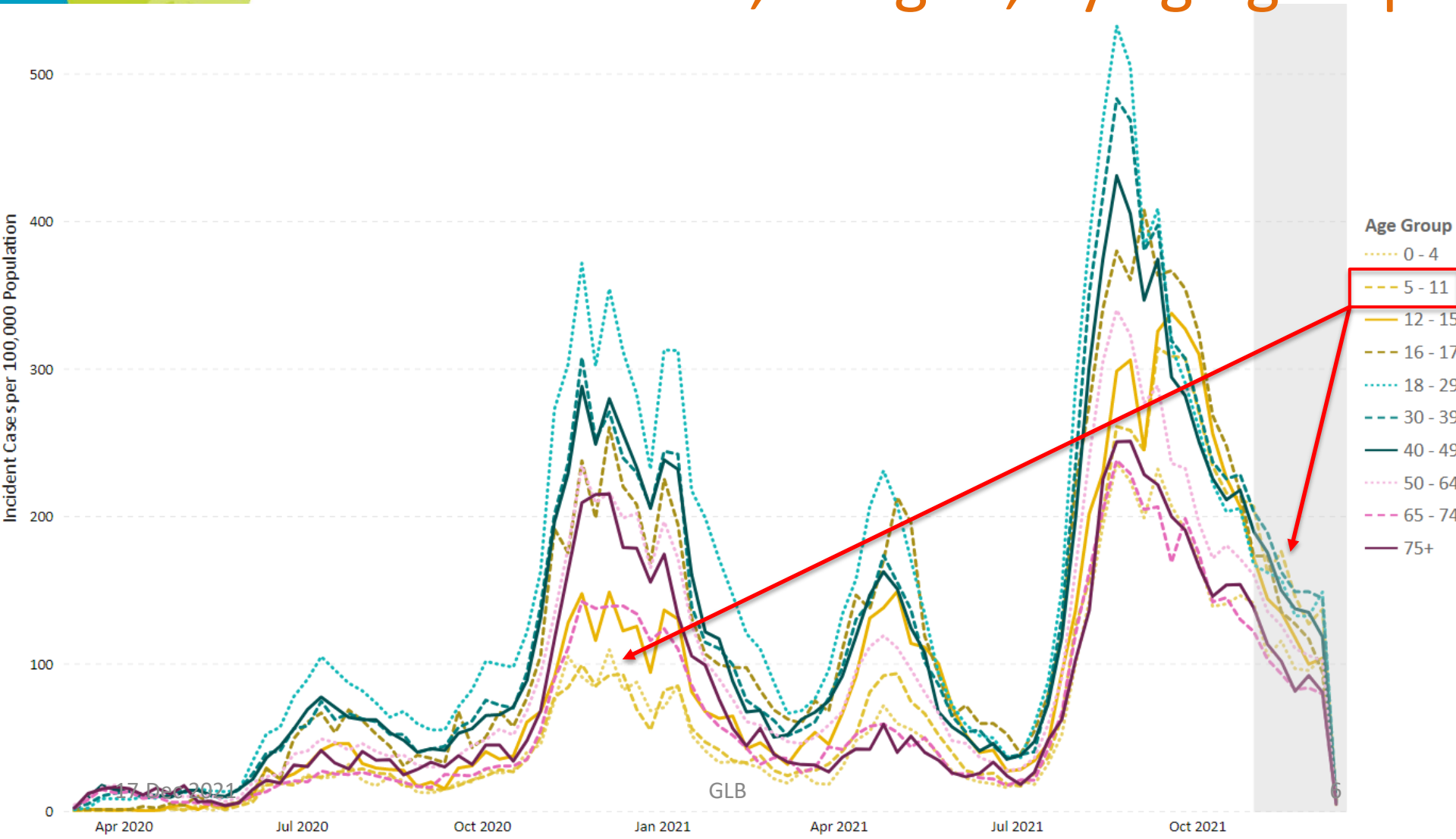
Pediatric SARS-CoV-2 Epi

As of 10 Dec 2021

COVID-19 Cases, US, by age group



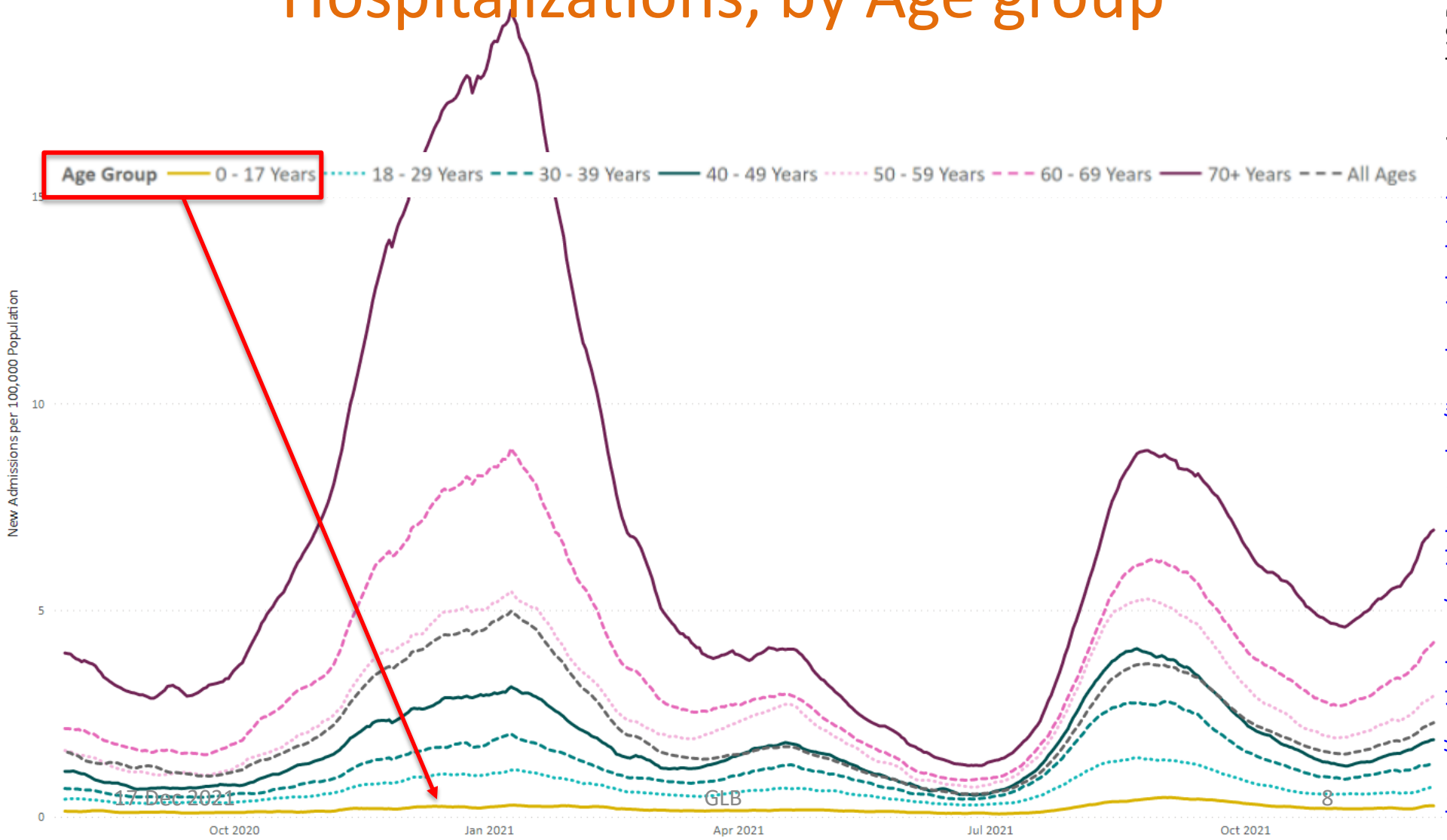
COVID-19 Cases, Oregon, by age group



COVID-19 cases, by Region 10 (OR, WA, ID)

- Pfizer EUA 12-17y: 10 May 2021
- Pfizer EUA 5-11y: 29 Oct 2021

Hospitalizations, by Age group



Other considerations

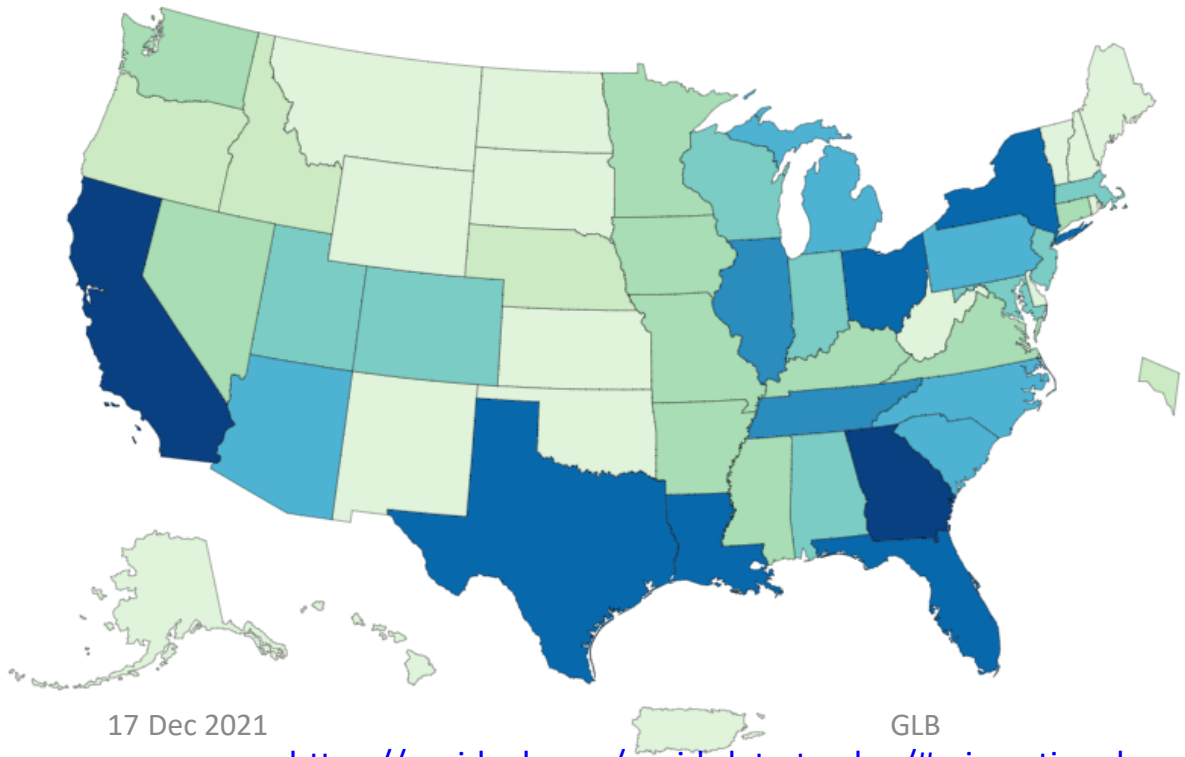
- Seroprevalence age 5-11 yrs 38% (Sep 2021)
- Number of infections per reported case, ages 0-17yrs: Median 6.2 (4.7-8.9)
- Similar household transmission if index case
- Similar asymptomatic case status
- Like adults: non-white, non-Asian more likely to be hospitalized

Multisystem inflammatory syndrome

TOTAL MIS-C PATIENTS MEETING CASE DEFINITION*	TOTAL MIS-C DEATHS MEETING CASE DEFINITION
5,973	52

*Additional patients are under investigation. After review of additional clinical data, patients may be excluded if there are alternative diagnoses that explained their illness.

Reported MIS-C Case Ranges by Jurisdiction, on or before November 30, 2021*



https://covid.cdc.gov/covid-data-tracker/#mis-national-surveillance. Accessed 10 Dec 2021

29 Oct 2021:
mRNA EUA for ages 5-11yrs

ACIP Review

- Advisory Committee on Immunization Practices 2 Nov, 2021
- https://www.cdc.gov/vaccines/acip/meetings/slides-2021-11-2-3.html
- Accessed 10 Dec 2021

Vaccine Study

Pfizer-BioNTech Pediatric COVID-19 Vaccine BNT162b2: Study Overview: 5 to <12 Years

Phase 1

48 PARTICIPANTS

5 to <12 yrs

Identification of preferred dose level(s)

10 µg | 20 µg | 30 µg

Phase 2/3

2:1 randomization

~1500 BNT162b2

750 placebo

~Additional 1500 BNT162b2 and 750 placebo recipients most with ≥2 weeks post dose 2 safety data

Non-inferior immune responses have been established to infer vaccine efficacy

Children 5 to <12 years of age — Compared to — 16–25-year-olds from the pivotal Phase 3 study

Although not required for EUA approval, COVID-19 surveillance was conducted permitting evaluation of vaccine efficacy

CC-6

ACIP Meeting 2 Nov 2021; Pfizer slides. Accessed 9 Dec 2021

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5 to <12 yrs

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10 µg | 20 µg | 30 µg

Phase 2/3

2:1 randomization

90 clinical trial sites

~1500 BNT162b2

750 placebo

~Additional 1500 BNT162b2 and 750 placebo recipients most with ≥2 weeks post dose 2 safety data

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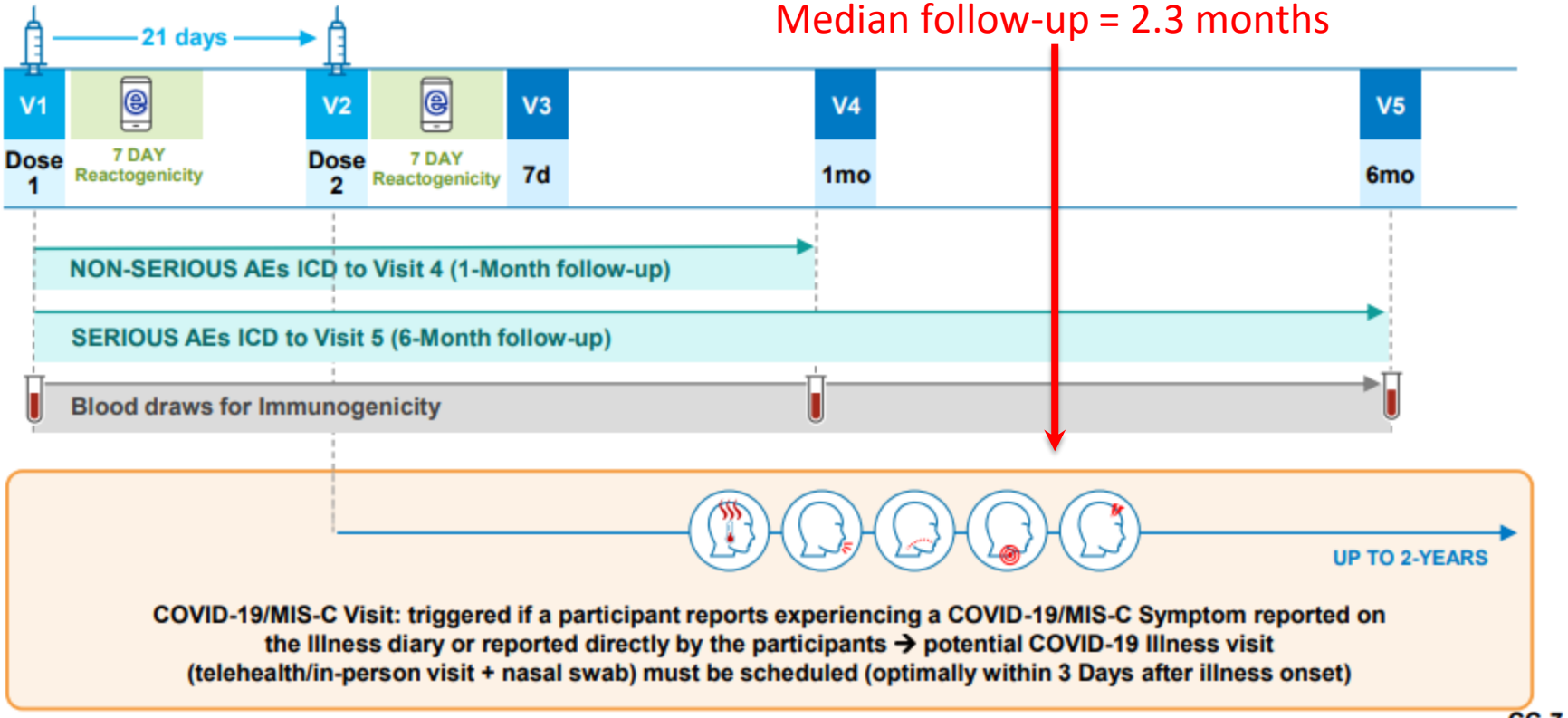
ACIP Meeting 2 Nov 2021; Pfizer slides. Accessed 9 Dec 2021

Study Timeline

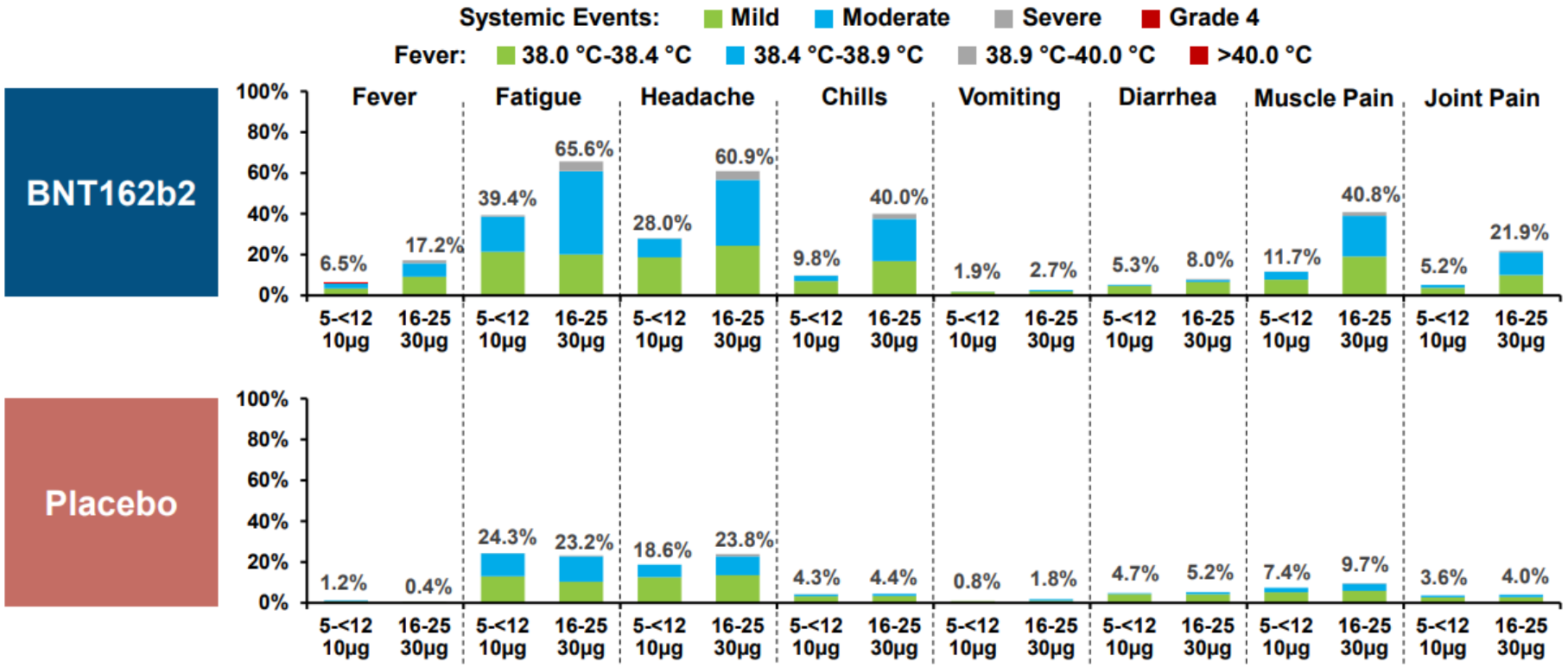
Phase 2/3 Timelines of Participants 5 to <12 Years of Age Through 6 Months Post-dose 2



ACIP Meeting 2 Nov 2021; Pfizer slides. Accessed 9 Dec 2021

Reactogenicity

Systemic Events, by Maximum Severity, Within 7 Days After Dose 2 in 5 to <12 and 16-25 Year Olds



Fatigue, headache, chills, muscle pain, joint pain severity definition: Mild=no interference; Moderate=some interference; Severe=prevents daily activity; Grade 4=ER visit or hospitalization
Vomiting severity definition: Mild=1-2 time in 24h; Moderate=>2times in 24h; Severe=Requires IV hydration; Grade 4=ER visit or hospitalization
Diarrhea severity definition: Mild=2-3 times in 24h; Moderate=4-5 times in 24h; Severe=6 or more times in 24h; Grade 4=ER visit or hospitalization
Dose 2: 5-<12 yrs N=2242 16-25 yrs N=984

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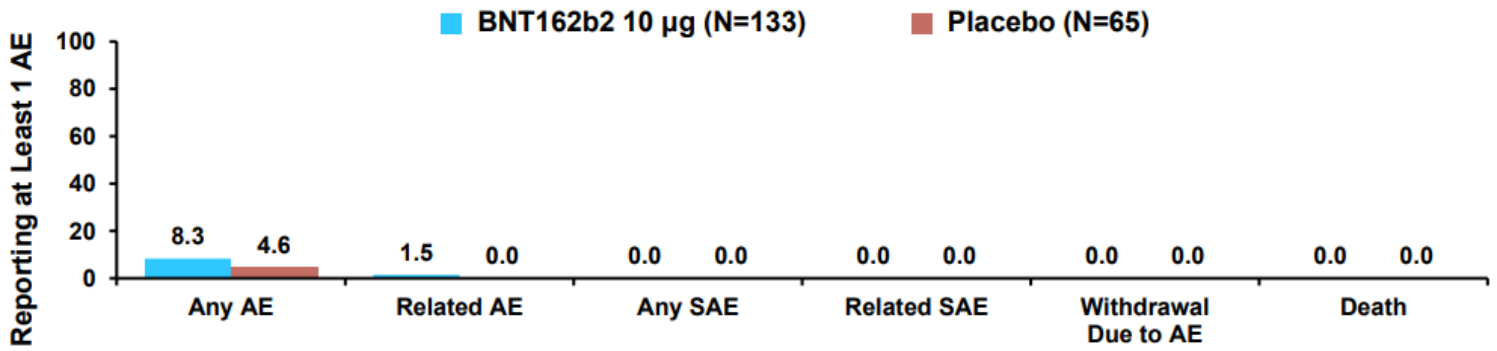
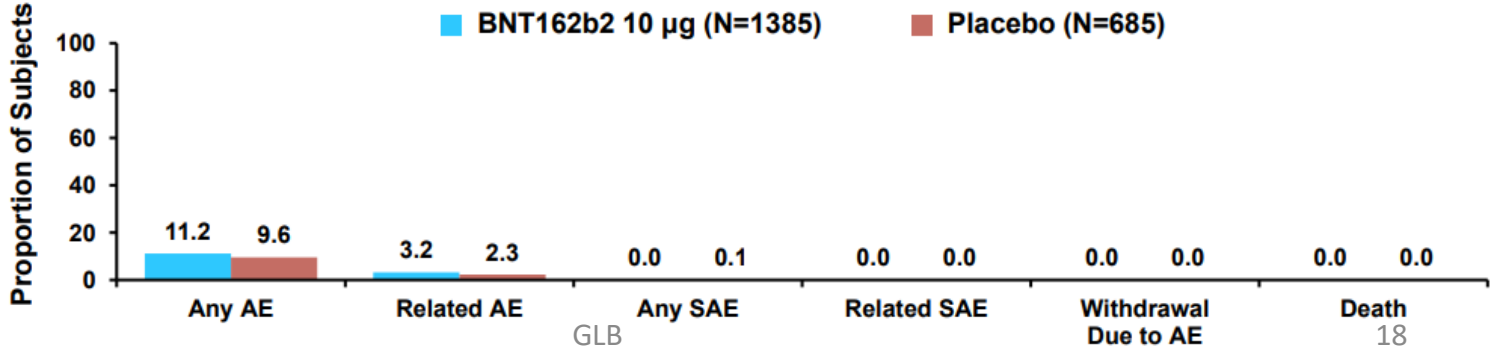
Overall Adverse Events from Dose 1 to 1 Month Post Dose 2 in 5 to <12 Year Olds by Baseline SARS-CoV-2 Status

Baseline SARS-CoV-2 Positive



Baseline SARS-CoV-2 Negative



CC-1

Serious Adverse Events from Dose 1 to Cutoff Date in 5 to <12 Year Olds

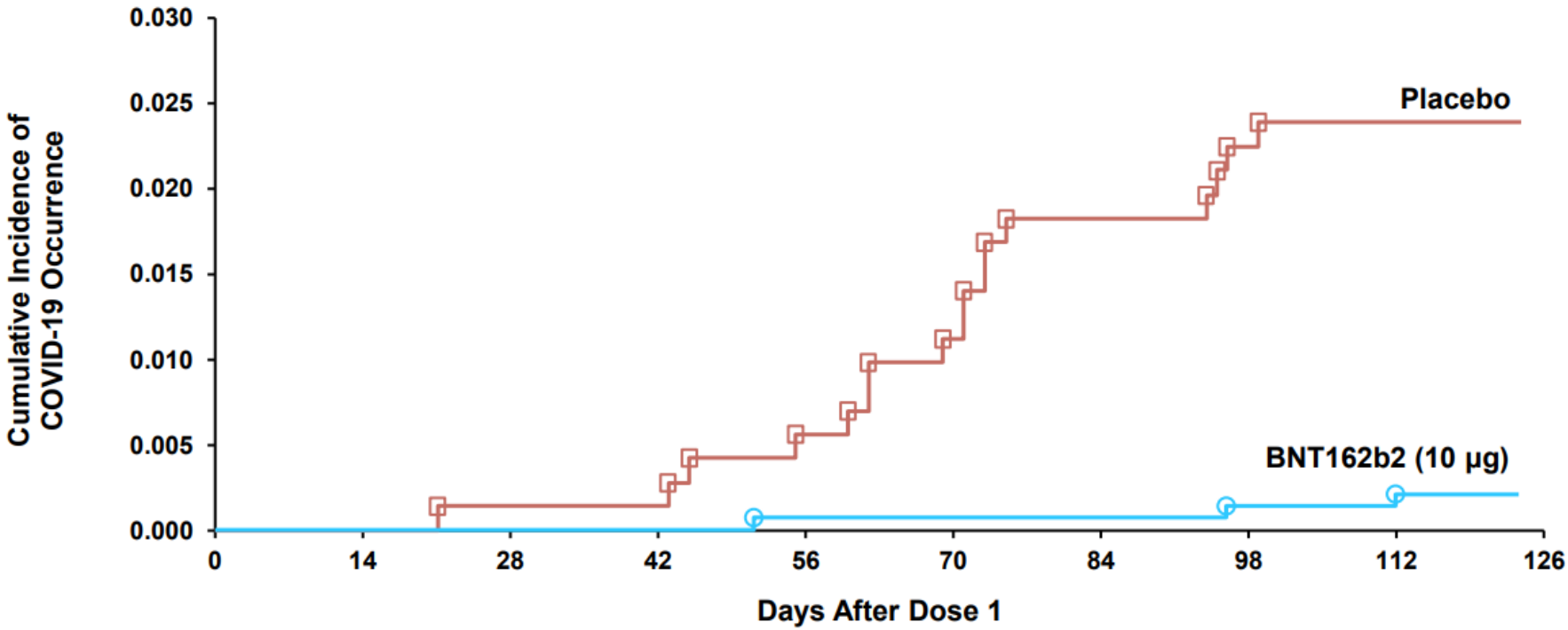
- **Initial enrollment group (all unrelated):**
  - One participant in the BNT162b2 group reported a SAE of an upper limb fracture
  - One participant in the Placebo group reported a SAE of abdominal pain and a SAE of pancreatitis related to trauma
- **Expansion Safety group (all unrelated; all in the BNT162b2 group)**
  - One participant reported a SAE of infective arthritis
  - One participant reported a SAE of epiphyseal fracture
  - One participant reported a SAE of ingestion of a foreign body

Adverse Events of Special Interest

Initial Enrollment Group and Safety Expanded Group

- **FDA AESIs:**
  - No anaphylaxis
  - No myocarditis/pericarditis
  - No Bell's palsy (or facial paralysis/paresis)
  - No appendicitis
- **CDC Defined AESIs:**
  - Potential hypersensitivity (angioedema, and predominantly rash and urticaria)
  - Arthritis (infective)
  - Vasculitis

Cumulative Incidence of COVID-19 After Dose 1: 5 to <12 Years of Age



CC-2

High Efficacy was Observed in 5 to <12 Year Olds Descriptive Analysis of First COVID-19 Occurrence From 7 Days After Dose 2

Subjects WITHOUT Evidence of Infection Prior to 7 Days After Dose 2

	BNT162b2 (10 µg) N=1305		Placebo N=663			
Efficacy Endpoint	n	Surveillance Time (n)	n	Surveillance Time (n)	VE (%)	(95% CI)
First COVID-19 occurrence ≥7 days after Dose 2	3	0.322 (1273)	16	0.159 (637)	90.7	(67.7, 98.3)

No severe cases of COVID-19 were reported
No cases of MIS-C were reported

Total surveillance time: 1000 person-years for all subjects within each group at risk for the endpoint

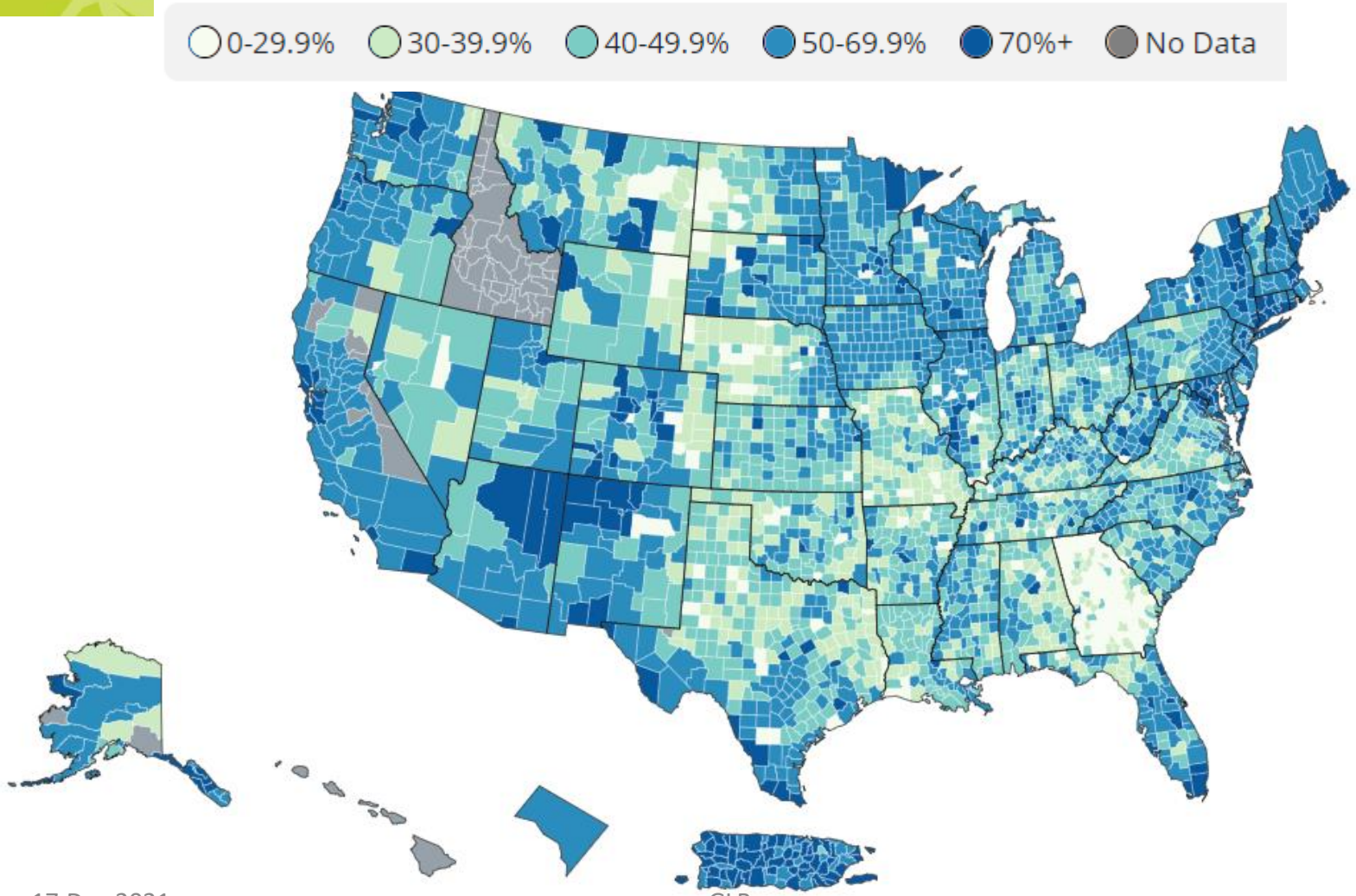
Formulation and Dosing for Pfizer-BioNTech COVID-19 Vaccines

	Formulation for ≥12-year-olds (purple cap)	Formulation for 5–11-year-olds (orange cap)
Age group	12 years and older	5-11 years
Vial cap color		
Dose (mRNA concentration)	30 ug	10 ug
Injection volume	0.3 mL	0.2 mL
Fill Volume (before dilution)	0.45 mL	1.3 mL
Amount of Diluent* Needed per vial	1.8 mL	1.3 mL
Doses per Vial	6 (after dilution)	10 (after dilution)

*Diluent: 0.9% sterile Sodium Chloride Injection, USP (non-bacteriostatic; DO NOT USE OTHER DILUENTS)
Modified from https://www.cdc.gov/vaccines/covid-19/downloads/Pfizer-Pediatric-Reference-Planning.pdf

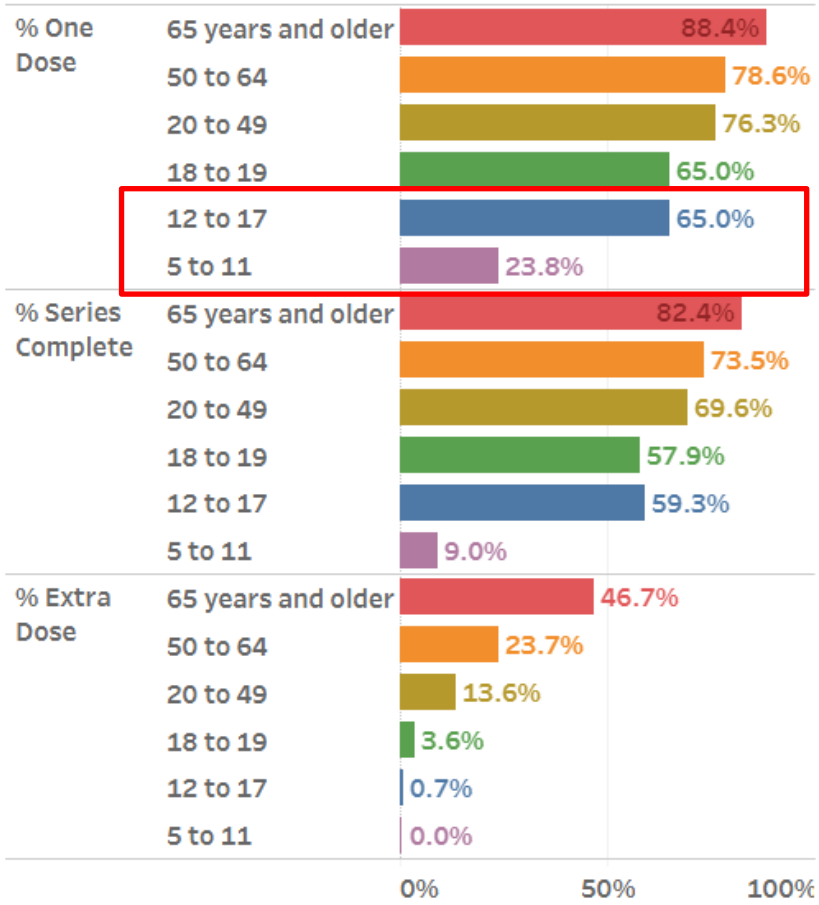
https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2021-11-2-3/07-COVID-Woodworth-508.pdf. Accessed 10 Dec 2021.

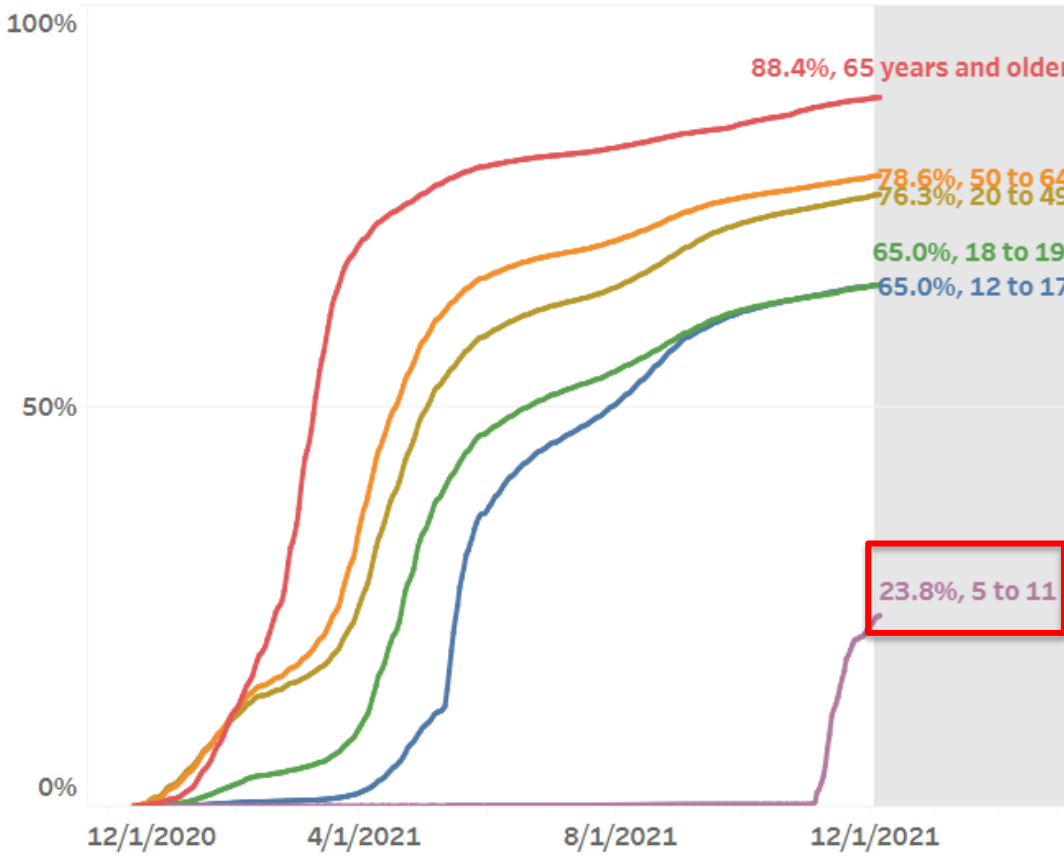
Percent population ≥5yrs of age fully vaccinated



https://covid.cdc.gov/covid-data-tracker/#county-view|Vaccinations|Administered_Dose1_Pop_Pct|all. Accessed 10 Dec 2021.

COVID-19 Vaccination Metrics





https://govstatus.egov.com/OR-OHA-COVID-19. Accessed 10 Dec 2021.

Everyone Ages 16 and Older Can Get a Booster Shot

IF YOU RECEIVED	Who can get a booster: / Who should get a booster:	When to get a booster:	Which booster can you get:
Pfizer-BioNTech	Who can get a booster: • Teens 16-17 years old Who should get a booster: • Adults 18 years and older	At least 6 months after completing your primary COVID-19 vaccination series	• Teens 16–17 years old can get a Pfizer-BioNTech COVID-19 vaccine booster • Adults 18 years and older can get any of the COVID-19 vaccines authorized in the United States
Moderna	Who should get a booster: Adults 18 years and older	At least 6 months after completing your primary COVID-19 vaccination series	Any of the COVID-19 vaccines authorized in the United States
Johnson & Johnson's Janssen	Who should get a booster: Adults 18 years and older	At least 2 months after completing your primary COVID-19 vaccination	Any of the COVID-19 vaccines authorized in the United States

https://www.cdc.gov/coronavirus/2019-ncov/vaccines/booster-shot.html. Accessed 17 Dec 2021

Safety

COVID-19 myocarditis among pediatric patients

	Myocarditis Diagnosed (%)	Myocarditis NOT Diagnosed (%)
COVID-19 (without MIS-C)	78 (0.02%)	356,721 (99.98%)
MIS-C	203 (8.10%)	2303 (91.90%)

	Myocarditis Diagnosed (%)	Myocarditis NOT Diagnosed (%)
COVID-19 (without MIS-C)	20 (0.08%)	24,144 (99.92%)
MIS-C	172 (9.04%)	1730 (90.96%)

https://www.epic.com/software#Cosmos

https://www.childrenshospitals.org/phis

https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2021-11-2-3/04-COVID-Oster-508.pdf. Accessed 10 Dec 2021

Vaccine Adverse Event Reporting System (VAERS): Reporting rates (per 1 million doses administered) of myocarditis after mRNA COVID-19 vaccines, 7-day risk period

- Reporting rates exceed background incidence*

	Pfizer (Males)		Pfizer (Females)	
Ages	**Dose 1**	**Dose 2**	**Dose 1**	**Dose 2**
12-15	**4.2**	**39.9**	0.4	**3.9**
16-17	**5.7**	**69.1**	0.0	**7.9**
18-24	**2.3**	**36.8**	0.2	**2.5**
25-29	1.3	**10.8**	0.2	1.2
30-39	0.5	**5.2**	0.6	0.7
40-49	0.3	**2.0**	0.1	1.1
50-64	0.2	0.3	0.3	0.5
65+	0.2	0.1	0.1	0.3

* An estimated 1–10 cases of myocarditis per 100,000 person years occurs among people in the United States, regardless of vaccination status; adjusted for the 7-day risk period, this estimated background is **0.2 to 1.9 per 1 million person 7-day risk period**

https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2021-11-2-3/04-COVID-Oster-508.pdf. Accessed 10 Dec 2021

Benefit-Harm analysis mRNA vaccine & myocarditis*

TABLE 2. Individual-level estimated number of COVID-19 cases and COVID-19–associated hospitalizations, intensive care unit admissions, and deaths prevented after use of 2-dose mRNA COVID-19 vaccine for 120 days and number of myocarditis cases expected per million second mRNA vaccine doses administered, by sex and age group* — United States, 2021

	No. per million vaccine doses administered in each age group (yrs)†				
Sex/Benefits and harms from mRNA vaccination	**12–29**	**12–17**	**18–24**	**25–29**	**≥30**
Male					
Benefit					
COVID-19 cases prevented§	11,000	5,700	12,100	15,200	15,300
Hospitalizations prevented	560	215	530	936	4,598
ICU admissions prevented	138	71	127	215	1,242
Deaths prevented	6	2	3	13	700
Harms					
Myocarditis cases expected¶	39–47	56–69	45–56	15–18	3–4
Female					
Benefit					
COVID-19 cases prevented§	12,500	8,500	14,300	14,700	14,900
Hospitalizations prevented	922	183	1,127	1,459	3,484
ICU admissions prevented	73	38	93	87	707
Deaths prevented	6	1	13	4	347
Harm					
Myocarditis cases expected¶	4–5	8–10	4–5	2	1

Abbreviations: ICU = intensive care unit; VAERS = Vaccine Adverse Event Reporting System.

* This analysis evaluated direct benefits and harms, per million second doses of mRNA COVID-19 vaccine given in each age group, over 120 days. The numbers of events per million persons aged 12–29 years are the averages of numbers per million persons aged 12–17 years, 18–24 years, and 25–29 years.

† Receipt of 2 doses of mRNA COVID-19 vaccine, compared with no vaccination.

§ Case numbers have been rounded to the nearest hundred.

¶ Ranges calculated as ±10% of crude VAERS reporting rates. Estimates include cases of myocarditis, pericarditis, and myopericarditis.

*myocarditis = myocarditis, pericarditis, myopericarditis

Gargano J et al, MMWR 2021

Benefit – Risk Stadium

COVID disease: 100,000 susceptible persons aged 12–29 years

1100 infections
56 hospitalizations
2 thrombotic events
1 death
6-25 cases myocarditis
<1 case MIS-C
doses of steroids, abx
long COVID

Post-vaccine: 100,000 vaccinated persons (2-dose) aged 12–29 years

77 infections*
<1 hospitalization
0 deaths
1 post-COVID myocarditis
0 MIS-C, long COVID?
4 post-vaccine myocarditis
<1 VITT, <1 GBS

As of 17 Dec 2021: 6.48 million pediatric cases (age 0-17yrs); 1005 deaths

*assume 93% effectiveness
Gargano J et al, MMWR 2021

What about 5-11 year olds?

- No cases of myocarditis in trial
- Trial not powered to see rare side effects
- Not expected because myocarditis is rare before puberty

- Quick review of VAERS reports since Nov 1, 2021
- Common:
  - Adult dose (Purple) given instead of Peds dose (Orange Vial)
    - What can your office do to avoid this?
  - Vasovagal
    - Common with children/teens
    - Hydration, food prior to any vaccination
  - Fever, headache, fatigue, rash 24h

Vaers.hhs.gov accessed 9 Dec 2021

Pediatric vaccine studies

- Pfizer (mRNA)
  - Phase 1, 2/3: age 5-12y; 2-5y; 6m-2y: RECRUITING
    - Start Mar 2021; completion June 2024
  - Pregnant women: ACTIVE, not recruiting
    - Start Feb 2021; completion Aug 2022
  - Immunocompromised adults and children: RECRUITING
    - Start Oct 2021; completion Mar 2023
- Moderna (mRNA)
  - Phase 2/3 age 12-17y, ENROLLMENT COMPLETE; no results posted; completion June 2022
  - Phase 2/3 age 6m-12y: RECRUITING (>13,000 so far)
    - Start Mar 2021; completion June 2023
- Novavax (Nanoparticle + Spike Ag + saponin-based adjuvant)
  - Phase 3 ≥ 18y with expansion to 12-17y: ACTIVE, not recruiting (33,000)
    - Start Dec 2020, completion June 2023
- Sinovac (inactivated SARS-CoV-2; NO EUA in USA)
  - Phase 3: 6m–17y
- Overcoming2: vaccine effectiveness against COVID-19 or MIS-C

Clinicaltrials.gov Accessed 9 Dec 2021

Other pediatric vaccine preventable diseases:

Hospitalizations per year prior to recommended vaccines

	Hepatitis A[1]	Varicella[2] (Chickenpox)	Influenza[3]	COVID-19
Age	5–14 years	<20 years	5–17 years	5–11 years
Time period	2005	1988–1995	2003–2007	Oct 2020–Oct 2021
Hospitalization Burden (per 100,000 population)	**<1**	**4-31**	**30-80**	**25**

[1] https://www.cdc.gov/mmwr/preview/mmwrhtml/ss5603a1.htm
[2] 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
[3] https://www.cdc.gov/flu/weekly/weeklyarchives2007-2008/07-08summary.htm

https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2021-11-2-3/08-COVID-Oliver-508.pdf. Accessed 10 Dec 2021

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Other vaccine preventable diseases:

Deaths per year prior to recommended vaccines

	Hepatitis A[1]	Meningococcal (ACWY)[2]	Varicella[3]	Rubella[4]	Rotavirus[5]	COVID-19
Age	<20 years	11–18 years	5–9 years	All ages	<5 years	5–11 years
Time period	1990–1995	2000–2004	1990–1994	1966–1968	1985–1991	Oct 2020–Oct 2021
Average deaths per year	**3**	**8**	**16**	**17**	**20**	**66**

[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. JAMA2007; 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.

https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2021-11-2-3/08-COVID-Oliver-508.pdf. Accessed 10 Dec 2021

Modeling the impact of COVID-19 vaccination in children ages 5–11 years

- Vaccination among 5–11-year-olds is expected to accelerate the decline in cases, reducing cumulative incidence nationally by an expected **8%** (~600,000 cases) from November 2021 to March 2022

- Vaccination of 5–11-year-olds would dampen, but not eliminate, a new variant emergence

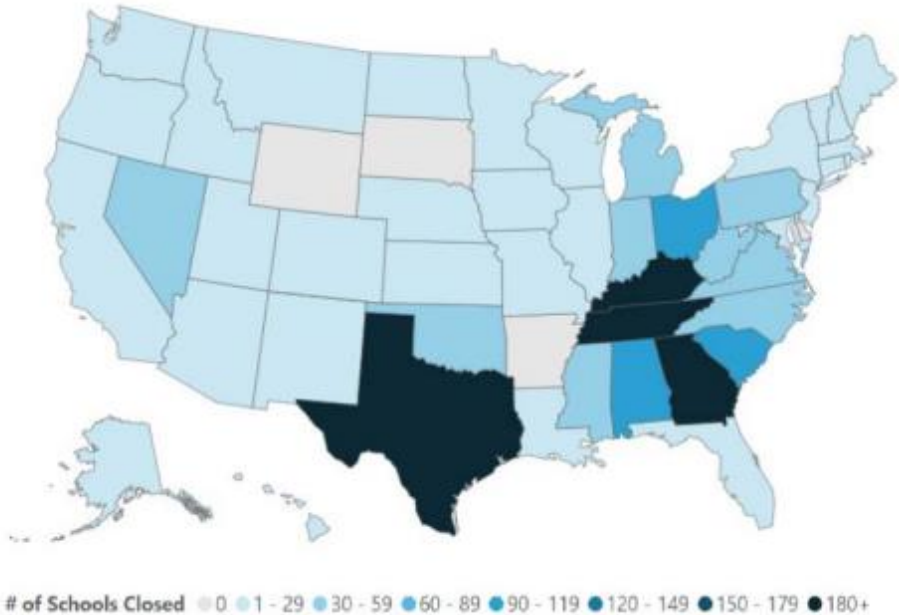
https://covid19scenariomodelinghub.org/

https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2021-11-2-3/08-COVID-Oliver-508.pdf. Accessed 10 Dec 2021

COVID-19 Related K-12 School Closures by State,

August 2, 2021 – October 22, 2021

School districts closed	Total # schools closed*	Estimated # students affected*	Estimated # teachers affected*
313	2,351	**1,217,777**	78,134



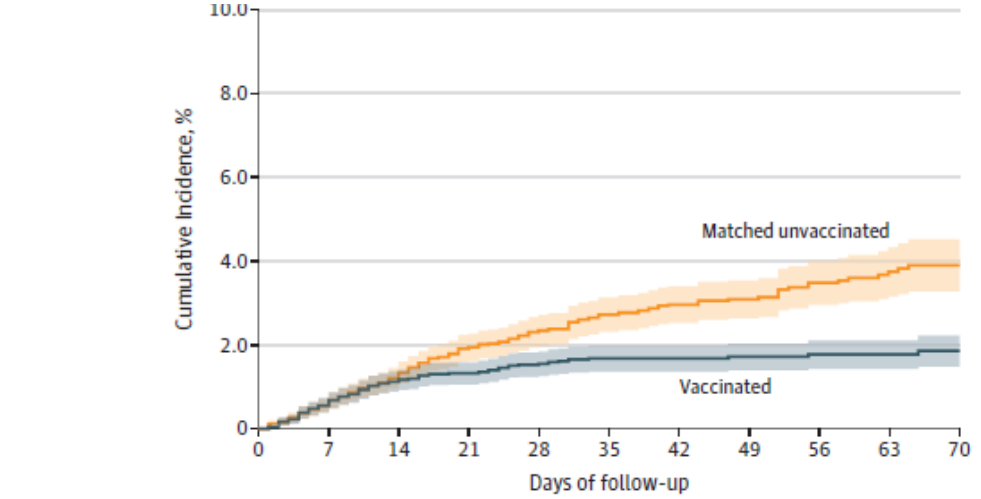
Data from the Unplanned School Closure Monitoring Project (DGMQ/CDC), ongoing research that uses systematic daily media searches (methods explained in https://doi.org/10.1371/journal.pone.0248925).

* Number of schools closed in district-wide closures, total number of students, and total number of teachers are estimated by matching the public school district ID or school ID with the district/school data for school year 2019/20 and private school ID with school data for year 2017/18 as obtained from the National Center for Education Statistics (https://nces.ed.gov/ccd/elsi/tableGenerator.aspx, accessed on Apr 20, 2021). Due to missing information in 2019/20 data, the total number of public school teachers in California is estimated using 2018/19 NCES data.

https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2021-11-2-3/08-COVID-Oliver-508.pdf. Accessed 10 Dec 2021

Vaccination safe during pregnancy

Figure 2. Cumulative Incidence of SARS-CoV-2 in Vaccinated vs Matched Unvaccinated Pregnant Women



No. at risk											
Matched unvaccinated	7530	7446	6825	5661	4788	4023	3376	2327	1748	1295	955
Vaccinated	7530	7446	6825	5661	4788	4023	3376	2327	1748	1295	955
Cumulative No. of events											
Matched unvaccinated	0	51	99	137	158	175	184	188	196	200	202
Vaccinated	0	51	87	97	109	115	115	116	117	117	118

Significantly less infection in vaccinated women.

Table 3. Exploratory Outcomes[a] Among the Matched[b] Study Population

Outcomes	Vaccinated	Matched unvaccinated
No.	7530	7530
SARS-CoV-2 hospitalization, No. (%)	13 (0.2)	23 (0.3)
Abortion,[c] No. (%)	128 (1.7)	118 (1.6)
Intrauterine growth restriction, No. (%)	36 (0.5)	38 (0.5)
Preeclampsia, No. (%)	20 (0.3)	21 (0.3)
Stillbirth, No. (%)	1 (<0.1)	2 (<0.1)
Maternal death, No. (%)	0	0
Obstetric pulmonary embolism, No. (%)	0	0
Birth week, median (IQR)	39 (38-40)	39 (38-40)
Preterm birth (<37 wk), No. (%)	77/1387 (6.6)	85/1427 (6.0)
Infant weight, median (IQR), kg	3.2 (2.9-3.6)	3.2 (2.9-3.5)

No significant differences in negative outcomes.

Goldshtein I et al. Association between BNT162b2 vaccination and incidence of SARS-Cov-2 infection in pregnant women. JAMA 2021; doi:10.1001/jama.2021.11035

Pregnancy and vaccination

- Observational study: Dec 17, 2020–Mar 2, 2021
- Vaccinated women had much higher titers than natural infection
- Breastmilk:
  - Boost in IgG, not IgA or IgM in vaccinated; elevated IgA after natural infection.
- Cord blood:
  - Spike- and RBD-specific IgG detectable 10 of 10 samples; more later from 2nd dose
- Prospective studies
  - OHSU study enrolling: https://news.ohsu.edu/2021/04/15/ohsu-studies-impacts-of-covid-19-infection-vaccination-on-immune-system-during-pregnancy-lactation
  - MOMI-VAX (NIAIS/NIH) enrolling: https://idcrc.org/concept/studies.html
  - University of Toronto; Ottawa Hospital Research Institute

Vaccination safe preconception, pregnancy, lactation

- Debunked myth that Spike protein antibody binds syncytin-1, involved in implantation and placentation
- Implantation rate in IVF not affected by vaccination vs natural infection vs neither
- Vaccination during pregnancy not associated with increased pregnancy or delivery complications
- Self-reported miscarriage rates in vaccinated women similar to general population (~25%)
- Vaccination preconception or during pregnancy not associated with spontaneous abortion

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Take aways

- Benefit of efficacious vaccines outweighs rare side effects
- Make sure clinic process to prevent incorrect vaccine administration
- Hand washing, respiratory etiquette, masking work!
- Reach out if questions: we are learning together
- IDSA Real-time Learning Network:
- https://www.idsociety.org/covid-19-real-time-learning-network/

Questions?

- Phone number: 503-216-6050
- Fax: 971-282-0102
- Epic code for internal referrals: REF76B
- Include: Relevant history and clinical question

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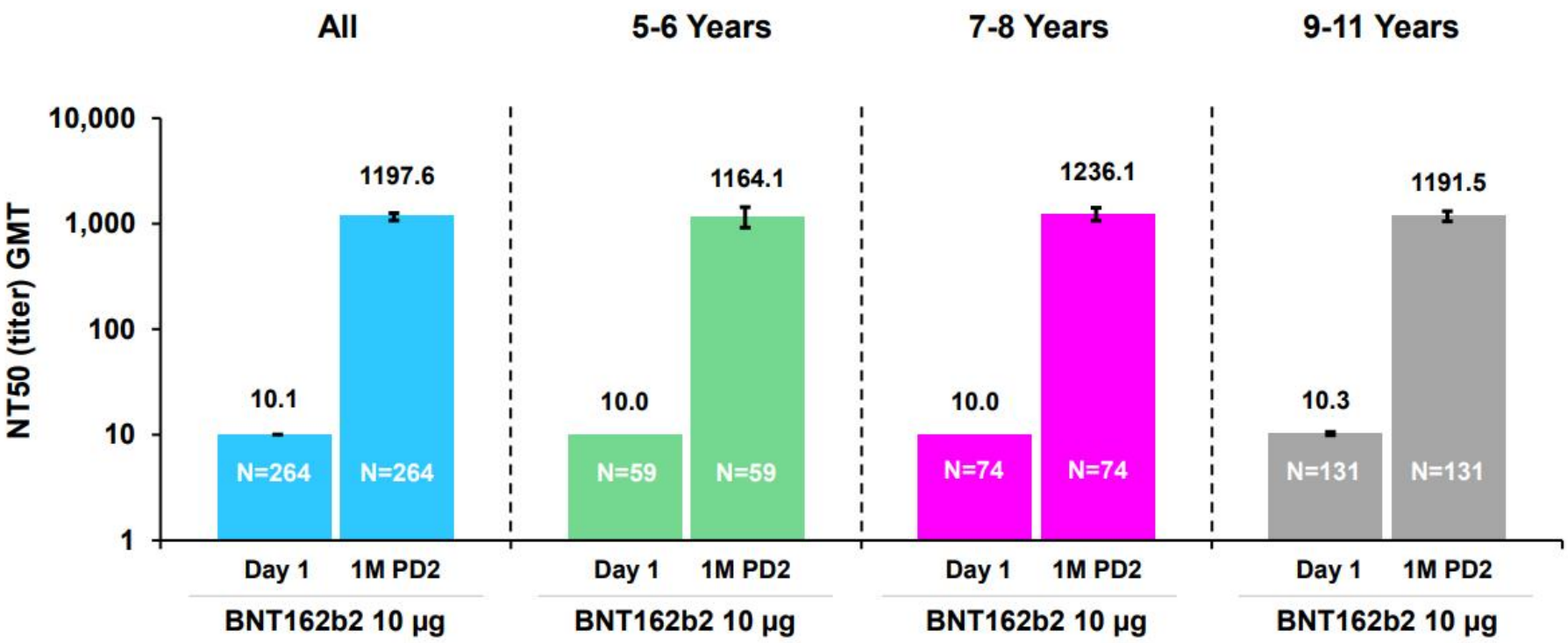
Extra

Geometric Mean Titers (NT50), by Age Subgroup – Subjects 5 to <12 Years – Evaluable Immunogenicity Population

Immunogenicity Subset – Without Evidence of Prior Infection up to 1 Month Post Dose 2



T50 = 50% neutralizing titers

CC-25

Benefit – risk discussion

COVID disease

- COVID-19 cardiac involvement
  - 1 case clinical myocarditis per 177 COVID-19 PCR+ college athletes;
  - 1 per 43 with any evidence of myocarditis (2.3% of 1,597) (Daniels, 2021)
  - N=37: 9 clinical myocarditis, 8 probable subclinical myocarditis; 20 possible
- MIS-C U.S.
  - 1 case MIS-C per 3200 SARS-CoV-2 infections <21 y (316 per million) (Payne, 2021)
  - N=4,196: 60% male; 62% Hisp/BlackNH; 9y (IQR 5–13y)
  - 37 deaths
  - High-dose steroids, IVIG, immune modulators (anakinra), immune suppression, long-term follow-up with cardiology, stress test, neurologic? Long-term?
- Thrombosis
  - 2–7% with COVID-19; 6.5–8% with MIS-C
  - CSVT w/i 2 weeks of COVID-19 (hospitalized): 1 per 25,640 (39 per million)
- Secondary infections from glucocorticoids:
  - Unknown incidence: Aspergillus, mucormycosis, TB, etc
- Long COVID: Sx >4 weeks after COVID-19 infection
  - Unknown incidence in children
  - N = 129 PCR+ surveyed: 50% ≥1 symptom 120d later; 42% of these affected daily activities; 3 MISC, 2 myocarditis (Buonsenso, 2021, preprint)
  - Fatigue, muscle/joint pain, headache, insomnia, respiratory problems, palpitations

Post-vaccine

- Local and systemic symptoms of immune response: self-limited
- Myocarditis post-vaccine
  - 1 per 79,365 second dose (12.6 cases per million) among persons aged 12–39 yr (N=26 in 3.4 million doses)
  - Rapid recovery. No deaths, transplants, no multi-system involvement
- Vaccine-induced thrombocytopenic thrombosis
  - UK: 1 per 126,582 vaccinated (7.9 per million) (Astra-Zeneca)
  - US Females aged 18-49y: 1 per 142,857 vaccinated (7 per million) (J&J)
- Guillaume-Barré
  - Imbalance in mRNA vaccine studies, not borne out in post-EUA vaccination
  - J&J: 100 VAERS reports only; 12.5 million doses (1 per 125,000 doses)

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Let's talk about confidence

- Most people are confident about vaccines
  - Local successes: Native Hawaiian/ Pacific Islander and Asian communities in Oregon by established outreach and grass-roots
- Natural disease vs vaccine side effects
- More pharmacies, physician offices
- Motivational interviewing, keep door open
- CATCH UP on OTHER DELAYED VACCINATIONS

Other Treatment Updates

EARLY mild/mod disease & post-exposure prophylaxis

- Bamlanivimab + etesevimab (EUA, Eli-Lilly)
  - Spike protein monoclonal AB
  - Neonates, infants, pediatrics (Dec 3, 2021)
  - <12yrs or <40kg, weight-based dosing
  - NO data on efficacy (no hospitalization/death)
  - Safety "same as adults": infusion-related
- Casirivumab + imdevimab (EUA, Regeneron)
  - Spike protein monoclonal AB
  - >=12yrs AND >=40kg
  - Benefit/safety extrapolated to peds

https://www.fda.gov/media/145802/download. Accessed 10 Dec 2021

Indications for mAb

- Unvaccinated or likely to have a suboptimal vaccine response

Criteria for Identifying High Risk Individuals

The following medical conditions or other factors may place adults and pediatric patients, including neonates, at higher risk for progression to severe COVID-19:

- Older age (for example age ≥65 years of age)
- <1 year old
- Obesity or being overweight
- Pregnancy
- Chronic kidney disease
- Diabetes
- Immunosuppressive disease or immunosuppressive treatment
- Cardiovascular disease (including congenital heart disease) or hypertension
- Chronic lung diseases (for example, chronic obstructive pulmonary disease, asthma [moderate-to-severe], interstitial lung disease, cystic fibrosis and pulmonary hypertension)
- Sickle cell disease
- Neurodevelopmental disorders (for example, cerebral palsy) or other conditions that confer medical complexity (for example, genetic or metabolic syndromes and severe congenital anomalies)
- Having a medical-related technological dependence (for example, tracheostomy, gastrostomy, or positive pressure ventilation (not related to COVID-19))

https://www.fda.gov/media/145802/download
Accessed 10 Dec 2021

LATE disease after hospitalization, oxygen requirement

- Remdesivir
- Steroids
- Tocilizumab (>=2yrs old)
- Baricitinib (>=2yrs old)

Others

Not enough data for or against

- Fluvoxamine
- Inhaled budesonide
- Ivermectin

Recommend against the use

- Colchicine
- Convalescent plasma
- Hydroxychloroquine or chloroquine
- Lopinavir/ritonavir