CDC Advisory Committee on Immunization Practices (ACIP) Meeting Report

Date: January 05, 2022

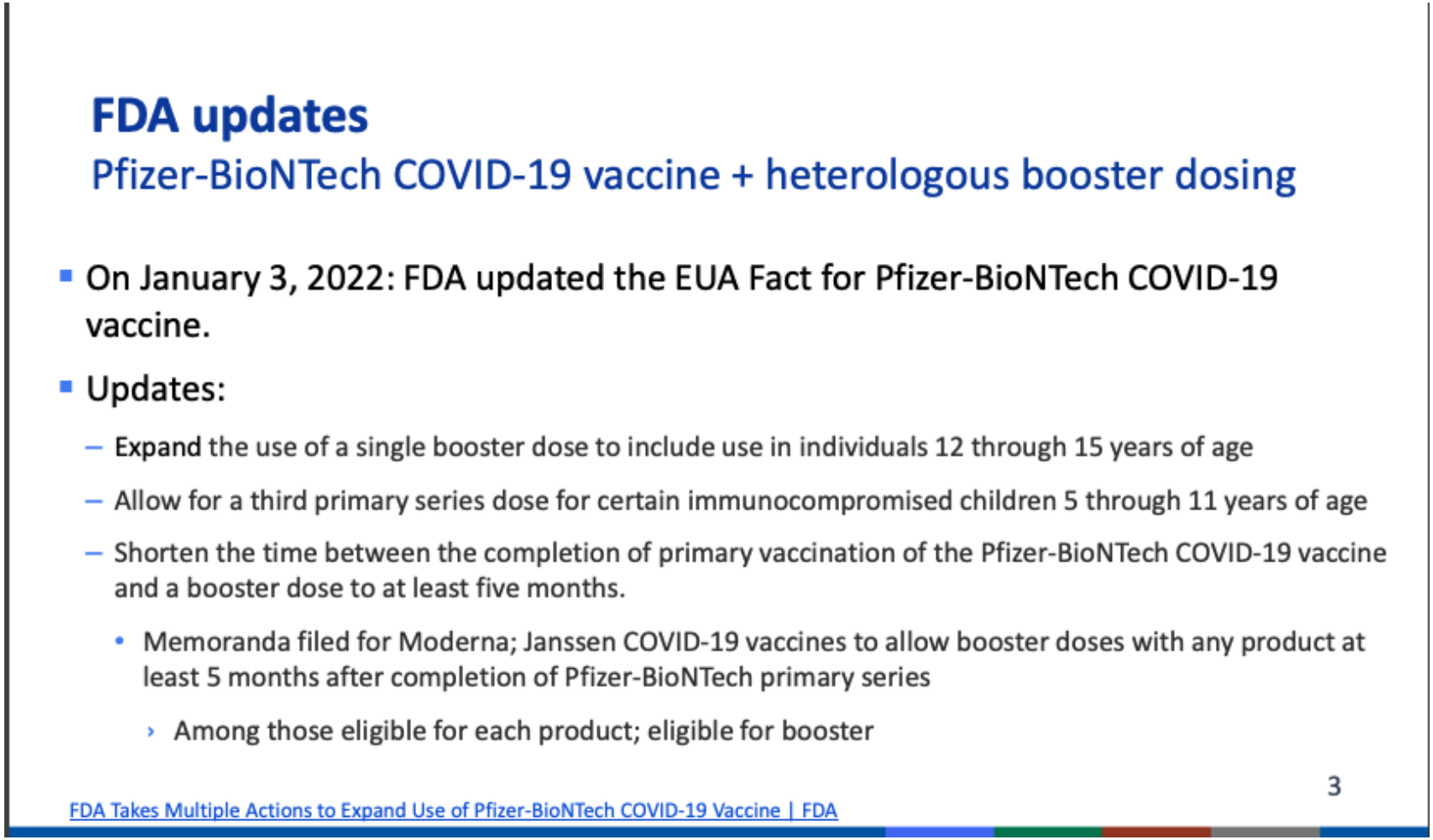
Following the FDA update on the EUA Fact Sheet for Pfizer-BioNTech COVID-19 vaccine on 03JAN2022, ACIP met to review safety data on this vaccine in children and adolescents for the purpose of voting on a recommendation to extend use of the booster dose to 12-15yo adolescents. At the end of the meeting, the ACIP took a vote on the following recommendation: A single Pfizer-BioNTech COVID-19 vaccine booster dose is recommended for persons 12-17 years at least 5 months after primary series under the FDA's Emergency Use Authorization , with a vote of 13-1 in favor. The single no vote was not anti-booster, but the member wanted to keep the emphasis on vaccinating more of the unvaccinated to diminish the hospitalizations rather than using precious resources to give already vaccinated a booster dose. A selection of slides from the various presentations can be found in the attached pdf.

VAERS presentation reported that 8.7 MM doses of vaccine had been administered to 5-11yo and 18.7 MM doses to 12-15yo children in the US. More than 92% of the reports were non-serious with similar demographics, reported AEs were known and well-characterized, vaccination errors or workups for myocarditis or MIS-C. Reporting rates for males 5-11 yrs were substantially lower than for 12-15 and 16-17yo males. Since authorization, booster doses have been administered to 47,000 persons 16-17yo and 930,000 persons 18-24 yo. 13 preliminary reports of myocarditis with 4 meeting CDC definition and 9 under review; all 4 recovered. **V-safe** presentation included data from 15,208 5-15yo children. Most reactions were mild to moderate, most were reported on day after vaccination and were more frequent after dose 2 than 1. Reports from 5-11yo were less frequent than in 12-15yo. **VSD** presentation provided an analysis of myocarditis/pericarditis in 12-17yo and 5-11yo. The rate ratio was elevated for 12-17yo during days 0-7 after Dose 2 with excess risk 0.3 cases per million first doses vs 70 cases per million second doses. With 431,485 doses administered to 5-11yo, there have been no safety signals within VSD. 2 potential cases in 5-11yo have been chart reviewed, with verification of an 11yo with acute pericarditis 19 days after dose 2 but no verification of the other. **Interim clinical considerations** focused on the new gray-top formulation for 12 yrs and older that requires no dilution and refrigerator storage and the updates announced yesterday by CDC for additional dose for immunocompromised 5-11yo children, and allowance of 5 month boost interval.

Discussion and the Evidence to Recommendation Framework reviewed the public health need and sparked heated discussion re: whether the vaccine is meant to diminish hospitalization/death or also to diminish mild/asymptomatic infections. Several of the members are attendings on clinical services that are swamped and the data showing that hospitalization rates in unvaccinated 12-17yo are 11X higher than vaccinated 12-17yo prompted some to maintain that increasing vaccination coverage was more important than providing a boost. Others thought that vaccination along with masking and distancing was arguably a factor in decreasing transmission. In the end, the group acknowledged that the pandemic was a moving target and that the current surge warranted protection of children against the onslaught of omicron. The full set of slide presentations can be found HERE.

Report created by: Cornelia L. Dekker, MD

1. **ACIP COVID-19 Vaccines Work Group (Matthew F. Daley, Chair)**



CDC updates

Decision Memos, Announced January 4th

- Moderately to severely immunocompromised children aged 5 through 11 years receive an additional primary (i.e., third) Pfizer-BioNTech COVID-19 vaccine dose at least 28 days after completion of doses one and two of the primary series
- People aged 18 years and older receive a single homologous Pfizer-BioNTech COVID-19 vaccine booster dose (or heterologous as authorized for another COVID-19 vaccine for those 18 and older):
  - 5 months after completion of a primary series of Pfizer-BioNTech COVID-19 Vaccine,
  - 6 months after completion of a primary Moderna COVID-19 vaccine series, or
  - 2 months after completion of a single dose primary series of Janssen COVID-19 vaccine, and
- People aged 16 through 17 years may receive a Pfizer-BioNTech booster 5 months after completion of a Pfizer-BioNTech primary series

Agenda: Wednesday January 5, 2022

▪ **Updates to COVID-19 vaccine safety: VAERS**	Dr. Su (CDC)
▪ **Updates to COVID-19 vaccine safety: v-safe**	Dr. Hause (CDC)
▪ **Updates to COVID-19 vaccine safety: VSD**	Dr. Klein (KPNC)
Break	
▪ **PUBLIC COMMENT**	
▪ **Updates to Clinical Considerations**	Dr. Twentyman (CDC)
▪ **Updates to EtR Framework: Pfizer-BioNTech COVID-19 vaccine booster doses in adolescents 12–15 years of age**	Dr. Oliver (CDC)
▪ **Discussion**	
▪ **VOTE** COVID-19 vaccine booster doses in adolescents 12–15 years of age	

2. Updates to COVID-19 vaccine safety: VAERS (John R. Su, CDC)

U.S. reports to VAERS among children and adolescents ages 5–11 and 12–15 years after Pfizer-BioNTech COVID-19 vaccination* (as of Dec 19, 2021)

Age group	Median age	Male n (%)	Female n (%)	Non-serious n (%)	Serious† n (%)	Total reports	Doses admin‡
5–11 years	8 years	1,896 (45)	1,911 (45)	**4,149 (98)**	100 (2)	4,249	8,674,378
12–15 years	13 years	4,946 (47)	5,381 (51)	**9,612 (92)**	846 (8)	10,458	18,707,169

- For both age groups, most reports (≥92%) were non-serious
- Distribution by sex similar

* Among children ages 5–11 years vaccinated during Nov 3–Dec 19, 2021, and among children and adolescents ages 12–15 years vaccinated during May 12–Dec 19, 2021; reports received and processed as of Dec 19, 2021.

† Includes 3 deaths (2 medically complex patients, 1 with influenza) among ages 5–11 years, and 12 deaths with no observable common mechanism among ages 12–15 years.

‡ Doses administered among children ages 5–11 years during Nov 4–Dec 16, 2021, and for children and adolescents ages 12–15 years during May 12–Dec 16, 2021.

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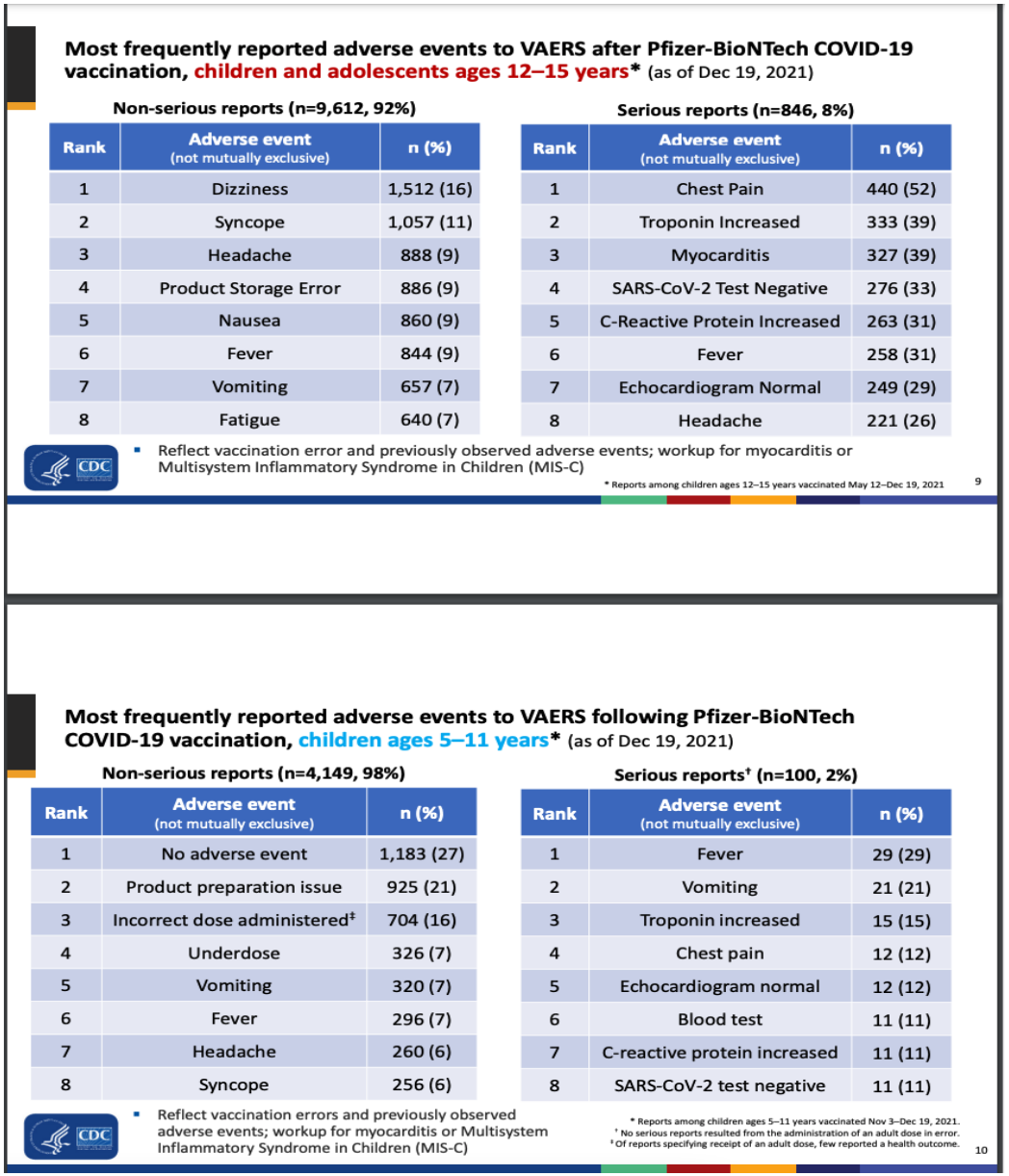

Most frequently reported adverse events to VAERS after Pfizer-BioNTech COVID-19 vaccination, children and adolescents ages 12–15 years* (as of Dec 19, 2021)

Non-serious reports (n=9,612, 92%)

Rank	Adverse event (not mutually exclusive)	n (%)
1	Dizziness	1,512 (16)
2	Syncope	1,057 (11)
3	Headache	888 (9)
4	Product Storage Error	886 (9)
5	Nausea	860 (9)
6	Fever	844 (9)
7	Vomiting	657 (7)
8	Fatigue	640 (7)

Serious reports (n=846, 8%)

Rank	Adverse event (not mutually exclusive)	n (%)
1	Chest Pain	440 (52)
2	Troponin Increased	333 (39)
3	Myocarditis	327 (39)
4	SARS-CoV-2 Test Negative	276 (33)
5	C-Reactive Protein Increased	263 (31)
6	Fever	258 (31)
7	Echocardiogram Normal	249 (29)
8	Headache	221 (26)

- Reflect vaccination error and previously observed adverse events; workup for myocarditis or Multisystem Inflammatory Syndrome in Children (MIS-C)

* Reports among children ages 12–15 years vaccinated May 12–Dec 19, 2021

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Most frequently reported adverse events to VAERS following Pfizer-BioNTech COVID-19 vaccination, children ages 5–11 years* (as of Dec 19, 2021)

Non-serious reports (n=4,149, 98%)

Rank	Adverse event (not mutually exclusive)	n (%)
1	No adverse event	1,183 (27)
2	Product preparation issue	925 (21)
3	Incorrect dose administered‡	704 (16)
4	Underdose	326 (7)
5	Vomiting	320 (7)
6	Fever	296 (7)
7	Headache	260 (6)
8	Syncope	256 (6)

Serious reports† (n=100, 2%)

Rank	Adverse event (not mutually exclusive)	n (%)
1	Fever	29 (29)
2	Vomiting	21 (21)
3	Troponin increased	15 (15)
4	Chest pain	12 (12)
5	Echocardiogram normal	12 (12)
6	Blood test	11 (11)
7	C-reactive protein increased	11 (11)
8	SARS-CoV-2 test negative	11 (11)

- Reflect vaccination errors and previously observed adverse events; workup for myocarditis or Multisystem Inflammatory Syndrome in Children (MIS-C)

* Reports among children ages 5–11 years vaccinated Nov 3–Dec 19, 2021.
† No serious reports resulted from the administration of an adult dose in error.
‡ Of reports specifying receipt of an adult dose, few reported a health outcome.

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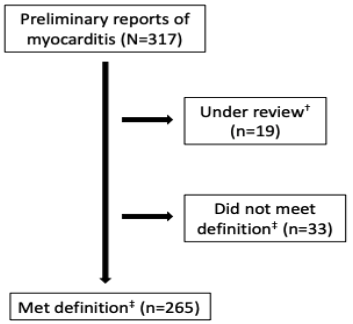
Reports to VAERS of myocarditis after Pfizer-BioNTech COVID-19 vaccination among children and adolescents ages 12–15 years* (as of Dec 19, 2021)

- 265 reports of myocarditis verified to meet case definition
  - Median age: 14 years (IQR: 13–15 years)
  - Median time to onset: 2 days (IQR: 1–3 days)
  - After dose 1 = 41; after dose 2 = 221
  - 238 (90%) males, 27 (10%) females
    - 251 hospitalized patients (241 discharged home)
    - 224 patients with known outcomes
      - 208 (92%) recovered from symptoms at time of report
      - 16 (8%) mostly reported improved, or resolved, symptoms, but ongoing physical restrictions or still under investigation
- Doses administered = 18,707,169§



* Reports of children and adolescents ages 12–15 years vaccinated May 12–Dec 19, 2021
† Awaiting medical records and/or healthcare provider interview; some still processing
‡ Adjudicated after healthcare provider interview and/or medical record review
§ Doses administered among children and adolescents ages 12–15 years May 12–Dec 16, 2021

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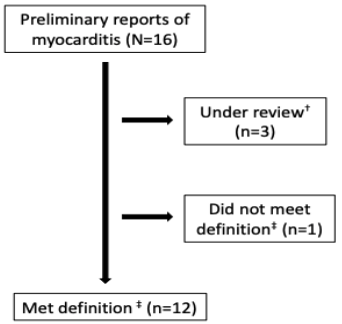
Reports to VAERS of myocarditis after Pfizer-BioNTech COVID-19 vaccination among children ages 5–11 years* (as of Dec 19, 2021)

- 12 reports of myocarditis verified to meet case definition
  - Median age: 10 years (IQR: 9–11 years)
  - Median time to onset: 2 days (IQR: 2–3 days)
  - After dose 1 = 2; after dose 2 = 9; not reported = 1
  - 8 (67%) males, 4 (33%) females
    - All discharged home
    - 8 recovered from symptoms at time of report
    - 4 still recovering at time of report
    - None reported a vaccination error
- Doses administered = 8,674,378§



* Reports of children ages 5–11 years vaccinated Nov 3–Dec 19, 2021
† Awaiting medical records and/or healthcare provider interview; some still processing
‡ Adjudicated after healthcare provider interview and/or medical record review
§ Doses administered among children ages 5–11 years Nov 4–Dec 16, 2021

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Reporting rates of myocarditis (per 1 million doses administered) after Pfizer-BioNTech COVID-19 vaccination, 7-day risk interval*

	Males		Females	
Age group	**Dose 1**	**Dose 2**	**Dose 1**	**Dose 2**
5–11 years	0.0	4.3	Not calculated†	2.0
12–15 years	4.8	45.7	1.0	3.8
16–17 years (included for reference)	6.1	70.2	0.0	7.6

- **37,810,998** total doses 1 and 2 of vaccine administered‡
- Reporting rates exceed background incidence (peach shaded cells) §
  - Males: after dose 1 (ages 12–15 and 16–17 years) and after dose 2 (ages 5–11, 12–15, and 16–17 years)
  - Females: after dose 2 (ages 12–15 and 16–17 years)
  - Reporting rates among males substantially lower among ages 5–11 vs. 12–15 and 16–17 years

* Reports of myocarditis after doses 1 and 2 of Pfizer-BioNTech COVID-19 vaccine during a 7-day risk interval after vaccination (as of Dec 19, 2021); reports verified to meet case definition by healthcare provider interview and/or medical record review.
† Too few reports of females ages 5–11 years to calculate a stable rate.
‡ Children ages 5–11 years vaccinated Nov 3–Dec 19, 2021, children and adolescents ages 12–15 years vaccinated May 12–Dec 19, 2021.
§ 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.

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Summary of VAERS findings — Reports after Pfizer-BioNTech COVID-19 vaccination among children and adolescents ages 5–11 and 12–15 years

- Since authorization, 8.7 million doses of Pfizer-BioNTech COVID-19 vaccine administered to children ages 5–11-years, and 18.7 million doses to children and adolescents ages 12–15-years, in the Unites States
- Regardless of age group, most reports (≥92%) were non-serious
  - Distribution by sex, race, and ethnicity similar between the two age groups
  - Most frequently reported adverse events (AEs) were known and well-characterized AEs associated with Pfizer-BioNTech COVID-19 vaccination, or consistent with vaccination errors or workup for myocarditis or MIS-C
  - Reported myocarditis among children ages 5–11 years:
    - Male predominance and mostly after dose 2, similar to older age groups
    - **Reporting rates for males ages 5–11-years substantially lower than for males ages 12–15 and 16–17-years**
- CDC will continue monitoring COVID-19 vaccine safety among these age groups

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Reports to VAERS after Pfizer-BioNTech COVID-19 booster vaccination among persons ages 16–24 years * (as of Dec 19, 2021)

Age group	Male n (%)	Female n (%)	Non-serious n (%)	Serious† n (%)	Total reports	Doses administered‡
16–17 years	11 (48)	12 (52)	22 (96)	1 (4)	23	47,040
18–24 years	140 (32)	303 (68)	423 (95)	21 (5)	444	929,842

- Most reports (≥95%) non-serious

* Among adolescents ages 16–17 years who received dose 3 of Pfizer-BioNTech vaccine during Dec 9–Dec 19, 2021, and persons ages 18–24 years who received dose 3 of Pfizer-BioNTech vaccine during Sep 22–Dec 19, 2021; processed and received as of Dec 19, 2021.
† Per federal law, includes reports of hospitalization, prolongation of existing hospitalization, life threatening condition, permanent disability, congenital deformity or birth defect, or death.
‡ Doses administered as of Dec 16, 2021.

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Most frequently reported adverse events to VAERS after Pfizer-BioNTech COVID-19 booster vaccination, ages 16–24 years*

Non-serious reports (n=445, 95%)

Rank	Adverse event (not mutually exclusive)	n (%)
1	Fever	66 (15)
2	Dizziness	61 (14)
3	Pain	59 (13)
4	Chills	54 (12)
5	Headache	53 (12)
6	Fatigue	51 (12)
7	Nausea	47 (11)
8	Pain in extremity	40 (9)

Serious† reports (n=22, 5%)

Rank	Adverse event (not mutually exclusive)	n (%)
1	Chest pain	10 (46)
2	Myocarditis	6 (27)
3	Nausea	6 (27)
4	Fever	6 (27)
5	Troponin increased	6 (27)
6	Palpitations	5 (23)
7	Chest discomfort	4 (18)
8	Blood test	3 (14)

- Reflect previously observed adverse events; workup for myocarditis

* Among adolescents ages 16–17 years who received dose 3 of Pfizer-BioNTech vaccine Dec 9–Dec 19, 2021, and persons ages 18–24 years who received dose 3 of Pfizer-BioNTech vaccine Sep 22–Dec 19, 2021; Reports processed and received as of Dec 19, 2021.
† Per federal law, serious reports include reports of hospitalization, prolongation of existing hospitalization, life threatening condition, permanent disability, congenital deformity or birth defect, or death.

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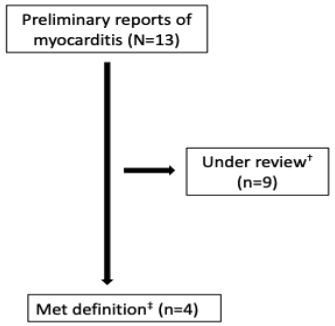
Reports of myocarditis to VAERS after Pfizer-BioNTech COVID-19 booster vaccination among persons ages 16–24 years*

- 13 preliminary reports of myocarditis
  - Median age: 21 years (IQR: 20–22 years)
  - Median time to onset: 1 day (IQR: day of vaccination–1 day)
  - 9 (69%) males, 4 (31%) females
  - 4 reports met case definition
    - 2 reports among ages 16–17 years§
    - 2 reports among ages 18–24 years
    - All reported patients recovered at time of report
- Doses administered = 976,882¶



* Among adolescents ages 16–17 years receiving dose 3 of Pfizer-BioNTech vaccine Dec 9–Dec 19, 2021, and persons ages 18–24 years receiving dose 3 of Pfizer-BioNTech vaccine Sep 22–Dec 19, 2021; reports processed and received as of Dec 19, 2021.
† Awaiting medical records and/or healthcare provider interview; some still processing.
‡ Adjudicated after healthcare provider interview and/or medical record review.
§ One report identified after Dec 19 but vaccinated during Sep 22–Dec 19, 2021.
¶ Doses administered as of Dec 16, 2021.

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Summary of VAERS findings after Pfizer-BioNTech COVID-19 booster vaccination, ages 16–24 years

- Since authorization, Pfizer-BioNTech COVID-19 vaccine booster doses have been administered to ~47,000 persons ages 16–17 years and ~930,000 persons ages 18–24 years in the United States
- Most reports (95%) were non-serious (similar to primary series)
  - Most frequently reported AEs were known and well-characterized AEs associated with Pfizer-BioNTech COVID-19 vaccination, or consistent with workup for myocarditis
  - 13 preliminary reports of myocarditis following a booster dose
    - 4 reports met CDC case definition (9 still under review)
      - All 4 reported patients had recovered from symptoms at time of report
    - Characteristics of case reports appear consistent with other reports of myocarditis after dose 1 and dose 2
- CDC will continue to monitor the safety of COVID-19 vaccine booster doses

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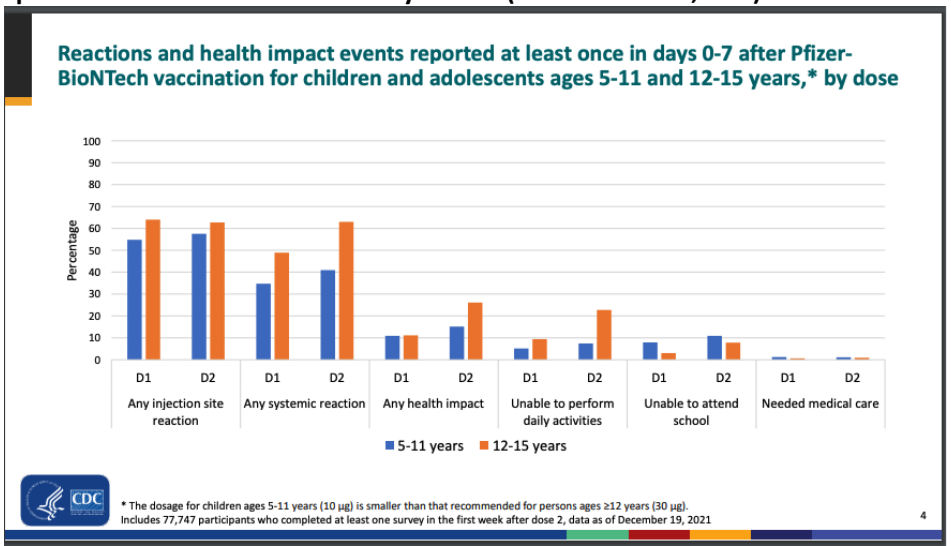
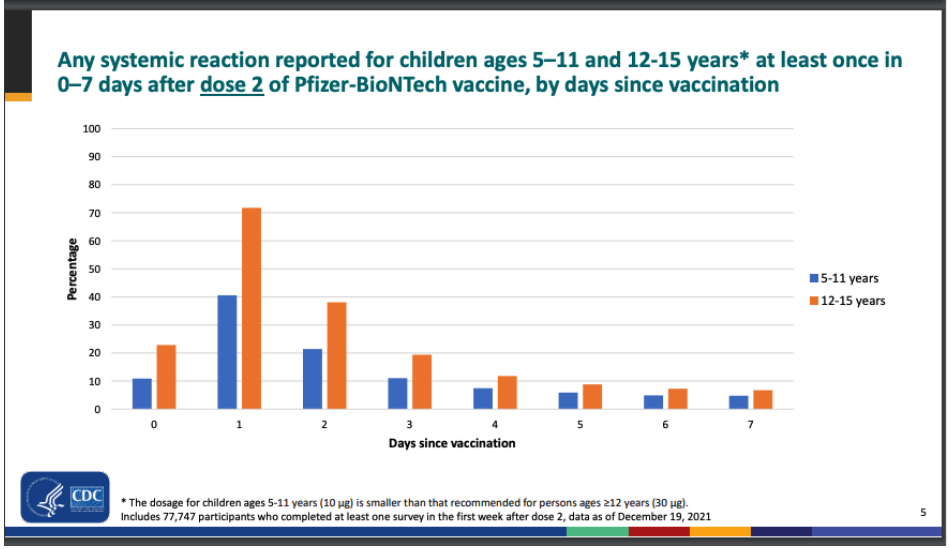
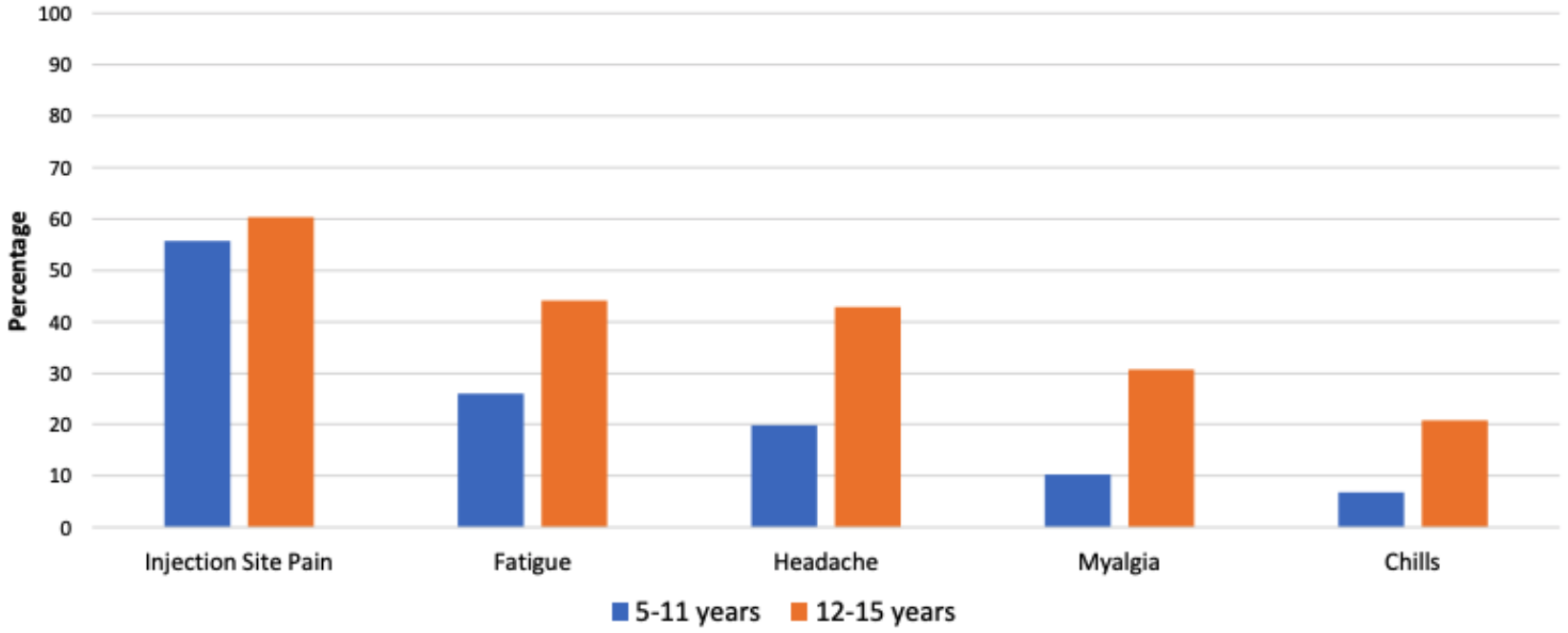
3. Updates to COVID-19 vaccine safety: v-safe (Anne M. Hause, CDC)





Top 5 reactions reported at least once in 0–7 days after dose 2 of Pfizer-BioNTech vaccine for children ages 5-11 and 12-15 years*



* The dosage for children ages 5-11 years (10 µg) is smaller than that recommended for persons ages ≥12 years (30 µg).
Includes 77,747 participants who completed at least one survey in the first week after dose 2, data as of December 19, 2021

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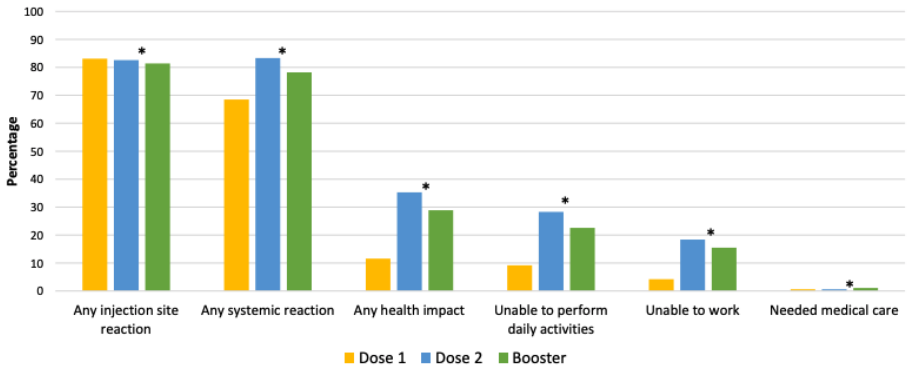
Reactions and health impact events reported by v-safe participants ages 16-24 years at least once in days 0-7 after Pfizer-BioNTech vaccination, by dose



Includes 7,088 participants who completed at least one survey in the first week after each dose, data collected during September 22–December 19, 2021
* Dose 2 compared to dose 3: statistically significant difference (p-value <0.05) using multivariable generalized estimating equations model that accounted for the correlation between registrants and adjusted for demographic variables. All differences were reported less frequently following booster dose than dose 2, except "needed medical care" which was more frequently reported.

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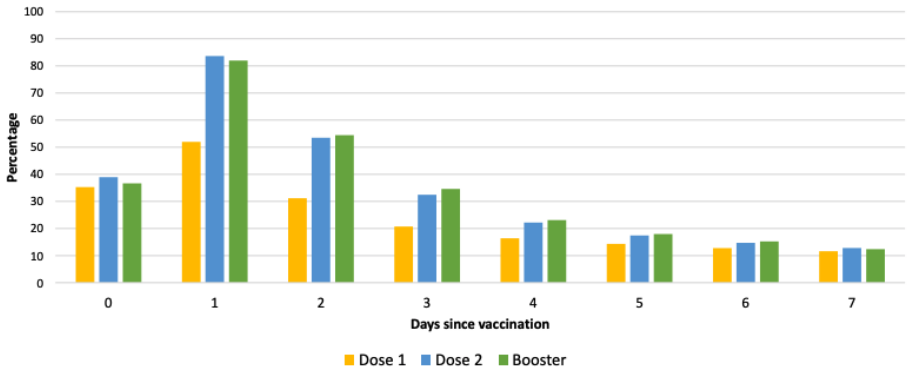
Any systemic reaction reported for v-safe participants ages 16-24 years at least once in 0–7 days after Pfizer-BioNTech vaccine, by dose and days since vaccination



Includes 7,088 participants who completed at least one survey in the first week after each dose, data collected during September 22–December 19, 2021

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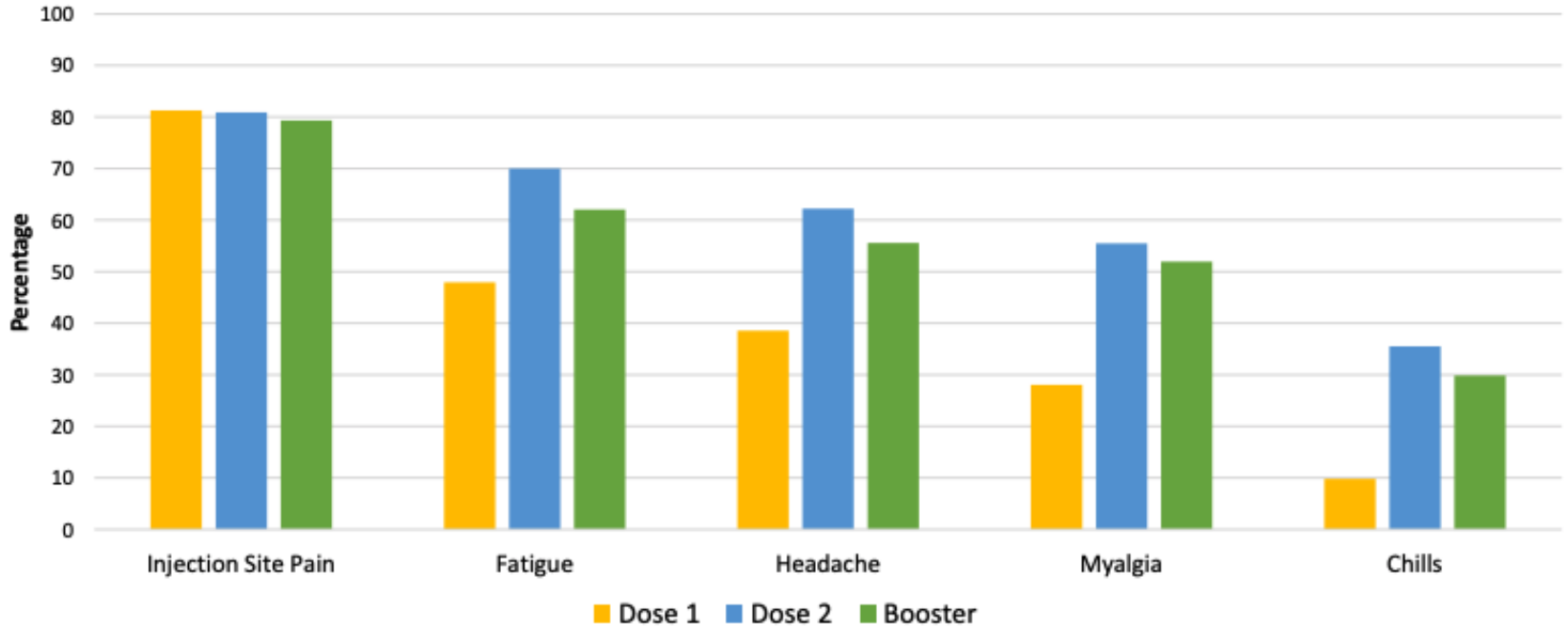
Top 5 reactions reported by v-safe participants ages 16-24 years at least once 0-7 days following Pfizer-BioNTech vaccination, by dose



Includes 7,088 participants who completed at least one survey in the first week after each dose, data collected during September 22–December 19, 2021

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Summary

- Over 115,208 v-safe participants ages 5-15 years have reported Pfizer-BioNTech vaccination
  - Reactions were generally mild to moderate and most frequently reported the day after vaccination
  - Reactions were more frequently reported after dose 2 than dose 1
  - Participants ages 5-11 years reported reactions less frequently than participants ages 12-15 years
- Over 7,088 v-safe participants ages 16-24 years reported a homologous Pfizer-BioNTech booster dose
  - Reactions were generally mild to moderate and most frequently reported the day after vaccination
  - Reactions were less frequently reported after booster dose than dose 2

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4. Updates to COVID-19 vaccine safety: VSD (Nicola Klein, Kaiser Permanente Vaccine Study Center)

VSD COVID-19 Vaccine RCA Outcomes

#	Outcomes	Settings	Risk Interval (days)	Chart Review	Monitoring Only	Exclude if COVID-19 in the Prior X Days
1	Acute disseminated encephalomyelitis	E, I	1-21, 1-42	Yes		
2	Acute myocardial infarction – **First Ever**	E, I	1-21, 1-42			30 days
3	Acute respiratory distress syndrome	E, I	0-84		Yes	42 days
4	Anaphylaxis – **First in 7 days**	E, I	0-1	Yes	Yes	
5	Appendicitis	E, I	1-21, 1-42			
6	Bell's palsy – **First Ever**	E, I, O	1-21, 1-42			30 days
7	Cerebral venous sinus thrombosis	E, I	1-21, 1-42	Yes		30 days
8	Disseminated intravascular coagulation	E, I	1-21, 1-42			42 days
9	Encephalitis / myelitis / encephalomyelitis	E, I	1-21, 1-42			30 days
10	Guillain-Barré syndrome	E, I	1-21, 1-42	Yes		
11	Immune thrombocytopenia	E, I, O	1-21, 1-42			30 days
12	Kawasaki disease	E, I	1-21, 1-42			
13	Multisystem inflammatory syndrome in children/adults (MIS-C/MIS-A)	E, I	0-84		Yes	
14	Myocarditis / pericarditis – **First in 60 Days**	E, I	1-21, 1-42	Yes (40 years of age and younger)		30 days
15	Narcolepsy / cataplexy	E, I, O	0-84		Yes	
16	Pulmonary embolism – **First Ever**	E, I	1-21, 1-42			30 days
17	Seizures	E, I	1-21, 1-42			30 days
18	Stroke, hemorrhagic	E, I	1-21, 1-42			30 days
19	Stroke, ischemic	E, I	1-21, 1-42			30 days
20	Thrombosis with thrombocytopenia syndrome – **First Ever**	E, I	1-21, 1-42	Yes		30 days
21	Thrombotic thrombocytopenic purpura	E, I	1-21, 1-42			30 days
22	Transverse myelitis	E, I	1-21, 1-42	Yes		
23	Venous thromboembolism – **First Ever**	E, I, O	1-21, 1-42			30 days

Abbreviations: E=ED, I=Inpatient, O=Outpatient

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Myocarditis/Pericarditis: Electronic Case Identification using ICD-10 Codes

Initial Code List (based on consultation with cardiologist)	Revised Code List (based on VSD feedback)
• B33.22 Viral myocarditis • B33.23 Viral pericarditis • I30.* Acute pericarditis • I40.* Acute myocarditis	• B33.22 Viral myocarditis • B33.23 Viral pericarditis • I30.* Acute pericarditis • I40.* Acute myocarditis • I51.4 Myocarditis, unspecified • I31.9 Disease of the pericardium, unspecified

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Analytic Strategy

- For the primary analysis, the number of outcomes observed in the risk interval (1-21 days) after COVID-19 vaccination were compared to the number expected.
- The expected was derived from "vaccinated concurrent comparators" who were in a comparison interval (days 22-42) after COVID-19 vaccination.
- On each day that an outcome occurred, vaccinees who were in their risk interval were compared with similar vaccinees who were concurrently in their comparison interval.
  - —Comparisons were adjusted for age group, sex, race/ethnicity, VSD site, as well as calendar date.

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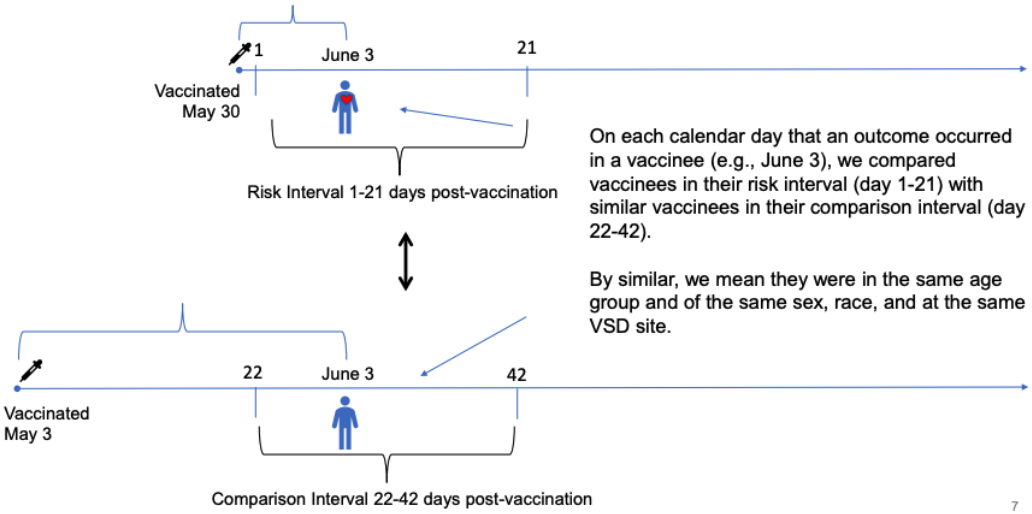
Vaccinee with Myocarditis in Risk Interval and a Concurrent Comparator



On each calendar day that an outcome occurred in a vaccinee (e.g., June 3), we compared vaccinees in their risk interval (day 1-21) with similar vaccinees in their comparison interval (day 22-42).

By similar, we mean they were in the same age group and of the same sex, race, and at the same VSD site.

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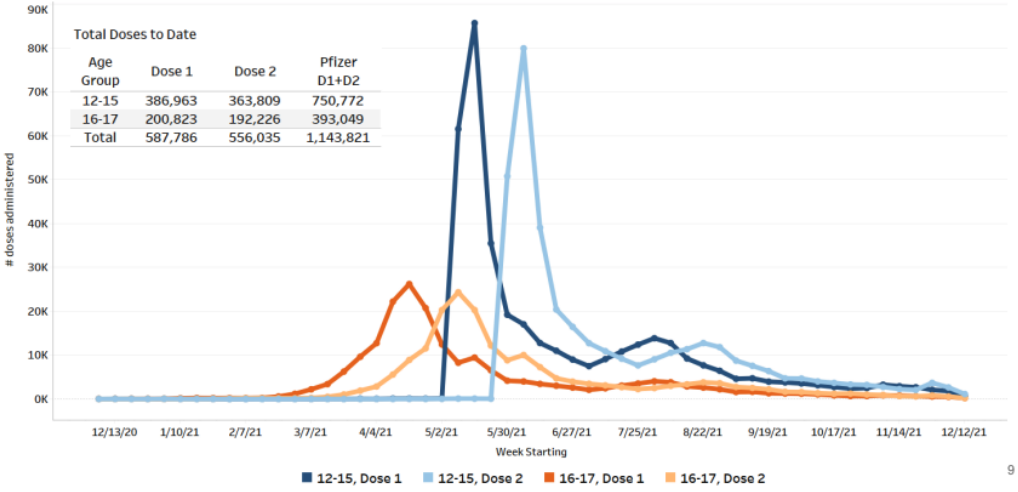
Pfizer Vaccine Totals by Week and Adolescent Age Group

Total Doses to Date

Age Group	Dose 1	Dose 2	Pfizer D1+D2
12-15	386,963	363,809	750,772
16-17	200,823	192,226	393,049
Total	587,786	556,035	1,143,821



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Myocarditis/Pericarditis Chart Review Summary

- Chart review completed through **December 30, 2021** for 53/75 cases aged 12-17 years (22 pending)
  - ✓Cases identified any time after dose 1 or 2 of Pfizer COVID-19 vaccine
- Initial chart review followed with adjudication by an infectious disease clinician and/or a cardiologist
  - ✓Confirm incident following vaccination
  - ✓Meet CDC case definition (myocarditis, pericarditis, or myopericarditis)
  - ✓Evaluate level of certainty for myocarditis
- **Adjudication confirmed 47/53 (89%) myocarditis/pericarditis cases**
  - ✓43 validated cases among 12–17-year-olds, with onset 0-21 days after vaccination
  - ✓39 validated cases among 12–17-year-olds, with onset 0-7 days after vaccination

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Characteristics of Validated Myocarditis/Pericarditis Cases Aged 12-17 Years in the 0-21 Days after Pfizer COVID-19 Vaccine (N=43)

Level of Care and Status	No. (%)
Highest level of care	
Emergency department	4 (9%)
Admitted to hospital (not ICU)	28 (65%)
Admitted to ICU	11 (26%)
Length of hospital stay, median days (range)	2 (0-7)
0 days (same day discharge)	3 (7%)
1 day	12 (28%)
2 days	8 (19%)
3 days	8 (19%)
4 days	5 (12%)
5 days*	4 (9%)
≥6 days*	3 (7%)
Discharged to home	43 (100%)
Follow-up visit noted at the time of chart review	31 (72%)

*All cases with a length of stay ≥5 days were admitted to the ICU

12

Characteristics of Validated Myocarditis/Pericarditis Cases Aged 12-17 Years that were Admitted to the ICU (N=11)

- Age range: 13-17 years
- Sex: All male
- Race/ethnicity: 5 Hispanic, 4 White, 1 Black, 1 unknown
- Adjudicated Diagnosis: 4 acute myocarditis, 7 myopericarditis
- Among those admitted to ICU during hospitalization, median LOS (range): 5 days (2-7 days)
- Chart notes for 2 cases indicated ICU admission was preventative; one additional chart noted that ICU admission was unrelated to myocarditis.

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Validated Myocarditis/Pericarditis, among 12–17-Year-Olds in the 0-7 and 0-21 Day Risk Interval after Pfizer Vaccine by Dose

Compared with Outcome Events in Vaccinated Comparators on the Same Calendar Days

				Analysis			
Risk Interval	**Dose**	**Events in Risk Interval**	**Events in Comparison Interval[1]**	**Adjusted Rate Ratio[2]**	**95% Confidence Interval**	**2-Sided P-value**	**Excess Cases in Risk Period per 1 Million Doses**
Days 0-21	**Both Doses**	45	3	**10.16**	**3.41 – 42.39**	**<0.001**	**36.2**
	Dose 1	3	3	1.16	0.17 – 8.05	0.873	0.7
	Dose 2	39	3	**15.21**	**5.07 – 63.70**	**<0.001**	**70.8**
Days 0-7	**Both Doses**	41	3	**29.63**	**9.76 – 125.24**	**<0.001**	**34.6**
	Dose 1	1	3	1.25	0.04 – 13.93	0.836	0.3
	Dose 2	37	3	**46.18**	**15.07 – 196.40**	**<0.001**	**70.2**

[1]**Comparison interval** is 22–42 days after either dose.
[2]**Adjusted** for VSD site, 5-year age group, sex, race/ethnicity, and calendar date.

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Follow-Up Information on Validated Myocarditis/Pericarditis Cases Aged 12-17 Years (N=24)*

Follow-Up Visit Timing, Symptoms, and Diagnostic Testing	No. (%)
Time from discharge to follow-up visit, median (range)	**88.5 days (28-153 days)**
Follow-up visit at least 3 months since initial encounter	13 (54%)
No new or worsening symptoms noted	13 (54%)
Any new or worsening symptom (not mutually exclusive)	11 (46%)
Chest pain/pressure/discomfort	9 (38%)
Shortness of breath/pain with breathing	3 (13%)
Palpitations	3 (13%)
Fatigue	1 (4%)
Other (orthostatic hypotension, dizziness, etc.)	3 (13%)
Troponin level obtained	18 (75%)
Abnormal troponin level	4/18 (22%)
Electrocardiogram completed	18 (75%)
Abnormal findings	9/18 (50%)
Echocardiogram completed	17 (71%)
Abnormal findings	2/17 (12%)
Cardiac MRI completed	1 (4%)
Abnormal findings	0 (0%)

*Only included cases with at least 1 follow-up visit at least 1 month since initial episode.
6 of these cases were admitted to the ICU during their initial encounter.

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Follow-Up Information on Validated Myocarditis/Pericarditis Cases Aged 12-17 Years (N=24)*

Status at Time of Most Recent Follow-Up Visit	No. (%)
Current Status (not mutually exclusive)	
Recovered: no symptoms, medication, or exercise restrictions	11 (46%)
Still symptomatic	7 (29%)
Still on medication (e.g., NSAIDs, colchicine)	2 (8%)
Still on exercise/physical activity restrictions	6 (25%)

*Only included cases with at least 1 follow-up visit at least 1 month since initial episode.
6 of these cases were admitted to the ICU during their initial encounter.

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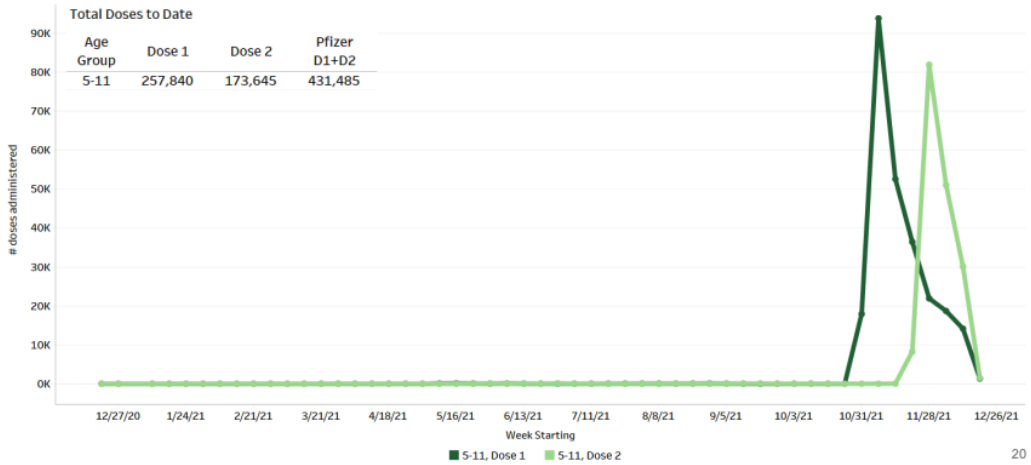
Pfizer Vaccine Totals by Week for Children Aged 5-11 Years

Total Doses to Date

Age Group	Dose 1	Dose 2	Pfizer D1+D2
5-11	257,840	173,645	431,485



20

RCA Analyses for 5–11-Year-Olds

- Same methods used for children aged 5-11 years, as for adults and adolescents
- In the VSD, there are ~848,300 children aged 5-11 years
- As of Dec 25, 2021, 431,485 doses of Pfizer COVID-19 vaccine have been administered in this age group
  - Dose 1: 257,840
  - Dose 2: 173,645
- In the 1–21-day risk window, we have electronically identified small numbers of cases for:
  - Appendicitis (n=9)
  - Seizures (n=2)
  - Myocarditis/pericarditis (n=2)
- So far 2 potential cases of myocarditis/pericarditis have been chart reviewed
  - Of the 2, chart review verified one 11-year-old as acute pericarditis 19 days after dose 2; chart review did not verify the other.
- No statistical signals have been identified to date

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Summary of the Analyses of COVID-19 Vaccine Safety Among 12–17 and 5–11-Year-Olds

- Among 12–17-year-olds, the rate ratio for myocarditis/pericarditis was elevated during days 0-7 after Dose 2.
  - The excess risk was 0.3 cases per million 1st doses.
  - The excess risk was 70 cases per million 2nd doses.
- The VSD has administered 431,485 Pfizer doses to children aged 5-11 years.
- In the VSD, there have been no safety signals among 5–11-year-olds.

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5. Updates to Clinical Considerations (Evelyn Tentyman, CDC)

Newest formulation of Pfizer-BioNTech COVID-19 Vaccine

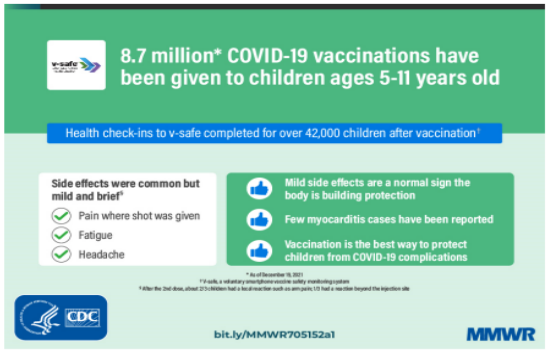
Description	Dilute Before Use	Do Not Dilute	Dilute Before Use
Age Group	12 years and older[1,2]	12 years and older[3]	5 through 11 years[4] ("Age 5y to <12y" on vial label)
Vial Cap Color	Purple 	Gray 	Orange 
Dose	30 mcg	30 mcg	10 mcg
Dose Volume	0.3 mL	0.3 mL	0.2 mL
Amount of Diluent Needed per Vial*	1.8 mL	NO DILUTION	1.3 mL
Doses per Vial	6 doses per vial (after dilution)	6 doses per vial	10 doses per vial (after dilution)
Storage Conditions			
Ultra-Low-Temperature (ULT) Freezer [-90°C to -60°C (-130°F to -76°F)]	9 months[1]	6 months[3]	6 months[3]
Freezer [-25°C to -15°C (-13°F to 5°F)]	2 weeks	DO NOT STORE	DO NOT STORE
Refrigerator [2°C to 8°C (35°F to 46°F)]	1 month	10 weeks	10 weeks
Room Temperature [8°C to 25°C (46°F to 77°F)]	2 hours prior to dilution (including any thaw time)	12 hours prior to first puncture (including any thaw time)	12 hours prior to dilution (including any thaw time)
After First Puncture [2°C to 25°C (35°F to 77°F)]	Discard after 6 hours	Discard after 12 hours	Discard after 12 hours

Image Credit: Pfizer-BioNTech, Vaccine Formulation Presentation Guide

6

Some children ages 5–11 years with immunocompromise should receive an additional Pfizer-BioNTech primary series dose

- Vaccine effectiveness is lower among patients with immunocompromise[1]
- CDC recommends an additional primary series mRNA vaccine dose in people with immunocompromise aged ≥12 years[2]
- Approximately 1.4 million children ages 5-17 have an immunocompromsing condition[3]
- Safety findings from VAERS and v-safe during administration of >8 million doses of Pfizer-BioNTech: rare reporting of any serious side effects[4]



1 Embi et al MMWR 5 Nov 2021; 2 CDC Interim Clinical Considerations; 3 Patel et al EID 2021; 4 Hause et al MMWR 31 Dec 2021

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Moderately and severe immunocompromise

- Active treatment for solid tumor and hematologic malignancies
- Receipt of solid-organ transplant and taking immunosuppressive therapy
- Receipt of CAR-T-cell or hematopoietic stem cell transplant (within 2 years of transplantation or taking immunosuppression therapy)
- Moderate or severe primary immunodeficiency (e.g., DiGeorge, Wiskott-Aldrich syndromes)
- Advanced or untreated HIV infection
- Active treatment with high-dose corticosteroids (i.e., ≥20mg prednisone or equivalent per day), alkylating agents, antimetabolites, transplant-related immunosuppressive drugs, cancer chemotherapeutic agents classified as severely immunosuppressive, TNF blockers, and other biologic agents that are immunosuppressive or immunomodulatory

CDC https://www.cdc.gov/coronavirus/2019-ncov/vaccines/recommendations/immuno.html

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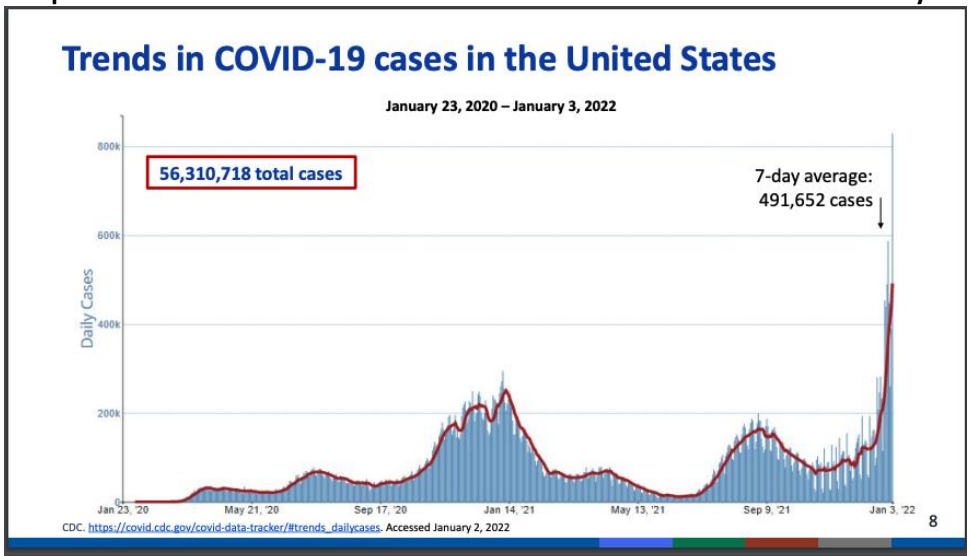
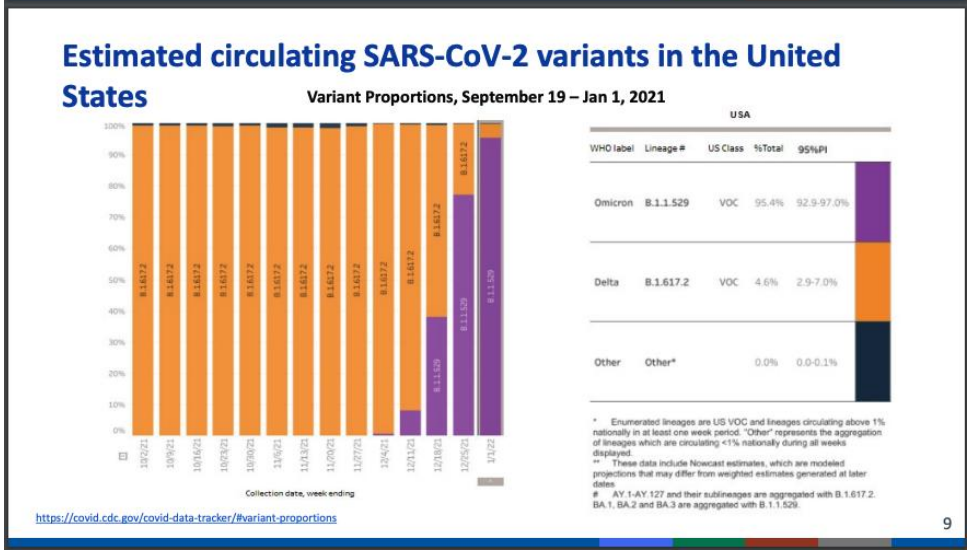
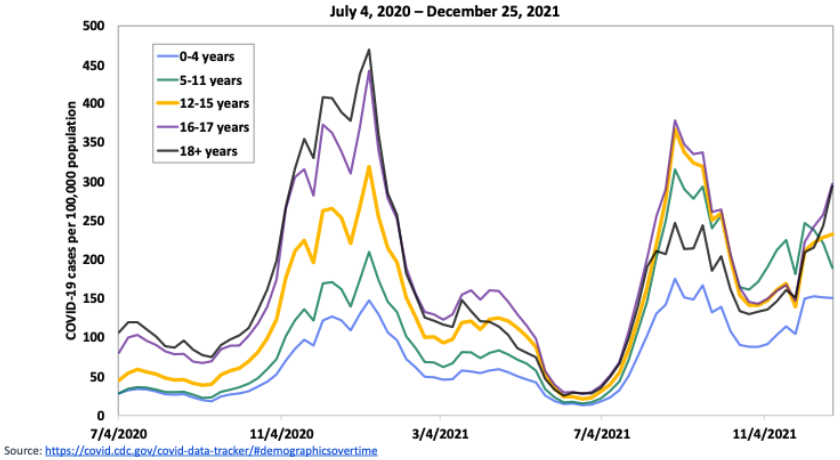
6. **Updates to EtR Framework: Pfizer-BioNTech vaccine booster doses in 12-15 year olds (Sara Oliver, CDC)**



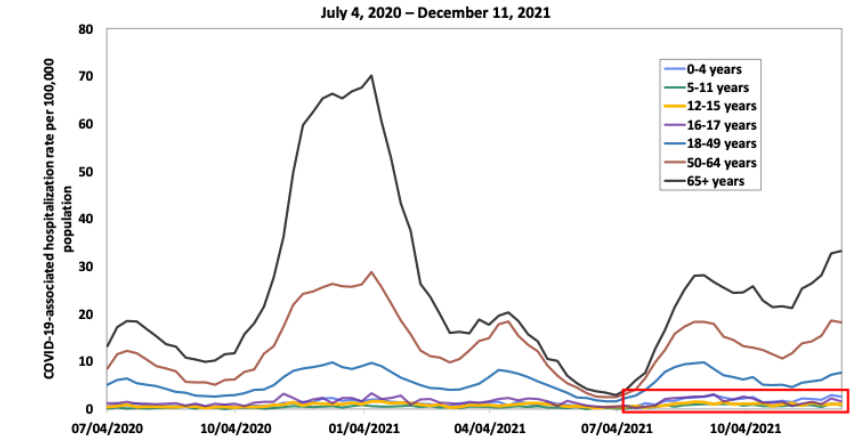


COVID-19 incidence rates, by age group



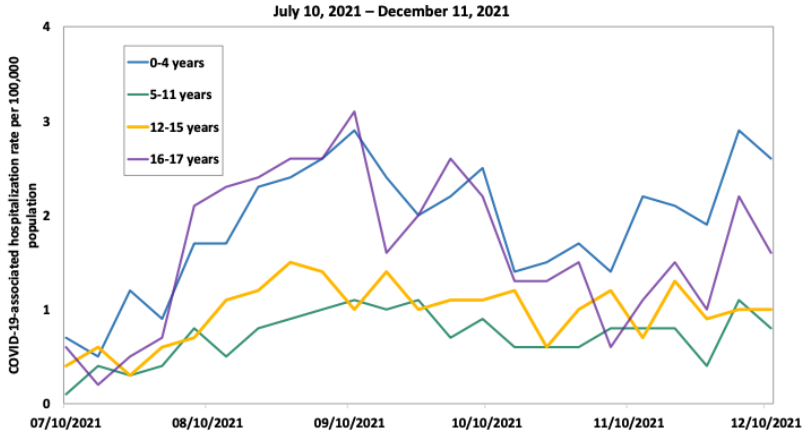
Source: https://covid.cdc.gov/covid-data-tracker/#demographicsovertime

COVID-19-associated hospitalization rates, by age group



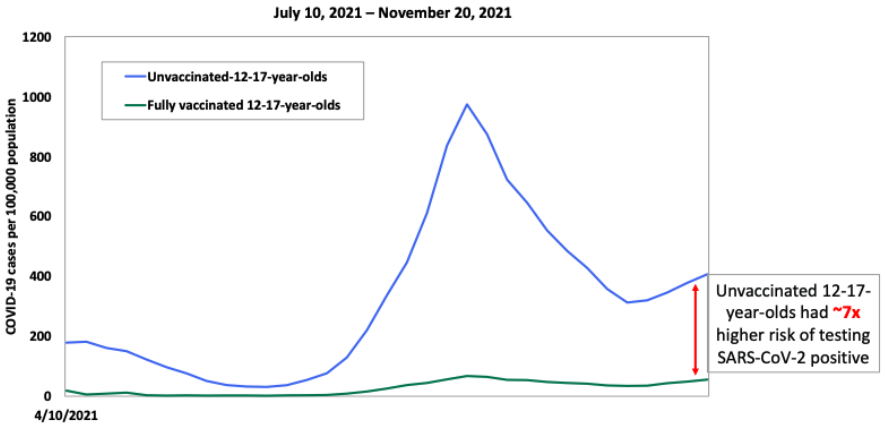
Source: CDC's COVID-NET, https://covid.cdc.gov/covid-data-tracker/#covidnet-hospitalization-network

COVID-19-associated hospitalization rates among pediatric age groups



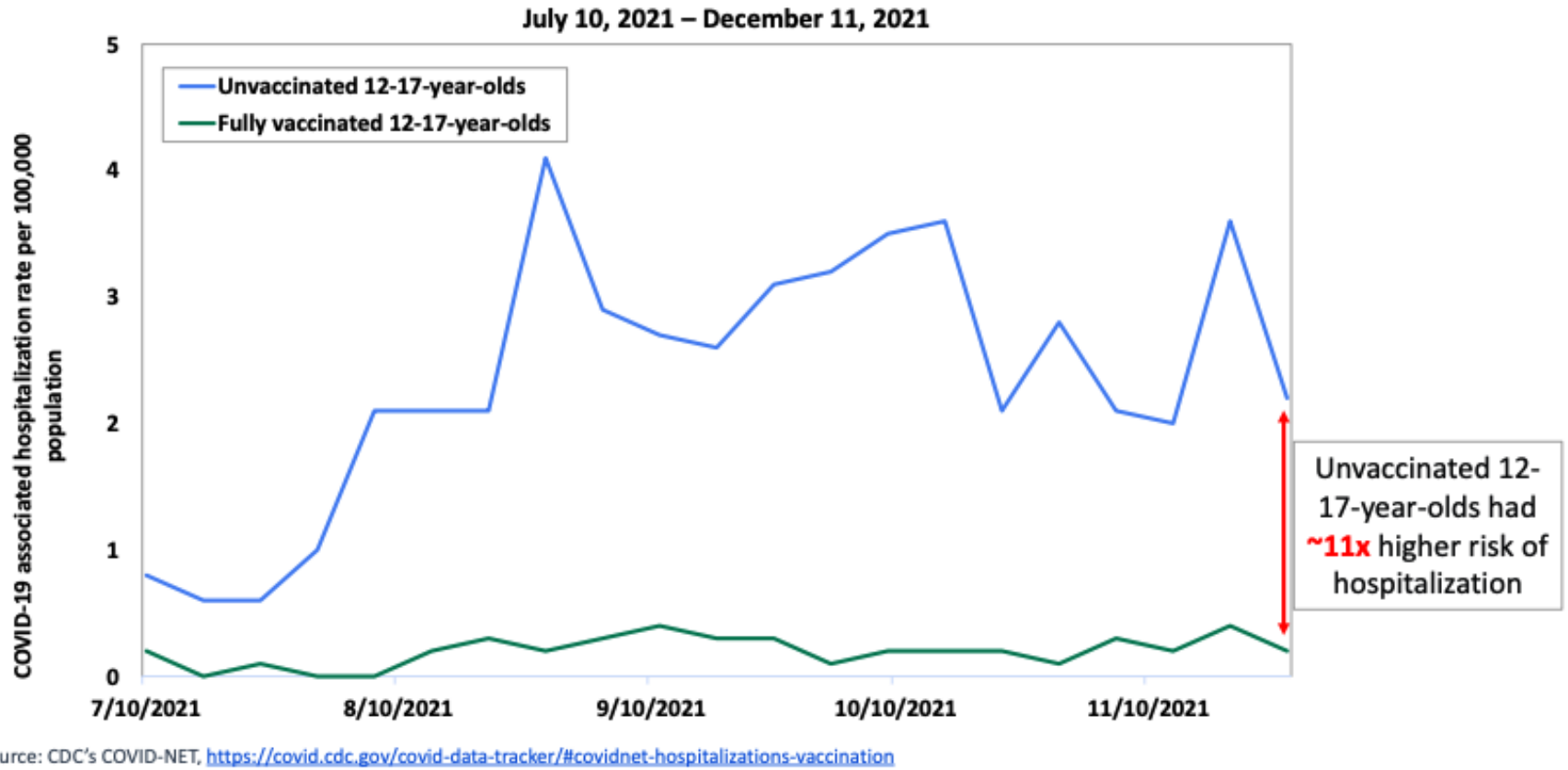
Source: CDC's COVID-NET, https://covid.cdc.gov/covid-data-tracker/#covidnet-hospitalization-network

COVID-19-incidence rates among 12–17-year-olds, by vaccination status



Source: https://covid.cdc.gov/covid-data-tracker/#rates-by-vaccine-status

COVID-19-associated hospitalization rates among 12–17-year-olds, by vaccination status



Source: CDC's COVID-NET, https://covid.cdc.gov/covid-data-tracker/#covidnet-hospitalizations-vaccination

Estimate of Vaccine Effectiveness of Pfizer-BioNTech COVID-19 Vaccine in Preventing SARS-CoV-2 Infection Among Adolescents Aged 12–17 Years — Arizona, July–December 2021

- **Design:** prospective cohort study
- **Period:** July 25th –December 4th
- **Population:** children and adolescents, aged 12–17 years in the PROTECT prospective cohort study. PROTECT participants in Arizona were recruited from families of adults participating in the HEROES study and the general public
- **Adjusted using:** inverse probability of treatment weighting approach with individual propensities to be vaccinated during each week based on sociodemographic characteristics, health information, frequency of close social contact, percentage of time wearing masks, and local virus circulation

Lutrick K, et al. MMWR. DOI: http://dx.doi.org/10.15585/mmwr.mm705152a2

Estimate of Vaccine Effectiveness of Pfizer-BioNTech COVID-19 Vaccine in Preventing SARS-CoV-2 Infection Among Adolescents Aged 12–17 Years — Arizona, July–December 2021

Pfizer COVID-19 vaccination status	No. of contributing participants*	Total person-days	No. of days, median (IQR)	No. of SARS-CoV-2 infections	VE, % (95% CI)	
					Unadjusted	Adjusted†,§
Unvaccinated	66	4,288	62 (23–98)	16	—	—
Partially vaccinated (≥14 days after dose 1 to day 13 after dose 2)	30	909	21 (20–28)	0	—	—
Fully vaccinated (≥14 days after dose 2)	190	21,693	119 (105–133)	5	94 (83–98)	92 (79–97)

* Contributing participants in vaccination categories did not equal the number of participants in the study because participants could contribute to more than one vaccination category since vaccination status varies by time.
† Adjusted VE is inversely weighted for propensity to be vaccinated; all covariates met balance criteria of standardized mean difference (SMD)<0.2 after weighting except community mask use and local virus circulation (SMD = 0.228 and 0.288, respectively), but community mask use was only found to change VE estimate by ≥5% when added to the model and was therefore included as a covariate in the Cox regression model for VE.
§ Five participants missing community mask use were excluded from analysis; this exclusion did not affect the VE estimate.

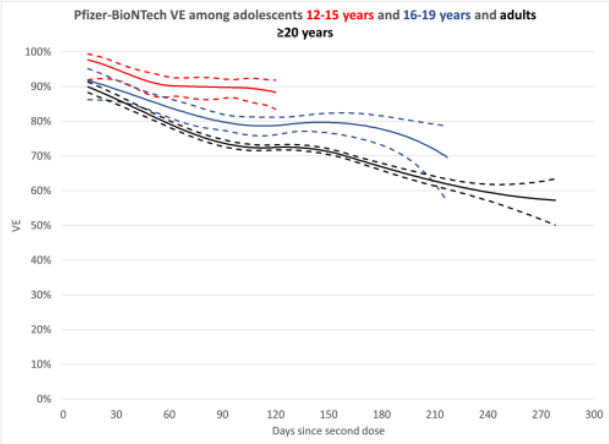
Lutrick K, et al. MMWR. DOI: http://dx.doi.org/10.15585/mmwr.mm705152a2

Increasing Community Access to Testing (ICATT) Partnership: VE analysis for symptomatic infection, July 18–October 17, 2021

- Nationwide community-based COVID-19 drive-through testing at pharmacies
- Self-reported vaccine history at time of registration for COVID-19 testing; excluded those who did not report vaccination status (~4% of records among adolescents)
- **Design**: Test-negative, case-control assessment
- **Period**: July 18-October 17 (Delta variant represented >90% of nationally sequenced specimens)
- **Population**: Persons aged 12-15, 16-19, ≥20 years with COVID-like illness (CLI) and laboratory-based nucleic acid amplification testing (NAAT)
- **Adjusted for**:
  - Calendar day, race, ethnicity, gender, site's state, site census tract's social vulnerability index (SVI)
  - **Not** adjusted for underlying conditions or prior infection

Comparison of Pfizer-BioNTech VE against symptomatic infection between adolescents 12-15 and 16-19 years and adults ≥20 years and day since the second dose, July 18-October 17

- VE is highest among ages 12-15 years, then 16-19 years, then adults ≥20 years
- VE wanes among all age groups with increasing time since vaccination
- Analysis reflects period with predominance of Delta variant



Confidence intervals shown in dotted lines. The presented (fitted) curves are truncated on the day with ≤10 cases observed beyond it to avoid presenting wide confidence bounds.

Effectiveness of Pfizer-BioNTech mRNA Vaccination Against COVID-19 Hospitalization Among Persons Aged 12–18 Years — United States, June–September 2021

- **Design:** test negative, case control
- **Period:** June 1st – September 30th
- **Population:** children and adolescents, aged 12-18 years hospitalized at 19 pediatric hospitals in 16 states
- **Adjusted for:** census region, calendar month of admission, age, sex, race/ethnicity

Olson SM, et al. MMWR 2021;70:1483–1488. DOI: http://dx.doi.org/10.15585/mmwr.mm7042e1

Vaccine effectiveness against COVID-19 hospitalization among patients aged 12–18, 19 pediatric hospitals, 16 states, July – September, 2021

Age group, yrs	No. vaccinated/Total (%)		Vaccine effectiveness, % (95% CI)
	Case-patients	Controls	
All	6/179 (3.4)	93/285 (32.6)	93 (83–97)
12–15	4/106 (3.8)	53/179 (29.6)	91 (74–97)
16–18	2/73 (2.7)	40/106 (37.7)	94 (78–99)

- **Limitation:** VE estimate reflects Delta dominant period

Olson SM, et al. MMWR 2021;70:1483–1488. DOI: http://dx.doi.org/10.15585/mmwr.mm7042e1

Effectiveness of Pfizer-BioNTech COVID-19 vaccine against MIS-C

- Using a test-negative case-control design that included 102 MIS-C case-patients and 181 hospitalized controls 12–18 years of age:
  - Vaccine effectiveness of 2-doses of the Pfizer-BioNTech vaccine against MIS-C was **91**% (95% CI = 78%–97%)
    - This estimate was calculated in consideration of children hospitalized a minimum of 28 days after receipt of their 2nd dose
  - 97/102 (95%) of hospitalized children with MIS-C were unvaccinated
  - None of the five vaccinated MIS-C patients required respiratory or cardiovascular life support (invasive mechanical ventilation, vasoactive infusions, or ECMO) compared to 38/97 (39%) of unvaccinated MIS-C patients

Data in press for Friday, Jan 7th, upcoming MMWR

Summary

Public Health Problem

- US experiencing substantial **increase** in cases over last month
- **Omicron** variant represents over half of recent U.S. cases
- COVID-19 cases and hospitalizations **7–11 times higher** in unvaccinated adolescents, compared to vaccinated adolescents
- Vaccine effectiveness in adolescents 12–15 years of age remains high, but may have some waning over time
  - Current VE estimates primarily in the setting of the **Delta variant**

Summary of the phase 2/3 trial data, primary series in 12-15-year-olds: Benefits

- The clinical trial for the Pfizer-BioNTech COVID-19 vaccine demonstrated efficacy against symptomatic, laboratory-confirmed COVID-19. There were no COVID-19 cases among the 1,001 vaccine recipients and 16 COVID-19 cases among 972 placebo recipients for a vaccine efficacy of **100%**
- The geometric mean ratio (GMR) for antibodies in 12–15-year-olds compared with 16–25-year-olds was 1.76 (95% CI:1.47, 2.10), and **met the noninferiority criteria**
- No hospitalizations due to COVID-19 or cases of MIS-C were reported by any trial participants

Frenck et al., New England Journal of Medicine, 2021

Summary of the phase 2/3 trial data, primary series in 12-15-year-olds: Harms

- Serious adverse events (SAE) were reported in a higher proportion of recipients of vaccine versus placebo (0.4% vs 0.2%) based on 5 SAEs in the vaccine group and 2 in the placebo group
- Severe reactions were more common in vaccine recipients; a grade ≥3 reaction was reported by 10.7% of vaccinated versus 1.9% of placebo group

Frenck et al., New England Journal of Medicine, 2021

Rate ratio for infection, booster doses compared to primary series
Israel, July 30–October 10, 2021

- Real world effectiveness data from Israel: 4.7 million individuals ≥16 years of age
  - Booster dose given 5 months after a 2-dose Pfizer-BioNTech COVID-19 vaccine primary series demonstrated efficacy against confirmed infection in all age groups
  - Among 16–29 year olds, the rate ratio for infection in the non-boosted group vs boosted group was **17.2**

Age group	Rate Ratio (95% CI)
≥60 yr	12.3 (11.8–12.8)
50–59 yr	12.2 (11.4–13.0)
40–49 yr	9.7 (9.2–10.3)
30–39 yr	9.0 (8.4–9.7)
16–29 yr	17.2 (15.4–19.2)

Bar-On et al., New England Journal of Medicine, 2021

Myocarditis in Israel

Reported after Pfizer-BioNTech COVID-19 vaccine, as of December 15, 2021

	Age (years)	Post-dose 1 Rate per 100,000	Post-dose 2 Rate per 100,000	Post-dose 3 Rate per 100,000	Number of 3rd dose delivered
Females	12-15	0	0.6	0	3,156
	16-19	0	0.9	1.6	125,088
	20-24	0.4	2.0	0	171,870
	25-29	0	0.9	0	156,673
	≥30	0.1	0.4	0.1	1,658,035
Males	12-15	0.5	6.6	0	3,178
	16-19	1.2	15.3	6.5	123,355
	20-24	2.1	10.5	4.7	171,235
	25-29	1.1	8.3	0.6	162,360
	≥30	0.3	1.5	1.0	1,554,155

No cases of myocarditis reported after a 3rd dose in 12–15 year olds, out of **6,334** doses provided

Data from: מצגת של PowerPoint (www.gov.il)

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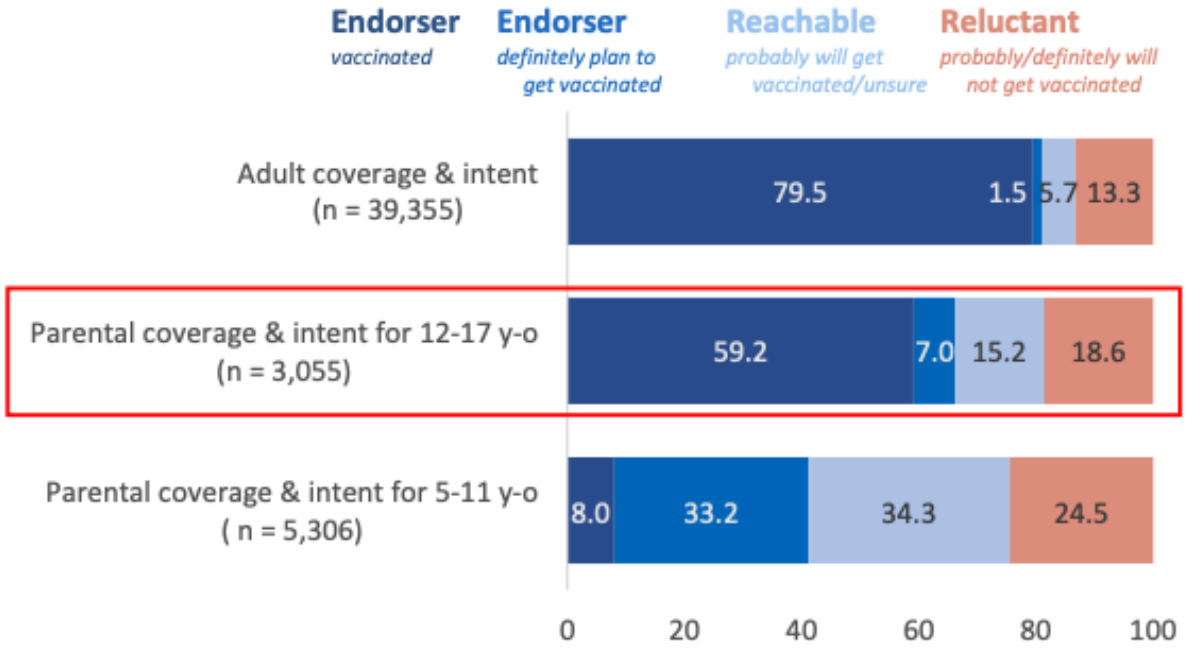
Summary

Benefits and Harms

- In the setting of Omicron, likely lower vaccine effectiveness in all populations, compared to effectiveness seen with Delta variant
- Higher antibody titers improve neutralization of Omicron variant; booster doses of COVID-19 vaccines increase neutralization titers
- Impact of booster dose on neutralizing antibody or VE in adolescents 12–15 years of age is unknown, but likely to provide additional protection
- Myocarditis rates after booster dose likely lower than what is seen after a 2nd dose in younger adolescents

Coverage and intent for vaccination among adults, adolescents, 12 – 17 years and children, 5 – 11 years



- 59% of 12-17-year-olds were vaccinated, but 7% of parents definitely planned to vaccinate their 12-17-year-old (unrealized intent)
- 8% of 5-11-year-olds were vaccinated, 33% of parents definitely planned to vaccinate their child

CDC Preliminary & Unpublished data, National Immunization Survey, October 31, 2021 – November 27, 2021

Summary

- Vaccine uptake among 12-17-year-olds has slowed over the past two months
  - As more information emerges on the potential impact of the Omicron variant in children, parents' attitudes towards vaccinating their teenagers and younger children for COVID-19 may change
- Parents of adolescents and children are concerned about the potential unknown long-term side effects

VaST assessment: Pfizer-BioNTech COVID-19 vaccine booster dose in 12–15-year-olds

- VaST reviewed the most recent data from three U.S. safety monitoring systems*, including data on safety after the primary vaccination series in 12–15-year-olds and after booster doses in 16–24-year-olds (the youngest age group for which boosters were previously authorized)
- No new safety signals or concerns were identified
- At the present time, data do not suggest safety concerns regarding a Pfizer-BioNTech COVID-19 vaccine booster dose for 12–15-year-olds, beyond those previously identified in older age groups

*VAERS, v-safe, VSD

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Work Group Interpretation

- Top priority remains **vaccination** of **unvaccinated individuals**
  - **Benefits** of COVID-19 vaccine primary series **outweigh risk** across all sex and age groups

Goals of COVID-19 vaccines:

- Primary goal: Prevention of **severe disease**
- Secondary goals:
  - Maintaining workforce and healthcare capacity
  - Reduce infection rates and risk of transmission
  - Greater confidence in in-person learning
  - Improved mental health with more social interactions
  - Prevention of post-COVID conditions

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Work Group Interpretation

- Work Group **supported** use of boosters in adolescents 12–15 years of age
- Emphasized the importance of **clear** and **consistent** recommendations for all adolescents (12–17 years of age)
- Vaccine recommendations can be updated as needed, especially in rapidly evolving pandemic

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ACIP Vote
Interim Recommendation

A single Pfizer-BioNTech COVID-19 vaccine booster dose is recommended for persons aged **12–17 years** at least **5 months** under the FDA's Emergency Use Authorization

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Proposed recommendations for COVID-19 vaccine booster doses

Age	Pfizer-BioNTech COVID-19 vaccine primary series	Moderna COVID-19 vaccine primary series	Janssen COVID-19 vaccine primary series
≥18 years	**Should** receive a booster **5 months** after receipt of primary series dose	**Should** receive a booster **6 months** after receipt of primary series dose	**Should** receive a booster **2 months** after receipt of primary series dose
12–17 years	**Should** receive a booster **5 months** after receipt of primary series dose	Not authorized	Not authorized

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N.B. This is the recommendation that was voted on 13-1 in favor of the “should” rather than “may” language for 12-17yo adolescents (with extensión to include 16-17yo as well).

Safety Platforms for Emergency vACcines (SPEAC)
Brighton Collaboration
The Task Force for Global Health
330 W. Ponce de Leon Avenue Decatur, GA 30030
Email: bc-coordinator@taskforce.org

www.brightoncollaboration.us