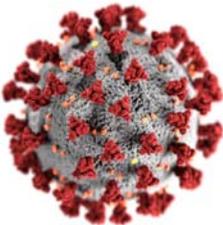
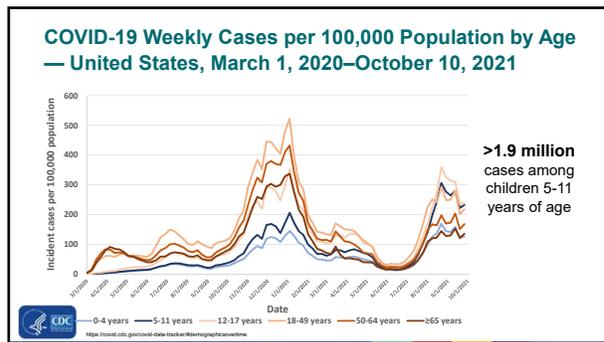


Pfizer-BioNTech COVID-19 Vaccine in Children aged 5–11 Years



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 cdc.gov/coronavirus



Summary SARS-CoV-2 epidemiology in children aged 5–11 years

- Children are at least as likely to be infected with SARS-CoV-2 as adults
 - Over 1.9 million reported cases; seroprevalence estimated ~38% among 5–11 years in Sept 2021
 - Infections in children less likely to be reported as cases than infections in adults
- Children 5-11 years of age are at risk of severe illness from COVID-19
 - >8,300 COVID-19 related hospitalizations as of mid-October
 - 94 COVID-19 deaths (1.7% of all deaths among U.S. children 5–11 years)
 - Cumulative hospitalization rate is similar to pre-pandemic influenza seasons
 - Severity comparable among children hospitalized with influenza and COVID-19, with approximately 1/3 of children 5–11 years requiring ICU admission
 - MIS-C most frequent among children 5–11 years; 2,316 cases reported among this age group
 - Post-COVID conditions have been reported in children
- Secondary transmission from young school-aged children occurs in household and school settings

Other pediatric 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

¹Ngitt TM, Wise ME, Bell BP, Finelli L. Declining hepatitis A mortality in the United States during the era of hepatitis A vaccination. J Infect Dis 2008; 197:1282-8.
²National Notifiable Diseases Surveillance System with additional serogroup and outcome data from Enhanced Meningococcal Disease Surveillance for 2015-2020.
³Meier PA, Seward JF, Jenkins AD, Whitman MK. Varicella mortality trends before vaccine licensure in the United States, 1970-1994. J Infect Dis 2003; 188:300-306. doi:10.1093/infdis/j15714
⁴Young SW, Murphy TV. Historical comparisons of morbidity and mortality for vaccine-preventable diseases in the United States. JAMA 2007; 298:2155-63.
⁵Chen R, Kaper JB, Holmes RK, et al. The epidemiology of rotavirus diarrhea in the United States: surveillance and estimates of disease burden. J Infect Dis 2006; 194:1497-1501.

Indirect impacts of COVID-19 pandemic on children

-  - Worsening of mental or emotional health
-  - Widening of existing education gaps
-  - Decreased physical activity and increased body mass index (BMI)
-  - Decreased healthcare utilization
-  - Decreased routine immunizations
-  - Increase in Adverse Childhood Experiences (ACEs)
-  - Loss of caregivers

Symptomatic lab-confirmed COVID-19

- Pfizer-BioNTech COVID-19 vaccine phase 2/3 randomized controlled trial (RCT)*
- Randomized 2:1 vaccine to placebo (median follow-up time: 3.3 months)
- Vaccine efficacy against symptomatic lab-confirmed COVID-19 was **90.9%** (95% CI: 68.3%, 98.3%)
 - 3 cases in the vaccine arm (N=1461; surveillance time: 369 person-years)
 - 16 cases in the placebo arm (N=714; surveillance time: 179-person-years)
- The geometric mean ratio (GMR) for antibodies in 5–11-year-olds compared with 16–25-year-olds was **1.04** (95% CI:0.93, 1.18), and met the noninferiority criteria

*Unpublished, data obtained from sponsor

Serious adverse events (SAE)

- Pfizer-BioNTech phase 2/3 randomized controlled trial (RCT)*
- None of the SAEs were assessed by the investigator as related to study intervention.
- No deaths were reported in any trial participants
- Initial Enrollment Group (median follow-up time: 3.3 months)
 - 1 SAEs in 1 participants in the vaccine group (n=1518)
 - Limb fracture
 - 2 SAEs in 1 in the placebo group (n=750)
 - Pancreatitis
 - Abdominal pain
- Safety Expansion Group (median follow-up time: 2.4 weeks)
 - 3 SAEs in 3 participants in the vaccine group (n=1591)
 - Infective arthritis (infection of the knee)
 - Foreign body ingestion of a penny
 - Epiphyseal fracture
 - 0 SAEs in the placebo group (n=788)

*Unpublished, data obtained from sponsor; randomized 2:1 vaccine to placebo

Reactogenicity, severe (grade ≥3)

- Pfizer phase 2/3 randomized controlled trial (RCT)* solicited events from participants or reported by their parent/legal guardian through electronic diaries for 7 days following each dose
- Local reactions (redness, swelling, pain at the injection site) and systemic reactions (fever, nausea/vomiting, headache, fatigue, chills, new or worsened muscle pain, new or worsened joint pain) were reported for 7 days after each dose
 - 2.7% of children in the vaccine arm vs 1.1% in the placebo arm had a local or system grade ≥ 3 reaction after either dose
 - Most reactions were grade 3; 1 child in the vaccine arm with had a grade 4 fever >40.0°C; there were no other grade 4 reactions
 - More common after Dose 2; pain at injection site, fatigue and headache were the most common

*Unpublished, data obtained from sponsor

Summary

COVID-19 vaccines and seropositivity

Data from Phase 3 clinical trial

- ~9% of children in clinical trial were baseline SARS-CoV-2 seropositive
- Post-vaccination antibodies **higher** in children who were baseline seropositive
- Rates of local and systemic reactions, as well as adverse events, were **lower** in children who were baseline seropositive

Data from U.S. studies

- Approximately **38%** of children aged 5–11 years have evidence of prior SARS-CoV-2 infection based on seroprevalence estimates
- Prior infection can result in protection against infection but not 100% and likely decreases over time
- Children have a greater proportion of asymptomatic infection relative to adults¹⁻⁴
 - Asymptomatic infection can result in lower antibody levels than severe disease

1. Viner RM, Ward H, Hudson L, et al. [published online ahead of print, 2020 Dec 17]. Arch Dis Child. 2020;arndis.2020.220872
 2. Hwang O, Kimball T, Tang X, Tang L, Lee D, Shaha Z. [published online ahead of print, 2021 Jan 14]. Arch Dis Child. 2021;arndis.2021.440-448
 3. Diamond C, Foxworth G, Vignelli V, et al. [published online ahead of print, 2021 Dec 12]. JAMA Network Open. 2021;24:e2130011. doi:10.1001/jamanetworkopen.2021.4217
 4. Khatib J, Galloway S, Khatib S, et al. [published online ahead of print, 2021 Dec 12]. JAMA Network Open. 2021;24:e2130012. doi:10.1001/jamanetworkopen.2021.4218

Balance of benefits and risks by seropositive status

- Delta-wave surges of pediatric COVID-19 hospitalizations occurred even with seroprevalence ~38%, suggesting this alone is not sufficient to provide broad protection
- Limited data on rates of reinfection in children
- Protection against asymptomatic/mild infection important outcome in children
 - MIS-C typically occurs after asymptomatic or mild infection; post-COVID conditions can also occur after mild infection
- No concerns identified in safety surveillance with seropositive adolescents and adults
 - Individuals 12-64 years with seropositivity >30%
- Vaccine recommendations that require serologic testing place unnecessary barriers
- Limited data to estimate impact of vaccination of seropositive children, but risks minimal
- **Balance of benefits and risks favorable for vaccination of all children**

Estimated benefits for every million Pfizer-BioNTech COVID-19 vaccinations in children 5-11 years of age using pandemic-average incidence

Recent Epidemiology 5-11 years	Pandemic Average 5-11 years
58,204 COVID-19 cases prevented	18,549 COVID-19 cases prevented
226 hospitalizations prevented	80 hospitalizations prevented
132 MIS-C cases prevented	42 MIS-C cases prevented
72 ICU admissions prevented	26 ICU admissions prevented

Assumptions: Benefits accrue over 180 days (6 months); VE against symptomatic COVID-19: 90%; VE against hospitalization: 95%
 Data Sources: COVID Data Tracker: <https://covid.cdc.gov/covid-data-tracker/#/ncs/citation-demographics>; COVID Data Tracker: <https://covid.cdc.gov/covid-data-tracker/#/ncs/citation-demographics>
 Recent epidemiology data from the week ending on 9/11/2021; Pandemic average data were averaged for the entire pandemic through the week ending on 10/16/2021.

Vaccine-associated myocarditis

- Identified rates of myocarditis are based on data from adolescents and adults receiving 30ug dose of Pfizer-BioNTech COVID-19 vaccine
 - Dose in pediatric (5–11-year-old) age group: 10ug dose
- Rare event, but most common in males 12–29 years of age
- No cases of myocarditis occurred during the clinical trials with 5–11-year-olds
 - N=3,082 with at least 7 days of follow up reported

Estimated risks for every million Pfizer-BioNTech COVID-19 vaccinations in children 5-11 years of age

 Rates of myocarditis after vaccination in 5–11-year-olds unknown
No cases occurred during clinical trials (n=3,082 with at least 7 days follow-up)
Myocarditis after vaccination in 5–11-year-old population likely **lower** than rates seen in 12–15-year-olds
Underlying epidemiology of viral myocarditis varies greatly between children aged 5–11 and 12–17 years: substantially **lower** in children 5–11 years of age
Dose used in 5–11-year-olds (10µg) is a third of dose used in 12–15-year-olds (30µg)

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Benefits and risks of Pfizer-BioNTech COVID-19 vaccine for children 5–11 years of age

Benefits

- Prevention of COVID-19 cases
- Likely prevention of hospitalizations, MIS-C and deaths and post-COVID conditions
- Possible prevention of transmission
- Greater confidence in safer return to school and social interactions



Risks

- Myocarditis or other rare events after mRNA vaccines?
- Short-term reactivity

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Benefits and Harms

Summary

- Clinical trial demonstrated Pfizer-BioNTech COVID-19 vaccine is **safe, immunogenic and efficacious** in children 5–11 years of age
 - Trial not powered to assess rate of rare adverse events; no cases of myocarditis in ~3100 vaccinated children
- Balance of benefits and risks varies by incidence of COVID-19
 - Largest benefits with higher incidence
- Benefit/risk balance **favorable**, regardless of seropositivity rates
 - While many children 5–11 years of age may be seropositive, unknown duration of protection for asymptomatic infection in children
 - Safety data reassuring in seropositive population

Parental surveys

Intent to have children vaccinated

- Among parents surveyed, **34–57%** plan to get their children vaccinated¹⁻⁶
- 90%** of parents ‘very worried’ their child would get COVID-19 reported intent to vaccinate their child, compared to **7%** of parents ‘not worried at all’⁵
- 82%** of fully vaccinated parents reported intent to vaccinate their child, compared to **1%** of parents who are unvaccinated/do not plan to get vaccinated⁵
- Among parents of teens who discussed vaccination with their pediatrician, **three-quarters** of those whose pediatrician recommended vaccination say their child received at least 1 dose⁶

1. Schlegel PC, et al. Parents' Intentions and Perceptions About COVID-19 Vaccination for Their Children: Results From a National Survey [published online ahead of print, 2021 Aug 25]. Pediatrics. 2021;147(10):e202102333.
2. Suggs NM, et al. Parents' Intentions to Vaccinate Their Children Against COVID-19 [published online ahead of print, 2021 Jun 16]. J Public Health Care.
3. Suggs NM, et al. The Willingness of Parents to Vaccinate Their Children Against COVID-19. JAMA. 2021;325(16):1541-1542.
4. Suggs NM, et al. The Willingness of Parents to Vaccinate Their Children Against COVID-19. JAMA. 2021;325(16):1541-1542.
5. Gallup Poll. Poll: Possible #1. https://www.gallup.com/1000000/parents-worried-about-covid-19.aspx. Accessed September 29, 2021.
6. Jones L, et al. MIS-C and Myocarditis After COVID-19 Vaccination: A Systematic Review. Pediatrics. 2021;147(10):e202102333. Accessed October 1, 2021.

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 µg	10 µg
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

Formulation and Dosing for Pfizer-BioNTech COVID-19 Vaccines

	Formulation for ≥12-year-olds (purple cap)	Formulation for 5–11-year-olds (orange cap)
Number of doses	2	2
Interval	3 weeks (21 days)	3 weeks (21 days)
Additional primary dose	Moderate and severe immunocompromise	Not recommended
Booster dose	Not recommended 12–17 years	Not recommended
	Recommended for certain groups ≥18 years*	

*Individuals 65 years and older or individuals ages 18 years and older who live in long-term care settings, have underlying medical conditions, or who work or live in high-risk settings. Mbaeyi S, Oliver SE, Collins JP, et al. The Advisory Committee on Immunization Practices' Interim Recommendations for Additional Primary and Booster Doses of COVID-19 Vaccines — United States, 2021. MMWR Morb Mortal Wkly Rep. ePubs. 28 October 2021.

Vaccine Dosage

- Children should receive the age-appropriate vaccine formulation regardless of their size or weight.
 - As opposed to many medications, vaccine dosages are based on age and not size or weight.
- The dosage should be based on the child's age on the day of vaccination.
 - If a child turns from 11 to 12 years of age in between their first and second dose and receives the 5–11 years 10 µg (orange cap) for their second dose, they do not need to repeat the dose and this is not considered an error under the EUA.

Summary

Since beginning of the COVID-19 pandemic, among U.S. children 5-11 years of age, there have been

1.9 million cases

8,300 hospitalizations

2,316 MIS-C cases

94 deaths

COVID-19 is now
vaccine preventable

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ACIP Vote – Interim Recommendation

The Pfizer-BioNTech COVID-19 vaccine is recommended for children 5–11 years of age in the U.S. population under the FDA's Emergency Use Authorization.