Epidemiology of COVID-19 in Children Aged 5 – 11 years

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Overview of COVID-19 in Children Aged 5 – 11 Years

- Incidence and seroprevalence estimates
- COVID-19-associated hospitalization rates and mortality
- Multisystem Inflammatory Syndrome in Children (MIS-C)
- Post-COVID conditions
- Transmission
Incidence and Seroprevalence
COVID-19 Weekly Cases per 100,000 Population by Age — United States, March 1, 2020–October 10, 2021

>1.9 million cases among children 5-11 years of age

https://covid.cdc.gov/covid-data-tracker/#demographics overtime
Proportion of Total COVID-19 Cases by Age Group — United States, March 1, 2020–October 10, 2021

Children 5-11 years are making up a greater proportion of total cases: **10.6%** of cases the week of October 10, 2021.
Nationwide Commercial Laboratory SARS-CoV-2 Seroprevalence Survey

- Every 2 weeks, ~50,000 specimens tested for SARS-CoV-2 antibodies
- De-identified residual sera collected by commercial laboratories for routine screening or acute clinical care
- Limited pediatric specimens
- Most common reasons for pediatric clinical visits include general examination (e.g., cholesterol screen), obesity, drug monitoring, and fatigue
Seroprevalence in children aged 5–11 years: 38% (95% CI: 36–40%)
  - Higher than estimates among adults
  - Similar to estimates in children aged 12–17 years

Range for jurisdiction-level estimates for children aged 5–11 years: 11%–61%*

Estimates lower than jurisdictions previously presented

Number of infections per reported case†:
  - General population: Median 2.4 (Range: 2.0–3.9)
  - Ages 0–17 years: Median 6.2 (Range: 4.7–8.9)

Data are preliminary and subject to change

*Restricted to 23 jurisdictions with ≥75 specimens from children aged 5–11 years:
†Jurisdiction-level May-June 2021 estimates restricted to jurisdictions that provided age data for >90% of individual cases: CA, IL, NV, NJ, NC, OH, SC, and TN
Infection-Induced Protection From Reinfection

- Based on data in adults, infected individuals have a low risk of reinfection for at least 6 months, but protection is not 100% and likely lower against Delta variant

- Infection-induced antibody response is lower and less consistent compared with mRNA vaccine-induced antibody response

- Antibody titers generated after infection are lower in people with mild or no symptoms

- Vaccination after infection significantly enhances protection and further reduces risk of reinfection

- CDC recommends vaccination regardless of history of infection
  - Serologic testing to assess for prior infection is not recommended for the purpose of vaccine decision-making

CDC. Interim Clinical Considerations for Use of COVID-19 Vaccines Currently Approved or Authorized in the United States: https://www.cdc.gov/vaccines/covid-19/clinical-considerations/covid-19-vaccines-us.html
Seroprevalence Summary

- Seroprevalence data suggest infections in children less likely to be reported compared with adults.

- Seroprevalence estimates in children 5–11 years were 38% in September 2021.

- Seroprevalence indicates that children are at least as likely as adults to be infected with SARS-CoV-2.

- Limitation: Seroprevalence estimates may not be representative of the general pediatric population.
  - Antibody tests cannot determine if a person is protected from reinfection or not.
  - Assay used for analysis good for detecting previous infection but unlikely to correlate with protection from infection.
Hospitalization
Cumulative COVID-19-Associated Hospitalization Rates by Race and Ethnicity among Children 5-11 Years of Age — COVID-NET, March 1, 2020–October 23, 2021

https://www.cdc.gov/coronavirus/2019-ncov/covid-data/covid-net/purpose-methods.html, Data are preliminary and subject to change
Cumulative Influenza- and COVID-19-Associated Hospitalizations Among Children Ages 5–11 Years

*Mitigation measure in place during 2020–2021
†Influenza seasons: MMWR week 40 of the earlier year to MMWR week 18 of the later year. The COVID period: Oct 2020-Sep 2021 goes from MMWR week 40 of year 2020 to MMWR week 39 of year 2021. MMWR Week 53 for MMWR Year 2020 is combined with MMWR Week 52 for consistency with other years.

COVID-NET-California, Colorado, Connecticut, Georgia, Iowa, Maryland (entire state), Michigan, Minnesota, New Mexico, New York, Ohio, Oregon, Tennessee, and Utah.
FluSurv-NET: California, Colorado, Connecticut, Georgia, Maryland (Baltimore Metropolitan Area), Michigan, Minnesota, New Mexico, New York, Ohio, Oregon, Tennessee, and Utah.
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Cumulative Influenza- and COVID-19-Associated Hospitalizations Among Children Ages 5–11 Years

Annualized COVID-NET surveillance period: Oct 1, 2020–Sept 30, 2021

*Mitigation measures in place during 2020-2021

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Clinical Interventions and Outcomes of Children Aged 5-11 Years with COVID-19 or Influenza-Associated Hospitalizations, COVID-NET\(^1\) and FluSurv-NET\(^2\)

<table>
<thead>
<tr>
<th></th>
<th>FluSurv-NET 2017-2018, 2018-2019, and 2019-2020 (N = 1,874),(^3) n (%)</th>
<th>COVID-NET March 1, 2020–August 31, 2021 (N = 696),(^4) n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital length of stay (median, IQR)</td>
<td>2 (1-4)</td>
<td>3 (2-6)</td>
</tr>
<tr>
<td>ICU admission</td>
<td>398 (21.2)</td>
<td>222 (31.9)</td>
</tr>
<tr>
<td>Invasive mechanical ventilation</td>
<td>87 (4.6)</td>
<td>50 (7.2)</td>
</tr>
<tr>
<td>Died during hospitalization</td>
<td>11 (0.6)</td>
<td>4 (0.6)</td>
</tr>
</tbody>
</table>

1 COVID-NET-California, Colorado, Connecticut, Georgia, Iowa, Maryland (entire state), Michigan, Minnesota, New Mexico, New York, Ohio, Oregon, Tennessee, and Utah.

2 FluSurv-NET: California, Colorado, Connecticut, Georgia, Maryland (Baltimore Metropolitan Area), Michigan, Minnesota, New Mexico, New York, Ohio, Oregon, Tennessee, and Utah. Surveillance conducted from October 1-April 30 each season.

3 Includes those with complete clinical data (~97% of pediatric cases) on hospital length of stay, ICU admission, invasive mechanical ventilation, and disposition discharge (i.e., discharged alive or died in-hospital).

4 Includes those with complete clinical data (~90% of pediatric cases) on hospital length of stay, ICU admission, invasive mechanical ventilation, and disposition discharge (i.e., discharged alive or died in-hospital).
Children Aged 5–11 Years Hospitalized with COVID-19—COVID-NET, March 2020–August 2021

- 68% were Black, non-Hispanic or Hispanic
- 32% had no underlying conditions
- Most common underlying medical conditions were chronic lung disease (primarily asthma) and obesity

### Demographic and clinical characteristics

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>(%)</th>
</tr>
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<tbody>
<tr>
<td>Total</td>
<td>562</td>
<td>(100)</td>
</tr>
<tr>
<td>Age (yrs) – median (IQR)*</td>
<td>8</td>
<td>(6–10)</td>
</tr>
<tr>
<td>Sex – Male</td>
<td>320</td>
<td>(57)</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black, non-Hispanic</td>
<td>207</td>
<td>(37)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>177</td>
<td>(31)</td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>124</td>
<td>(22)</td>
</tr>
<tr>
<td>Asian, non-Hispanic</td>
<td>23</td>
<td>(4)</td>
</tr>
<tr>
<td>Other, non-Hispanic</td>
<td>31</td>
<td>(6)</td>
</tr>
<tr>
<td>Severe disease†</td>
<td>200</td>
<td>(36)</td>
</tr>
<tr>
<td>≥1 underlying condition</td>
<td>381</td>
<td>(68)</td>
</tr>
</tbody>
</table>

*Interquartile range; †Requiring intensive care unit admission or mechanical ventilation

Mortality

Children 5-11 years:
94 COVID-19 deaths*
(1.7% of all deaths among U.S. children 5–11 years)

*Lag in reporting of deaths might result in underestimate
Leading Causes of Death in Children 5-11 Years of Age, NCHS, 2019

<table>
<thead>
<tr>
<th>Causes of Death</th>
<th>Death (n)</th>
<th>Crude rate per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accidents (unintentional injuries)</td>
<td>969</td>
<td>3.4</td>
</tr>
<tr>
<td>Malignant neoplasms</td>
<td>525</td>
<td>1.8</td>
</tr>
<tr>
<td>Congenital malformations, deformations and chromosomal abnormalities</td>
<td>274</td>
<td>1.0</td>
</tr>
<tr>
<td>Assault (homicide)</td>
<td>207</td>
<td>0.7</td>
</tr>
<tr>
<td>Diseases of the heart</td>
<td>115</td>
<td>0.4</td>
</tr>
<tr>
<td>Chronic lower respiratory diseases</td>
<td>107</td>
<td>0.4</td>
</tr>
<tr>
<td>Influenza and pneumonia</td>
<td>84</td>
<td>0.3</td>
</tr>
<tr>
<td>Intentional self-harm (suicide)</td>
<td>66</td>
<td>0.2</td>
</tr>
<tr>
<td>Cerebrovascular diseases</td>
<td>56</td>
<td>0.2</td>
</tr>
<tr>
<td>Septicemia</td>
<td>48</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Total population 5-17 years, 2019: 52,715,248

COVID-19 associated deaths in children 5–11 10/3/20-10/2/2021
MIS-C and Additional Post-COVID Conditions
Multisystem Inflammatory Syndrome in Children (MIS-C)

- Severe hyperinflammatory syndrome occurring 2-6 weeks after acute SARS-CoV-2 infection, resulting in a wide range of clinical manifestations and complications
- Incidence has been estimated as 1 MIS-C case in approximately 3,200 SARS-CoV-2 infections
- 60-70% of patients are admitted to intensive care, 1-2% die

MIS-C in Children

- 5,217 MIS-C cases reported to national surveillance with date of onset between February 19, 2020–September 23, 2021
  - Median age of 9 years
  - 2,316 (44%) of these cases occurred in children aged 5–11 years
- 61% occurred in children who are Hispanic/Latino or Black, Non-Hispanic
- Among children aged 5–11 years, 9 died (20% of MIS-C deaths)

Bowen, et al. Demographic and Clinical Factors Associated With Death Among Persons <21 Years Old With Multisystem Inflammatory Syndrome in Children—United States, February 2020–March 2021, Open Forum Infectious Diseases, Volume 8, Issue 8, August 2021,
https://doi.org/10.1093/ofid/ofab388
Additional Post-COVID Conditions in Children

- **Post-COVID conditions occur in children**
  - Appear to be less common in children than in adults
  - A national survey in the UK found 7-8% of children with COVID-19 reported continued symptoms >12 weeks after diagnosis\(^1\)
  - May appear after mild or severe infections, or after MIS-C

- **Most common symptoms**: Similar to adults, and include fatigue, headache, insomnia, trouble concentrating, muscle and joint pain, and cough\(^2,3\)

- **Impact on quality of life**: Limitations of physical activity, feeling distressed about symptoms, mental health challenges, decreased school attendance/participation\(^2\)

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SARS-CoV-2 Transmission
Children and Transmission of SARS-CoV-2

- Transmission of SARS-CoV-2 virus is influenced by presence and type of symptoms, type and timing of exposure, viral load, and variant.

- Some studies reported similar rates of transmission from infected children as from adults, while others observed lower rates of transmission from infected children compared with rates from infected adults.

- Secondary transmission from children occurs in both household and school settings.

- Studies have shown that vaccination decreases transmission.

Children and Transmission of SARS-CoV-2

- Outbreak investigations have demonstrated efficient transmission among children and adults.
Summary: COVID-19 Epidemiology in Children Aged 5–11 years

- Children aged 5–11 years are at least as likely to be infected with SARS-CoV-2 as adults
  - Over 1.9 million reported cases; seroprevalence estimated to be ~38% in September 2021
  - Seroprevalence data suggests that infections in children less likely to be reported as cases than infections in adults

- Children aged 5–11 years are at risk of severe illness from COVID-19
  - >8,300 hospitalizations to date
    - Hospitalization rates are 3x times higher for non-Hispanic Black, non-Hispanic American Indian/Alaska Native, and Hispanic children compared with non-Hispanic White children
    - Hospitalization rates are similar to pre-pandemic influenza-associated hospitalization rates
    - Severity was comparable among children hospitalized with influenza and COVID-19
    - Approximately 1/3 of hospitalized children aged 5–11 years require ICU admission
  - At least 94 COVID-19-associated deaths occurred in children aged 5–11 years
  - MIS-C was most frequent among children aged 5–11 years
  - Post-COVID conditions have been reported in children
  - All might have been more numerous had pandemic mitigation measures not been implemented

- Secondary transmission from young school-aged children occurs in household and school settings
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For more information, contact CDC
1-800-CDC-INFO (232-4636)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.