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# SARS-CoV-2–Associated Deaths Among Persons Aged 21 Years ...

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## Summary

### What is already known about this topic?

Symptoms associated with SARS-CoV-2 infection are milder in children compared with adults.

### What is added by this report?

Among 121 SARS-CoV-2–associated deaths among persons

aged <21 years reported to CDC by July 31, 2020, 12 (10%) were infants and 85 (70%) were aged 10–20 years. Hispanic, non-Hispanic Black and non-Hispanic American Indian/Alaskan Native persons accounted for 94 (78%) of these deaths; 33% of deaths occurred outside of a hospital.

### **What are the implications for public health practice?**

Persons aged <21 years exposed to SARS-CoV-2 should be monitored for complications. Ongoing surveillance for SARS-CoV-2–associated infection, hospitalization, and death among persons aged <21 years should be continued as schools reopen in the United States.

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Since February 12, 2020, approximately 6.5 million cases of SARS-CoV-2 infection, the cause of coronavirus disease 2019 (COVID-19), and 190,000 SARS-CoV-2–associated deaths have been reported in the United States (1,2). Symptoms associated with SARS-CoV-2 infection are milder in children compared with adults (3). Persons aged <21 years constitute 26% of the U.S. population (4), and this report describes characteristics of U.S. persons in that population who died in association with SARS-CoV-2 infection, as reported by public health jurisdictions. Among 121 SARS-CoV-2–associated deaths reported to CDC among persons aged <21 years in the United States during February 12–July 31, 2020, 63% occurred in males, 10% of decedents were aged <1 year, 20% were aged 1–9 years, 70%

were aged 10–20 years, 45% were Hispanic persons, 29% were non-Hispanic Black (Black) persons, and 4% were non-Hispanic American Indian or Alaska Native (AI/AN) persons. Among these 121 decedents, 91 (75%) had an underlying medical condition,\* 79 (65%) died after admission to a hospital, and 39 (32%) died at home or in the emergency department (ED).† These data show that nearly three quarters of SARS-CoV-2–associated deaths among infants, children, adolescents, and young adults have occurred in persons aged 10–20 years, with a disproportionate percentage among young adults aged 18–20 years and among Hispanics, Blacks, AI/ANs, and persons with underlying medical conditions. Careful monitoring of SARS-CoV-2 infections, deaths, and other severe outcomes among persons aged <21 years remains particularly important as schools reopen in the United States. Ongoing evaluation of effectiveness of prevention and control strategies will also be important to inform public health guidance for schools and parents and other caregivers.

Public health jurisdictions in the United States use standard definitions to identify cases of COVID-19§ and multisystem inflammatory syndrome in children (MIS-C),¶ a severe illness characterized by fever, multiorgan system involvement, laboratory evidence of inflammation, and laboratory or epidemiologic evidence of SARS-CoV-2 infection or exposure. SARS-CoV-2–associated deaths were defined as deaths associated with COVID-19 or MIS-C per the determination of the jurisdiction. Persons aged <21 years who met the definition for a SARS-CoV-2–associated death and died during February 12–July 31, 2020, were included in this study. Fifty states, New York City, the District of Columbia, Puerto Rico, Guam, and the U.S. Virgin Islands were asked to submit information on SARS-

CoV-2–associated deaths among persons aged <21 years, including COVID-19 or MIS-C case status (as determined by each jurisdiction), demographics, dates of illness onset and hospitalization, underlying medical conditions, and location of death. Number of days from illness onset to hospitalization, days from hospitalization until date of death, and days from onset to date of death were calculated for decedents with available data.

Cases of SARS-CoV-2 infection among persons aged <21 years in the United States were first reported in March 2020 ([Figure 1](#)); the first SARS-CoV-2–associated fatality among persons in that age group also occurred in March. During February 12–July 31, a total of 391,814 cases of confirmed or probable COVID-19 or MIS-C in persons aged <21 years were reported through case-based surveillance in the United States.

Among the 55 health jurisdictions invited to submit information on SARS-CoV-2–associated deaths among persons aged <21 years, 47 responded; 20 reported no deaths,\*\* and 27 identified 121 deaths†† that met inclusion criteria. Overall, 120 (99%) decedents met the confirmed or probable COVID-19 case definition, and 15 (12%) met the MIS-C case definition, including 14 (12%) who met both case definitions. Twelve (10%) deaths were in infants aged <1 year, 24 (20%) in children aged 1–9 years, and 85 (70%) in persons aged 10–20 years; the median age at death was 16 years (interquartile range [IQR] = 7–19 years) ([Figure 2](#)) ([Table](#)). Among the 121 decedents, 76 (63%) were male, 54 (45%) were Hispanic, 35 (29%) were Black, and five (4%) were AI/AN.

Among the 121 decedents, 30 (25%) were previously healthy (no reported underlying medical condition), 91 (75%) had at least one underlying medical condition, and 54 (45%) had two or more underlying medical conditions. The most frequently

reported medical conditions were chronic lung disease, including asthma (34 [28%]), obesity (33 [27%]), neurologic and developmental conditions (26 [22%]), and cardiovascular conditions (22 [18%]).

Overall, 79 (65%) deaths occurred after hospital admission. Among the remaining 42 decedents, 16 (38%) died at home, 23 (55%) were critically ill and died in the ED, one (2%) died in hospice care, and the location of death was unknown for two (5%). Out-of-hospital deaths occurred in all age groups; however, the highest proportions of deaths at home or in the ED occurred in infants (33%) and adolescents and young adults aged 14–20 years (37%)<sup>§§</sup> (Supplementary figure, <https://stacks.cdc.gov/view/cdc/93381>). Among the 79 decedents who died in the hospital, the median interval from onset of symptoms until admission was 3 days (IQR = 1–7 days),<sup>¶¶</sup> and the median interval from hospital admission until death was 8 days (IQR = 4–21.5 days).\*\*\* Among 94 decedents with known illness onset date, median interval from onset of symptoms until death was 11 days (IQR = 6–24 days).

## Discussion

During February 12–July 31, 2020, a total of 391,814 cases of COVID-19 and MIS-C (representing approximately 8% of all reported cases) (1,2) and 121 deaths (approximately 0.08% of all deaths) (1,2) were identified among persons aged <21 years in the United States. Four important findings were identified. First, although Hispanic, Black, and AI/AN persons represent 41% of the U.S. population aged <21 years (4), these groups accounted for approximately 75% of deaths in persons aged <21 years. Second, deaths were more prevalent among males and among persons aged 10–20 years; young adults aged 18–20

years accounted for nearly half of all deaths in this population. Third, 75% of decedents had at least one underlying condition, and 45% had two or more underlying conditions. Fourth, a substantial proportion of out-of-hospital deaths in association with SARS-CoV-2 infection occurred among all age groups in this analysis.

Among infants, children, and adolescents hospitalized with laboratory-confirmed COVID-19 (5) and cases of MIS-C (6), persons from racial and ethnic minority groups are overrepresented. These racial/ethnic groups are also disproportionately represented among essential workers unable to work from their homes (7), resulting in higher risk for exposure to SARS-CoV-2 with potential secondary transmission among household members, including infants, children, adolescents, and young adults. In addition, disparities in social determinants of health, such as crowded living conditions, food and housing insecurity, wealth and educational gaps, and racial discrimination, likely contribute to racial and ethnic disparities in COVID-19 and MIS-C incidence and outcomes (7). Finally, higher rates of adverse outcomes among racial and ethnic minorities are likely related to challenges in seeking care for various reasons, including difficulty and delays in accessing health care services because of lack of insurance, child care, transportation, or paid sick leave, and social determinants of health that contribute to higher prevalence of medical conditions (7).

Thirty-nine out-of-hospital SARS-CoV-2–associated deaths occurred at home or in the ED among persons aged <21 years. In the United States, significant reductions in ED visits (8) and childhood immunizations (9) occurred during March–April 2020, suggesting that necessary care might be delayed or deferred

during the pandemic. Although infants, children, and adolescents are more likely to have milder COVID-19 illness than are adults (3), complications, including MIS-C (6) and respiratory failure (5,6), do occur in these populations. Persons infected with or exposed to SARS-CoV-2 should be followed closely so that clinical deterioration can be detected early. In this analysis, the number of deaths was highest in persons aged 14–20 years. Adolescents especially need patient-centered follow-up services that are developmentally appropriate (10).

The findings in this report are subject to at least five limitations. First, case-based surveillance data<sup>†††</sup> underestimate cases of COVID-19 compared with aggregate case reports<sup>§§§</sup> from states, and data for some variables in case-based surveillance (e.g., demographic variables) are missing. Therefore, data on cases and deaths by race/ethnicity are not comparable and case fatality rates by race/ethnicity cannot be calculated. Second, the possibility exists that all deaths were not recognized or reported, in part because of incomplete testing, failure to update vital status after death of a previously reported case of COVID-19 or MIS-C, or delays in reporting SARS-CoV-2–associated deaths because of the lengthy process for cause of death ascertainment. Third, autopsy findings and death certificates were not available to verify cause of death for this report. More detailed review of available medical and death records is currently underway in collaboration with public health jurisdictions. Fourth, although guidance for death certificate coding for COVID-19 is available,<sup>¶¶¶</sup> a standard surveillance case definition for SARS-CoV-2–associated death is not in use in the United States; case ascertainment and data collection procedures were nonuniform among jurisdictions. Finally, during most of the time between February 12 and July 31, 2020, the



majority of U.S. early child care providers, schools, and other educational institutions were closed, gatherings of children and adolescents were reduced, and testing and treatment protocols changed.\*\*\*\* As early child care providers, schools, and other educational institutions reopen for in-person learning and treatment protocols continue to evolve, the incidence of pediatric SARS-CoV-2–associated deaths might change, and pediatric case and death surveillance should continue.

Adolescents and young adults, Hispanic, Black, and AI/AN persons, and persons with underlying medical conditions are disproportionately represented among deaths associated with SARS-CoV-2 in persons aged <21 years reported to CDC. Infants, children, adolescents, and young adults, particularly those from racial and ethnic minority groups at higher risk, those with underlying medical conditions, and their caregivers, need clear, consistent, and developmentally, linguistically, and culturally appropriate COVID-19 prevention messages (e.g., related to mask wearing, physical distancing, hand hygiene). To ensure accurate surveillance, it is important that health care providers and health departments assure follow-up for infants, children, adolescents, and young adults infected with or exposed to SARS-CoV-2 and document and report underlying medical conditions and cause of death related to COVID-19. Health departments, in collaboration with school districts and the communities they serve, can evaluate and improve health promotion, health access, and health equity for all infants, children, adolescents, and young adults. Ultimately, health departments, health providers, and community partners can mobilize to remove systemic barriers that contribute to health disparities.†††

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Health and Mental Hygiene; <sup>21</sup>New York State Department of Health; <sup>22</sup>North Carolina Department of Health and Human Services; <sup>23</sup>Ohio Department of Health; <sup>24</sup>Oklahoma State Department of Health; <sup>25</sup>Pennsylvania Department of Health; <sup>26</sup>South Carolina Department of Health and Environmental Control; <sup>27</sup>Tennessee Department of Health; <sup>28</sup>Texas Department of State Health Services; <sup>29</sup>Utah Department of Health; <sup>30</sup>University of Alabama School of Medicine, Birmingham, Alabama.

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\* <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-medical-conditions.html>.

† Location of death for all cases (121): hospital (79 [65.3%]), home (16 [13.2%]), ED (23 [19.0%]), hospice (one [0.8%]), and unknown (2 [1.7%])

§ <https://wwwn.cdc.gov/nndss/conditions/coronavirus-disease-2019-covid-19/case-definition/2020/>.

¶ <https://www.cdc.gov/mis-c/hcp/>.

\*\* Jurisdictions reporting no deaths included Alaska, Delaware, District of Columbia, Guam, Hawaii, Idaho, Kentucky, Massachusetts, Missouri, Montana, New Mexico, Oregon, South Dakota, Vermont, Virginia, U.S. Virgin Islands, Washington, West Virginia, Wisconsin, and Wyoming.

†† Jurisdictions reporting one or more deaths included: Alabama, Arizona, California, Colorado, Connecticut, Florida, Georgia, Illinois, Indiana, Kansas, Louisiana, Maryland, Michigan, Minnesota, Mississippi, Nevada, New Jersey, New York City, New York State, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, and Utah.

§§ By age group the following decedents died at home or in the ED: infants (four of 12 [33%]), age 1–4 years (three of 11 [27%]), age 5–9 years (two of 13 [15%]), 10–13 years (three of 12 [25%]), 14–17 years (nine of 23 [39%]), and 18–20 years (18 of 50 [36%]); overall, 39 (32%) of 121 decedents died at home or in the ED.

¶¶ Calculation is based on data from 72 decedents for whom information on onset date and hospital admission date were available.

\*\*\* Calculation is based on data from 60 decedents for whom information on hospital admission date and death date were available.

††† <https://covid.cdc.gov/covid-data-tracker/#demographics>.

§§§ [https://covid.cdc.gov/covid-data-tracker/#cases\\_totalcases](https://covid.cdc.gov/covid-data-tracker/#cases_totalcases).

¶¶¶ <https://www.rheumatology.org/Portals/0/Files/ACR-COVID-19-Clinical-Guidance-Summary-MIS-C-Hyperinflammation.pdf>.

\*\*\*\* <https://www.rheumatology.org/Portals/0/Files/ACR-COVID-19-Clinical-Guidance-Summary-MIS-C-Hyperinflammation.pdf>.

†††† <https://www.cdc.gov/coronavirus/2019-ncov/community/health-equity/what-we-can-do.html>.

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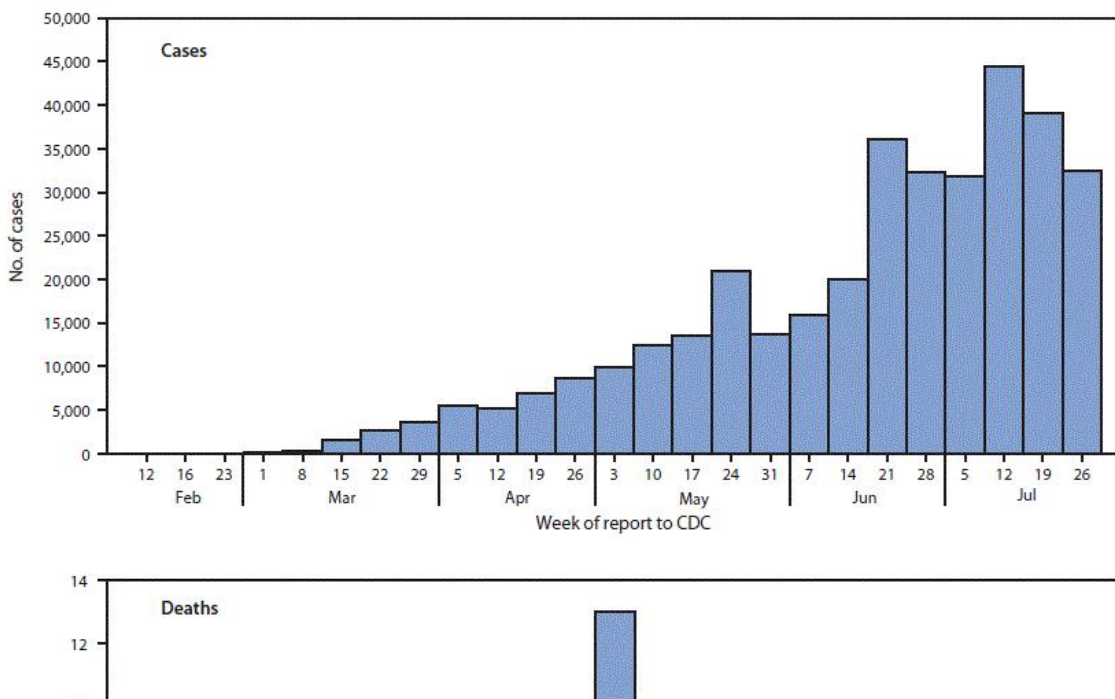
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**FIGURE 1. SARS-CoV-2-associated cases,<sup>\*,†</sup> by week of case report to CDC, and deaths,<sup>§,¶</sup> by week of death,<sup>\*\*</sup> among persons aged <21 years — United States, February 12–July 31, 2020**



\* <https://wwwn.cdc.gov/nndss/conditions/coronavirus-disease-2019-covid-19/case-definition/2020/>.

† During February 12–July 31, 2020, 391,814 cases of coronavirus disease 2019 (COVID-19) in persons age <21 years were reported to CDC. Among these, date of report to CDC was missing for 34,538 cases not shown here. Weeks beginning February 12 and July 26 represent partial weeks, February 12–15 and July 26–31, respectively.

§ The first SARS-CoV-2–associated death in a person aged < 21 years in the United States occurred during the week beginning March 15, 2020.

¶ Includes 121 total decedents, 120 persons who met the case definition for COVID-19, 15 persons who met the case definition for multisystem inflammatory syndrome in children, and 14 persons who met both case definitions.

\*\* Among 121 decedents, 94 had a recorded symptom onset date; median interval from symptom onset to death was 11 days (interquartile range = 6–24 days).

**TABLE. Demographic and clinical characteristics of SARS-CoV-2–associated deaths among persons aged <21 years — United States, February 12–July 31, 2020\***



<b>Characteristic</b>	<b>No. (%)</b>
<b>Total</b>	<b>121 (100)</b>
<b>Age group, yrs</b>	
<1	12 (9.9)
1–4	11 (9.1)
5–9	13 (10.7)
10–13	12 (9.9)
14–17	23 (19.0)
18–20	50 (41.3)
Age, yrs, median (IQR)	16 (7–19)
<b>Sex</b>	
Female	45 (37.2)
Male	76 (62.8)
<b>Race/Ethnicity</b>	
Hispanic	54 (44.6)
American Indian/Alaska Native, non-Hispanic	5 (4.1)
Asian or Pacific Islander, non-Hispanic	5 (4.1)



<b>Characteristic</b>	<b>No. (%)</b>
Black, non-Hispanic	35 (28.9)
White, non-Hispanic	17 (14.0)
Multiple/Other <sup>†</sup>	2 (1.7)
Missing/Unknown	3 (2.5)
<b>SARS-CoV-2–associated condition<sup>§</sup></b>	
COVID-19	120 (99.2)
MIS-C	15 (12.4)
<b>Underlying medical condition<sup>¶</sup></b>	
No underlying condition	30 (24.8)
1 underlying condition	91 (75.2)
2 underlying conditions	54 (44.6)
Chronic lung disease <sup>**</sup>	34 (28.1)
Obesity <sup>††</sup>	33 (27.3)
Neurologic and developmental <sup>§§</sup>	26 (21.5)
Cardiovascular disease <sup>¶¶</sup>	22 (18.2)
Cancer or immunosuppressive condition <sup>***</sup>	17 (14.0)
Diabetes mellitus <sup>†††</sup>	11 (9.1)
Chronic kidney disease	5 (4.1)
Chronic liver disease	3 (2.5)
Other <sup>¶¶¶</sup>	37 (30.6)

Characteristic	No. (%)
<b>Location of death</b>	
Home	16 (13.2)
Emergency department	23 (19.0)
Hospital	79 (65.3)
Other/Unknown	3(2.5)
<b>Median interval from symptom onset to hospital admission, days (IQR)** ** *</b>	3 (1–7)
<b>Median interval from hospital admission to death, days (IQR)† † † †</b>	8 (4–21.5)
<b>Median interval from symptom onset to death, days (IQR)§ § § §</b>	11 (6–24)

**Abbreviations:** COVID-19 = coronavirus disease 2019; IQR = interquartile range; MIS-C = multisystem inflammatory syndrome in children.

\* Persons aged <21 years were included if they were reported by state and local health departments as meeting case definitions for COVID-19 (<https://www.cdc.gov/nndss/conditions/coronavirus-disease-2019-covid-19/case-definition/2020/>) or MIS-C (<https://www.cdc.gov/mis-c/hcp/>) with a fatal outcome that occurred before August 1, 2020.

Denominator for calculation of all percentages was total decedents with COVID-19 or MIS-C (121).

† Includes persons reported as multiracial and persons reported as being of another race without further specification.

§ Individual decedents could meet both definitions. Both confirmed (114) and probable (six) cases of COVID-19 are included in totals.

¶ Decedents could have more than one underlying condition.

Categories include only decedents for whom the condition within the specified category was present at the time of illness onset as reported from state and local health departments.

*\*\* Among 34 decedents with chronic lung disease, 21 had additional information, including 19 with asthma and three with other lung disease. Decedents could have more than one chronic lung condition.*

*†† Decedents with body mass index  $\geq 30$  kg/m<sup>2</sup> at or above the 95th percentile for age and sex.*

*§§ Among 26 decedents with neurologic or developmental disorders, 26 had additional information, including 10 with seizure disorders, 11 with neuromuscular disorders, and 20 with other neurologic and developmental conditions. Decedents could have more than one neurologic or developmental condition.*

*¶¶ Among 22 decedents with cardiovascular disease, 14 had additional information, including five with hypertension, three with lipid disorders, three with congenital heart disease, and six with other cardiovascular diseases. Decedents could have more than one cardiovascular condition.*

*\*\*\* Among 17 decedents with cancer and immunosuppressive conditions, 14 had additional information, including 10 with any history of cancer, two with immunosuppressive therapy, one with solid organ transplantation and three with other conditions. Decedents could have more than one condition in this category.*

*††† Includes decedents with type 1 and type 2 diabetes mellitus.*

*¶¶¶ Includes decedents with history of hematologic disorders (three), rheumatologic disorders (four), metabolic disorders (five), gastrointestinal disorders (five), endocrine disorders (six), dermatologic conditions (three), congenital disorders (14), psychiatric conditions (five), substance use disorder (three), smoking or vaping (two), pregnancy (one), and other medical conditions (nine). Decedents could have more than one condition in this category.*

*\*\*\*\* Calculation is based on decedents for whom information on symptom onset date and hospital admission date were available (72).*

*†††† Calculation is based on decedents for whom information on hospital admission date and date of death were available (60).*

*§§§§ Calculation is based on decedents for whom information on symptom onset date and date of death were available (94).*

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