

## EDITORIAL

# Children in the Eye of the Pandemic Storm— Lessons From New York City

Jason G. Newland, MD, MEd; Kristina A. Bryant, MD

**On December 31, 2019**, no one knew how the world was about to change forever. In Wuhan, China, health care officials alerted the World Health Organization (WHO) of a severe respiratory illness. On March 11, 2020, WHO announced that the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus was causing the coronavirus disease 2019 (COVID-19) pandemic. Initial clinical data from China and Italy revealed that children were not severely affected. Chinese children younger than 1 year potentially had more severe infection, and as many as 15% were asymptomatic.<sup>1</sup>

Worldwide, children comprise 1% to 6% of all positive cases.<sup>2,3</sup> The initial data from the US suggests only 1.7% of positive cases are children, but the number of asymptomatic infections in children is unknown.<sup>4</sup> The lack of testing capacity early in the pandemic resulted in limited testing of both mildly ill and asymptomatic children, likely resulting in an underreporting of cases.

To date, New York City, New York, has been the most affected US city, with more than 190 408 cases and 15 888 confirmed deaths as of May 17, 2020.<sup>5</sup> While Seattle, Washington, and cities in California were the first to experience the COVID-19 pandemic, New York City was among the first US cities with many infected children who required hospitalization. In this issue of *JAMA Pediatrics* in a study by Zachariah et al<sup>6</sup> of 50 children and adolescents with COVID-19 hospitalized at a New York City hospital, many key points are illustrated about children hospitalized with COVID-19. First, while previous reports suggested only approximately 50% of infected children had fever, in this study, 80% of hospitalized children had fever. Respiratory symptoms (eg, cough, congestion, shortness of breath, and sore throat) were the next most common finding. A recent case series from Washington, DC, describing hospitalized and nonhospitalized children found fever to be present in 66% of children, but only 48% presented with fever and respiratory symptoms.<sup>7</sup> Second, comorbidities are common in hospitalized children. In this cohort, 61% of the patients had a comorbidity and in the group with severe disease, 89% had a comorbidity. In a report of children across the US and Canada admitted to intensive care units, 83% had a comorbidity.<sup>8</sup> Obesity has emerged as an important comorbidity in adults and children. In the article by Zachariah and colleagues,<sup>6</sup> obesity occurred in 60% of the children characterized as having severe disease. Third, viral coinfections only occurred in 8% of patients and included respiratory syncytial virus, adenovirus, rhinovirus/enterovirus, and human metapneumovirus. In Washington, DC, 6% had a coinfection. While

in New York City routine respiratory viral testing was not performed on all patients because of shortages of supplies, the lower rate also observed in Washington, DC, suggests that coinfection in children may be less than originally reported.

Transmission dynamics between children and adults are not well understood. A study from China demonstrated that children were much less likely than adults to become infected when an adult family member was ill with COVID-19.<sup>9</sup> In this study, all but 1 child contracted the virus from the community and 52% of the children had a known household contact with an adult with symptoms compatible with COVID-19. This study does not report on whether any of these children became infected from another child. The transmissibility of the virus between children has enormous implications on whether summer camps, youth sports, and school should resume. Recent commentaries from the United Kingdom and Italy argue that children should return to school because of the lack of severe illness in children, the potential that children do not spread the virus efficiently, and the negative effect on children's lives without education.<sup>10,11</sup>

While the findings of the study by Zachariah et al<sup>6</sup> add to what we know about the clinical manifestations acute SARS-CoV-2 infections cause in children and may inform some public policy decisions, they do not tell the whole story. In late April 2020, investigators in London, England, described 8 previously healthy children who were hospitalized with a severe inflammatory syndrome; all had positive serologic test results for SARS-CoV-2, suggesting recent or past infection.<sup>12</sup> On May 4, 2020, public health officials in New York City issued a public health alert describing 15 children with a multisystem inflammatory syndrome potentially associated with COVID-19, the signs and symptoms resembling those of other pediatric inflammatory conditions, including Kawasaki disease, toxic shock syndrome, or bacterial sepsis.<sup>13</sup> A recent US Centers for Disease Control and Prevention health alert notes that cases of multisystem inflammatory syndrome in children associated with COVID-19 have continued to rise, with more than 100 cases reported in New York State alone.<sup>14</sup> Although multisystem inflammatory syndrome in children is likely to be rare, the potential for postinfectious sequelae must be factored into the discussion on the burden of SARS-CoV-2 infection in children.

Studies such as this one emphasize that certain groups of children may be disproportionately affected. In this study, 50% were Hispanic. In the article by Riphagen et al,<sup>12</sup> 75% of the patients were of Afro-Caribbean descent. As the COVID-19 pandemic has spread and created adversity for many people physically, emotionally, and economically, the

groups most affected have been those of color. In New York City, age-adjusted rates of fatal COVID-19 cases have been highest in African American individuals (92.3/100 000) compared with Hispanic/Latino (74.3) and white individuals (45.2).<sup>15</sup> While some publications report race/ethnicity as a risk factor for COVID-19 and severe disease, care must be taken not to suggest or infer inherent biological susceptibility in certain groups. A person's race/ethnicity, while statistically a risk factor, is a result of the meaning that being in one of these minority groups has inscribed on their individual lives. Are racial disparities in health outcomes associated with COVID-19 associated with access to health care? Economic resources that allow one to self-isolate or practice social distancing? Reflective of trust in messaging from public health authorities? As health care professionals, we cannot continue to simply label someone's race/ethnicity as a risk factor without acknowledging the underlying factors that have put individuals at this risk.

Pediatricians are eager for information about COVID-19 in children, especially those who have seen relatively few cases (or cannot confirm that they have seen cases because of a lack of testing). Zachariah and colleagues<sup>6</sup> are to be commended for compiling and sharing a comprehensive data set on a group of children admitted to a single hospital in New York City. Publicly reported data on infected children have been relatively limited. Going forward, multicenter collaborative studies are needed to define the infectious and postinfectious sequelae of COVID-19 in children in communities across the US, including rural communities, and in all racial and ethnic groups. We also need to understand the association of the pandemic with adverse health outcomes in children beyond the consequences of viral infection. On May 15, 2020, the US Centers for Disease Control and Prevention reported a precipitous drop in the ordering and administration of pediatric vaccines.<sup>16</sup> Are outbreaks of vaccine-preventable diseases on the horizon? That could be the next important chapter of the evolving COVID-19 story.

#### ARTICLE INFORMATION

**Author Affiliations:** Division of Infectious Diseases, Department of Pediatrics, Washington University School of Medicine in St Louis, St Louis, Missouri (Newland); Division of Infectious Disease, Department of Pediatrics, University of Louisville, Louisville, Kentucky (Bryant).

**Corresponding Author:** Jason G. Newland, MD, MEd, Division of Infectious Diseases, Department of Pediatrics, Washington University School of Medicine in St Louis, 660 S Euclid Ave, St Louis, MO 63110 (jgnewland@wustl.edu).

**Published Online:** June 3, 2020.  
doi:10.1001/jamapediatrics.2020.2438

**Conflict of Interest Disclosures:** Dr Bryant reported being an investigator on multicenter vaccine trials and serving as president for the Pediatric Infectious Diseases Society. No other disclosures were reported.

#### REFERENCES

- Dong Y, Mo X, Hu Y, et al. Epidemiological characteristics of 2143 pediatric patients with 2019 coronavirus disease in China. *Pediatrics*. Published online March 16, 2020. doi:10.1542/peds.2020-0702
- Garazzino S, Montagnani C, Donà D, et al; The Italian Sitip-Sip Pediatric Infection Study Group. Multicentre Italian study of SARS-CoV-2 infection in children and adolescents, preliminary data as at 10 April 2020. *Euro Surveill*. 2020;25(18):2000600. doi:10.2807/1560-7917.ES.2020.25.18.2000600
- COVID-19 National Emergency Response Center, Epidemiology and Case Management Team, Korea Centers for Disease Control and Prevention. Coronavirus disease-19: the first 7,755 cases in the Republic of Korea. *Osong Public Health Res Perspect*. 2020;11(2):85-90. doi:10.2471/j.phrp.2020.11.2.05
- CDC COVID-19 Response Team. Coronavirus disease 2019 in children—United States, February 12–April 2, 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69(14):422-426. doi:10.15585/mmwr.mm6914e4
- New York City Department of Health. COVID-19: data. Accessed May 18, 2020. <https://www1.nyc.gov/site/doh/covid/covid-19-data.page>
- Zachariah P, Johnson CL, Halabi KC, et al; Columbia Pediatric COVID-19 Management Group. Epidemiology, clinical features, and disease severity in patients with coronavirus disease 2019 (COVID-19) in a children's hospital in New York City, New York. *JAMA Pediatr*. Published online June 3, 2020. doi:10.1001/jamapediatrics.2020.2430
- DeBiasi RL, Song X, Delaney M, et al. Severe COVID-19 in children and young adults in the Washington, DC metropolitan region. *J Pediatr*. Published online May 13, 2020. doi:10.1016/j.jpeds.2020.05.007
- Shekardemian LS, Mahmood NR, Wolfe KK, et al; International COVID-19 PICU Collaborative. Characteristics and outcomes of children with coronavirus disease 2019 (COVID-19) infection admitted to US and Canadian pediatric intensive care units. *JAMA Pediatr*. Published online May 13, 2020. doi:10.1001/jamapediatrics.2020.1948
- Li W, Zhang B, Lu J, et al. The characteristics of household transmission of COVID-19. *Clin Infect Dis*. Published online April 17, 2020. doi:10.1093/cid/cia450
- Esposito S, Principi N. School closure during the coronavirus disease 2019 (COVID-19) pandemic: an effective intervention at the global level? *JAMA Pediatr*. Published online April 17, 2020. doi:10.1001/jamapediatrics.2020.1892
- Munro APS, Faust SN. Children are not COVID-19 super spreaders: time to go back to school. *Arch Dis Child*. Published online May 5, 2020. doi:10.1136/archdischild-2020-319474
- Riphagen S, Gomez X, Gonzalez-Martinez C, Wilkinson N, Theocharis P. Hyperinflammatory shock in children during COVID-19 pandemic. *Lancet*. 2020;395(10237):1607-1608. doi:10.1016/S0140-6736(20)31094-1
- New York City Health Department. 2020 Health alert #13: pediatric multi-system inflammatory syndrome potentially associated with COVID-19. Accessed May 17, 2020. <https://www1.nyc.gov/assets/doh/downloads/pdf/han/alert/2020/covid-19-pediatric-multi-system-inflammatory-syndrome.pdf>
- US Centers for Disease Control and Prevention Health Alert Network. Multisystem inflammatory syndrome in children (MIS-C) associated with coronavirus disease 2019 (COVID-19). Accessed May 17, 2020. <https://emergency.cdc.gov/han/2020/han00432.asp>
- New York City Health Department. Age-adjusted rates of lab confirmed COVID-19 nonhospitalized cases, estimated non-fatal hospitalized cases, and patients known to have died/100 000 by race/ethnicity group as of April 16, 2020. Accessed May 16, 2020. <https://www1.nyc.gov/assets/doh/downloads/pdf/imm/covid-19-deaths-race-ethnicity-04162020-1.pdf>
- Santoli JM, Lindley MC, DeSilva MB, et al. Effects of the COVID-19 pandemic on routine pediatric vaccine ordering and administration—United States, 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69(19):591-593. doi:10.15585/mmwr.mm6919e2