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The Challenge of Clearly Counting COVID-19 Cases in Children

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Abbreviations: COVID-19: coronavirus disease 2019; PCR: polymerase chain reaction; SARS-CoV-2: Severe Acute Respiratory Syndrome Coronavirus-2.

In this volume of *Pediatrics*, Sisk and colleagues[1] used state and territory health department data to describe temporal and geographic trends in COVID-19 among children over a 4-month period. The authors found that in the latter half of the study period, the proportion of cases identified in children increased three- to four-fold from the start of the study period.

We were struck by several features of this report, which we feel have implications for COVID-19 surveillance. First, there was substantial heterogeneity across the data sources aggregated in regard to definitions (including the chronological definition of a child) and the data reported. There was also variation across surveillance methods regarding *which* tests were used and reported. For example, Texas only reports 'confirmed' cases, defined by PCR, and does not report rapid antigen tests, which defined a 'probable' case,[2] leading to an underestimation of the burden of disease. These variations make comparisons across regions and within regions over time challenging. As we are likely to be living with the pandemic until there is widespread availability and uptake of an effective vaccine, standardizing reporting (as is done for other infectious diseases) going forward would allow more transparent quantification and assessment of the impact of public health interventions and (ultimately) vaccine efficacy.

Second, pediatric data are typically not disaggregated by age. Disaggregate data are important, as much remains to be learned about the dynamics of viral transmission by age group. For example, while viral loads in upper respiratory tract secretions are high in all age groups,[3] transmission appears to be more common from older children.[4] Treating the entire pediatric age cohort as monolithic has the potential to bury important epidemiological associations and trends, particularly if factors other than viral load are most associated with SARS-CoV-2 transmission. For example, asymptomatic infection is more common in young children than adolescents,[5] and asymptomatic patients may transmit the virus less effectively

than overtly symptomatic patients. The ability to assess data separately for younger and older children will become even more important with the emphasis on school re-openings.

Third, while children younger than 18 years comprise 22% of the U.S. population,[6] only 9% of all cases have been reported in children. This is likely due in part to more ill patients being most frequently tested, with surveillance typically being passive, based on patients seeking medical care. Additionally, the nonspecific and often mild symptoms seen in infants and young children,[7] combined with the inability to ascertain more specific symptoms (e.g., anosmia) for the preverbal child, necessitate a high index of suspicion for COVID-19 to be diagnosed in children. Active, longitudinal surveillance of both children and adults across the spectrum of symptom severity, including the asymptomatic, would more clearly identify the incidence and trends of SARS-CoV-2 across ages and locale.[8] Finally, under-diagnosis of pediatric cases may also be due to infrastructure barriers. Many public and commercial testing venues have opted not to test toddler- or preschool-aged children,[9] leading to systemic discrepancies in access to testing compared to adults.

While testing does not artificially increase case counts, the variation in access to and reporting of testing does have the consequence of artificially depressing case counts in children. We have opportunities to improve surveillance data by expanding the accessibility of tests to children; conducting active as well as passive surveillance; more fully integrating children into contact tracing; standardizing reporting criteria across states; and disaggregating pediatric data into more epidemiologically meaningful age brackets. These modifications would allow a more data-driven, phased approach to re-opening schools and other institutions based on local transmission patterns.

References

1. Sisk B, Cull W, Harris JM, Rothenburger A, Olson L. National Trends of Cases of COVID-19 in Children Based on US State Health Department Data. IN PRESS, this issue, *Pediatrics*.

2. Dempsey M, Lamm S, Rubio J. Thousands of Texans are getting rapid result COVID tests; the state isn't counting them. Houston Chronicle. August 2, 2020. Available online at: https://www.houstonchronicle.com/news/investigations/article/Thousands-of-Texans-are-getting-rapid-result-15452709.php (accessed 9/9/2020).

3. Baggio S, L'Huillier AG, Yerly S, et al. SARS-CoV-2 viral load in the upper respiratory tract of children and adults with early acute COVID-19. *Clin Infect Dis*. 2020; doi: 10.1093/cid/ciaa1157.

4. Park YJ, Choe YJ, Park O et al. Contact tracing during coronavirus disease outbreak, South Korea, 2020. *Emerg Infect Dis.* 2020;26(10). doi: 10.3201/eid2610.201315.

5. Davies NG, Klepac P, Liu Y, et al. Age-dependent effects in the transmission and control of COVID-19 epidemics. *Nature Med*. 2020;26(8):1205-1211.

6. United States Census Bureau. National population by characteristics: 2010-2019. Available online at: https://www.census.gov/data/tables/time-series/demo/popest/2010s-national-detail.html (accessed 9/9/2020).

7. McLaren SH, Dayan PS, Fenster DB. Novel coronavirus infection in febrile infants aged 60 days and younger. *Pediatrics*. 2020;146(3):e20201550.

8. Galanti M, Birger R, Ud-Dean M, et al. Longitudinal active sampling for respiratory viral infections across age groups. *Influenza Other Respir Viruses.* 2019;13(3):226-232.

9. Kliff S, Sanger-Katz M. It's not easy to get a coronavirus test for a child. *New York Times.* September 8, 2020. Available online at: https://www.nytimes.com/2020/09/08/upshot/children-testing-shortfalls-virus.html (accessed 9/9/2020).

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