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Important Considerations for COVID-19 Vaccination of Children With Developmental Disabilities

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Abbreviations: DD = developmental disability; ASD = autism spectrum disorder; ID = intellectual disability

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Contributors' Statement Page

Dr. Tinker drafted the initial manuscript and reviewed and revised the manuscript.

Drs. Ryerson, Cogswell, and Peacock critically reviewed the manuscript for important intellectual content and revised the manuscript.

All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

Children can transmit SARS-CoV-2, and although lower risk, can experience serious outcomes from infection. Vaccinating children against COVID-19 is essential to protecting their health and establishing higher population immunity. In 2015–2017, 1 in 6 children aged 3–17 years had a developmental disability (DD) such as cerebral palsy, autism spectrum disorder (ASD), or intellectual disability (ID).¹ DDs are a diverse group of chronic conditions that begin in childhood and can impact functioning throughout life. Despite limited data in public health surveillance systems, some evidence suggests that some children with DDs might be disproportionately affected by COVID-19, both by the illness itself, and the pandemic's impact on receipt of services. Children with DDs often have medical conditions that contribute to higher risk for severe illness from COVID-19,² and can experience barriers to accessing needed health care and possess other characteristics increasing their risk from COVID-19, including limited mobility, direct care requirements, and challenges practicing preventive measures and communicating illness symptoms.³ We describe the limited available data relevant for children with DDs and highlight other considerations for COVID-19 vaccination.

In a cross-sectional study of >64 million U.S. patients of all ages, COVID-19 incidence was >3 times higher among people with ID than those without.⁴ Among those with COVID-19, twice as many people with ID were hospitalized, admitted to the intensive care unit, or died compared to those without ID. In analyses adjusting for age and comorbidities, ID was the strongest risk factor for COVID-19 diagnosis and the odds of mortality were almost six times higher among patients with COVID-19 who had ID compared with those without ID.

Private insurance claims data from the FAIR Health database showed similar results among patients of all ages for other DDs.⁵ Among people with COVID-19, those with ASD, ID, learning disabilities, and attention-deficit/hyperactivity-disorder had ~3 to 9 times higher

likelihood of hospitalization (adjusted for age and gender) than those without these conditions, and longer hospitalizations. Those who had a DD had ~3-fold higher odds of mortality than those without.⁶ Data on 43,465 children ≤ 18 years showed that from March 2020–January 2021 children with neurodevelopmental disorders were 1.6 times as likely to be hospitalized with COVID-19 than children without neurodevelopmental disorders, although severe illness among children hospitalized for COVID-19 with neurodevelopmental disorders was less common than among children with other conditions.⁷ An analysis of 30,282 patients with COVID-19 from the TriNetX COVID-19 Research Network showed the COVID-19 fatality rate among children < 18 years with ID and other DDs was 13 times higher than among children without these conditions. However, these rates were based on only two fatalities among 125 children with DD and one fatality among 791 children without DD.²

Limitations of the available data should be considered. It is challenging to compare results across studies because of variability in types, severity, and definitions of DDs, which can lead to heterogeneity in risk. Few studies examined children specifically, and not all accounted for underlying medical conditions or other confounders. Many studies used administrative healthcare data, which is not generalizable to all patients (e.g., includes only commercial insurance) and relies on diagnostic or other billing codes, which might result in misclassification of DDs or of COVID-19 as the reason for healthcare use (versus incidental finding). Finally, not all analyses have undergone peer-review.

Data on influenza vaccination can be used to inform potential challenges to COVID-19 vaccination among children with DDs. Despite many children with DDs being considered high-risk for influenza complications, vaccination rates in this population are consistently low (see

Data Supplement). Reasons for these suboptimal vaccination rates might be related to limited knowledge about increased risk for severe outcomes, access barriers, or vaccine hesitancy.

An online survey of parents of children with an ID or other neurological disorder found that their most important source of information regarding vaccines was their child's healthcare provider.⁸ However, in a companion survey of physicians likely to treat these children, <50% recognized ID as a high-risk condition for influenza.⁸

Data from studies before 2020 show that children with ASD have lower rates of influenza and other vaccinations compared with children without ASD and that parents of children with ASD have higher rates of vaccine hesitancy than parents of children with other DDs or no DDs (see Data Supplement).

Although vaccinating siblings of children with DDs might help to reduce COVID-19 transmission within households, data show that siblings of children with DDs have lower vaccination rates than their siblings with DDs, and siblings of children with DDs have a lower prevalence of on-time vaccination and a higher prevalence of parent vaccine refusal than siblings of children without DDs (see Data Supplement).

People with DDs face long-standing systemic health and social inequities. Children with DDs have greater healthcare and community-based service use than children without DDs,⁹ yet are more likely to have unmet healthcare needs. Additional challenges were raised by the COVID-19 pandemic. In a survey of >3,000 caregivers of children with ASD, 62% reported moderate to severe negative impacts of COVID-19-related disruption in services on their child's ASD symptoms and 72% reported experiencing moderate to extreme stress due to these disruptions.¹⁰ School closings to in-person learning and modified remote learning options have kept children within the home more, isolating and essentially re-segregating many children with

DDs from their peers, despite the Individuals with Disabilities Education Act mandate that children with disabilities be educated with children without disabilities to the maximum extent possible in the least restrictive environment. Prioritizing adolescents with DDs aged ≥ 12 years for COVID-19 vaccination, and children aged < 12 years when vaccines are authorized for use in this age group, is essential to resuming needed educational services within the school setting.

Pediatricians can work with other providers to tailor COVID-19 vaccination efforts for children with DDs to overcome issues of access and hesitancy. Children with DDs may have more interactions with healthcare or other service specialists than with general pediatricians. Collaboration between pediatric hospital systems, pediatric specialists, disability-specific practices and clinics, and occupational, physical, or speech specialists with knowledge of the specific needs of the children with DD in their community will be important for successful vaccination implementation. COVID-19 vaccination can be provided in ways that are easier for children with DDs to accept, such as the option to be vaccinated in their vehicle or in quiet areas. Some children with DDs may require more time or sensory modifications during vaccination appointments. In addition, some children with DDs may be unable to wear masks or practice physical distancing, limiting their ability to receive services at many locations. Trusted care providers can work with parents to learn and address specific concerns with vaccination. Collaboration with schools may facilitate parental education and/or leverage school-based clinics.

In conclusion, children with DDs are likely at higher risk of COVID-19 illness because of increased prevalence of underlying health conditions, suboptimal vaccination rates, and systemic inequities. Strategies can be implemented and supported by pediatricians to ensure that children with DDs, their caregivers, family members, and service providers receive the COVID-19

vaccine to reduce negative outcomes. Highlighting the unique considerations for COVID-19 vaccination for children with DDs can support equitable access of vaccination for children with DDs and their families.

References

1. Zablotsky B, Black LI, Maenner MJ, Schieve LA, Danielson ML, Bitsko RH, et al. Prevalence and Trends of Developmental Disabilities among Children in the United States: 2009-2017. *Pediatrics*. 2019;144(4).
2. Turk MA, Landes SD, Formica MK, Goss KD. Intellectual and developmental disability and COVID-19 case-fatality trends: TriNetX analysis. *Disabil Health J*. 2020;13(3):100942.
3. Centers for Disease Control and Prevention. COVID-19: People with Disabilities. <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-disabilities.html>. Published 2021. Accessed May 20, 2021, 2021.
4. Gleason J, Ross W, Fossi A, Blonsky H, Tobias J, Stephens M. The Devastating Impact of Covid-19 on Individuals with Intellectual Disabilities in the United States. *NEJM Catalyst Innovations in Care Delivery*. 2021;2.
5. Karpur A, Vasudevan V, Shih A, Frazier T. Brief Report: Impact of COVID-19 in Individuals with Autism Spectrum Disorders: Analysis of a National Private Claims Insurance Database. *J Autism Dev Disord*. 2021.
6. FAIR Health WHI, Makary M. Risk Factors for COVID-19 Mortality among Privately Insured Patients: A Claims Data Analysis. 2020.
7. Kompaniyets L, Agathis NT, Nelson JM, Preston LE, Ko JY, Belay B, et al. Underlying medical conditions associated with severe COVID-19 illness among children. *JAMA Network Open*. 2021;4(6):e2111182-e2111182.
8. Smith MJ, McFalls D, Hendricks J, Watkins J, Moore C, Peacock G, et al. Influenza vaccination practices of physicians and caregivers of children with neurologic and neurodevelopmental conditions—United States, 2011–12 Influenza Season. *MMWR Morbidity and mortality weekly report*. 2013;62(36):744.
9. Cummings JR, Lynch FL, Rust KC, Coleman KJ, Madden JM, Owen-Smith AA, et al. Health Services Utilization Among Children With and Without Autism Spectrum Disorders. *J Autism Dev Disord*. 2016;46(3):910-920.
10. White LC, Law JK, Daniels AM, Toroney J, Vernioia B, Xiao S, et al. Brief Report: Impact of COVID-19 on Individuals with ASD and Their Caregivers: A Perspective from the SPARK Cohort. *J Autism Dev Disord*. 2021.

Data Supplement

Details of studies on COVID-19, influenza vaccination, vaccine hesitancy, and sibling vaccination for children with developmental disabilities

Data Source (Time Period)	Relevant Population ¹	Results	Reference
COVID-19			
Cross-sectional administrative healthcare data (Jan 2019-Nov 2020)	All ages, 64,414,495 patients, 127,003 with intellectual disabilities (ID)	<p>COVID-19 incidence was 3.1% among people with ID and 0.9% among those without ID.</p> <p>Among those with COVID-19 and ID, 63.1% were hospitalized, 14.5% were admitted to the intensive care unit, and 8.2% died, compared to 29.1%, 6.3%, and 3.8% among those without ID, respectively.</p> <p>In analyses adjusting for age and comorbidities, odds of COVID-19 diagnosis were 2.6 times higher among people with ID compared to those without ID (95% confidence interval [CI]: 2.5, 2.7). The odds of mortality were 5.9 times higher among patients with COVID-19 who had ID compared with those without ID (95% CI: 5.3,6.6).</p>	Gleason J, Ross W, Fossi A, Blonsky H, Tobias J, Stephens M. The Devastating Impact of Covid-19 on Individuals with Intellectual Disabilities in the United States. NEJM Catalyst Innovations in Care Delivery. 2021;2.
Cross-sectional administrative healthcare data (Jan 2020-Sept 2020)	All ages, 35,898,076 privately-insured patients	Among people with COVID-19, adjusting for age and gender, odds of hospitalization was higher among people with specific developmental disabilities, i.e., ranging from 2.9 times higher for people with ADHD, conduct disorders, or hyperkinetic syndrome to 9.3 times higher for people with autism spectrum disorder plus ID or related conditions (ASD+ID). Odds of hospitalization longer than the median stay was 2.1 (learning disability) to 5.9 (ASD+ID) times higher.	Kapur A, Vasudevan V, Shih A, Frazier T. Brief Report: Impact of COVID-19 in Individuals with Autism Spectrum Disorders: Analysis of a National Private Claims Insurance Database. J Autism Dev Disord. 2021.

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Cross-sectional administrative healthcare data (Apr 2020-Aug 2020)	All ages, 467,773 privately-insured patients diagnosed with COVID-19	Adjusted for age and gender, odds of COVID-19 mortality were 3.1 times higher for people with developmental disorders than those without.	FAIR Health WHI, Makary M. Risk Factors for COVID-19 Mortality among Privately Insured Patients: A Claims Data Analysis. 2020.
Cross-sectional administrative healthcare data, Premier Health Care Database (Mar 2020-Jan 2021)	Children ≤18 years, 43,465 hospital (emergency room or inpatient) patients with COVID-19	<p>Adjusting for underlying medical conditions, demographics, hospital and payer characteristics, and month of admission, children with neurodevelopmental disorders were 1.6 times as likely to be hospitalized with COVID-19 compared with children without neurodevelopmental disorders, with age-specific odds ratios of 1.9 (95% CI: 1.3, 2.7), 2.2 (95% CI: 1.6, 3.0), and 1.7 (95% CI: 1.5, 1.9) for children age 2-5 years, 6-11 years, and 12-18 years, respectively.</p> <p>The adjusted odds ratios for severe illness among children hospitalized for COVID-19 with neurodevelopmental disorders compared to children with other conditions were 0.6 (95% CI: 0.4, 0.9), 0.8 (95% CI: 0.5, 1.1), and 0.9 (95% CI: 0.8, 1.1) for children age 2-5 years, 6-11 years, and 12-18 years, respectively.</p>	Kompaniyets L, Agathis NT, Nelson JM, Preston LE, Ko JY, Belay B, et al. Underlying medical conditions associated with severe COVID-19 illness among children. JAMA Network Open. 2021;4(6):e2111182-e2111182.
Cross-sectional administrative healthcare data (through May 2020)	30,282 patients with COVID 19, including 916 children <18 years	Children with COVID-19 and intellectual and developmental disabilities (IDD) had 1.6% mortality and those without had 0.1% mortality.	Turk MA, Landes SD, Formica MK, Goss KD. Intellectual and developmental disability and COVID-19 case-fatality trends: TriNetX analysis. Disabil Health J. 2020;13(3):100942.
INFLUENZA VACCINATION			
Commercial insurance claims data (2006-2014)	Privately insured children (1-17 years); 184,460 with neurologic disorders and 4,697,486	34.6% children with neurologic disorders and 23.8% of children in the general pediatric population received influenza vaccination	Havers FP, Fry AM, Peacock G, Chen J, Reed C. Influenza Vaccination Coverage in Children With Neurologic Disorders

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	general pediatric population		and Their Siblings, July 2006 to June 2014. <i>Pediatr Infect Dis J.</i> 2018;37(8):814-816.
Autism spectrum disorder (ASD) registry (2009-2010)	Children (3-17 years) treated at any of 5 health care systems, 8,325 with ASD, and 83,195 without ASD	The percentage point difference between children aged 3-9 years with ASD compared to without ASD was -4.2 for influenza vaccination and -2.4 for other vaccinations, adjusting for sociodemographic characteristics, comorbidities, and enrollment characteristics; for children age 10-17 years the differences were -2.1 and -3.1, respectively	Cummings JR, Lynch FL, Rust KC, Coleman KJ, Madden JM, Owen-Smith AA, et al. Health Services Utilization Among Children With and Without Autism Spectrum Disorders. <i>J Autism Dev Disord.</i> 2016;46(3):910-920.
Vaccine Safety Datalink (children born 1995-2010)	Children aged 7 years as of September 30, 2015, 2,855 with ASD, 483,961 without ASD	Rate ratio for full on-time vaccination of children with ASD compared to children without ASD was 0.87 (95% confidence interval [CI]: 0.85, 0.88), adjusting for maternal and child characteristics	Zerbo O, Modaressi S, Goddard K, Lewis E, Fireman BH, Daley MF, et al. Vaccination Patterns in Children After Autism Spectrum Disorder Diagnosis and in Their Younger Siblings. <i>JAMA Pediatr.</i> 2018;172(5):469-475.
VACCINE HESITANCY			
Mail survey (2015-2017)	Parents of children ages 2-17 years, 129 with ASD, 42 with non-ASD developmental disorders (DDs), and 91 who were patients seen in well child care (no DDs)	29.5% of parents of children with ASD expressed vaccine hesitancy, approximately twice as many as for parents of children with other DDs (14.3%) or no DDs (17.6%).	Sahni LC, Boom JA, Mire SS, Berry LN, Dowell LR, Minard CG, et al. Vaccine Hesitancy and Illness Perceptions: Comparing Parents of Children with Autism Spectrum Disorder to other Parent Groups. <i>Child Health Care.</i> 2020;49(4):385-402
Online survey (2018)	Parents of 225 minor children with an ASD diagnosis who were participants in an ASD registry	28.8% of parents of children with ASD were vaccine hesitant, with hesitancy more common among parents whose child had more severe ASD symptoms.	Goin-Kochel RP, Fombonne E, Mire SS, Minard CG, Sahni LC, Cunningham RM, et al. Beliefs about causes of autism and vaccine hesitancy among parents of children with autism spectrum

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			disorder. Vaccine. 2020;38(40):6327-6333
SIBLING VACCINATION			
Commercial insurance claims data (2006-2014)	Privately insured children (1-17 years); 184,460 with neurologic disorders and 4,697,486 general pediatric population Privately insured children (1-17 years); 184,460 with neurologic disorders and 204,966 siblings	28.1% of siblings of children with neurologic disorders received influenza vaccination, compared with 34.6% of children with neurologic disorders	Havers FP, Fry AM, Peacock G, Chen J, Reed C. Influenza Vaccination Coverage in Children With Neurologic Disorders and Their Siblings, July 2006 to June 2014. <i>Pediatr Infect Dis J.</i> 2018;37(8):814-816.
Vaccine Safety Datalink	Children aged 7 years as of September 30, 2015, 2031 siblings of children with ASD, 475,501 siblings of children without ASD.	Rate ratios for full on-time vaccination of younger siblings of children with ASD compared to younger siblings of children without ASD were 0.86 (95% CI: 0.82, 0.89), 0.84 (95% CI: 0.79, 0.89), and 0.88 (95% CI: 0.84, 0.92) for children ages 1-11 months, 1-2 years, and 4-6 years, respectively. Parental vaccine refusal was >12% for younger siblings of children with ASD compared to <8% for younger siblings without ASD.	Zerbo O, Modaresi S, Goddard K, Lewis E, Fireman BH, Daley MF, et al. Vaccination Patterns in Children After Autism Spectrum Disorder Diagnosis and in Their Younger Siblings. <i>JAMA Pediatr.</i> 2018;172(5):469-475

¹All studies based on individuals living in the United States.

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