Severe and Long-Term Outcomes of COVID-19 Infection and Vaccine Hesitancy and Adverse Events in Children with Pediatric Rheumatic Diseases: Insights from a COVID-19 Global Rheumatology Alliance Caregiver Survey

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Background

- Fewer than 50% of US children have received at least one COVID-19 vaccine, the lowest rate among age groups.[1]
- COVID-19 vaccination protects against acute illness, decreases the risk of multisystem inflammatory syndrome in children (MIS-C) and post-COVID conditions.[2-4]
- Rates of COVID-19 vaccination among children with pediatric rheumatic disease (PRD) have not been well characterized, and the factors that influence whether parents choose to vaccinate their children with PRD remain unclear.
- There is limited understanding of the severe and long-term complications of COVID-19 among children with PRD and post-COVID conditions.

Objectives

- To describe the COVID-19 experiences of children with PRDs, focusing on severe and long-term consequences, including MIS-C and PASC.
- To describe the sentiment of caregivers of children with PRDs toward COVID-19 vaccines, and explanations for vaccine hesitancy among this population.
- To describe COVID-19 vaccine experiences in children with PRDs.

Methods

- The 2023 COVID-19 Global Rheumatology Alliance Pediatric Survey was a multilingual, international survey of caregivers of children with PRD. The survey was written in English and translated into 25 languages. It was disseminated globally through email, social media, and partnerships with patient support organizations.
- Eligible respondents were ≥18 years of age and the caregiver of a child with PRD < 18 years of age.
- The survey captured caregiver-reported data on severe and long-term COVID-19 outcomes, as well as caregiver vaccine hesitancy and vaccine adverse events among children with PRD. PASC was defined as symptoms lasting 4 weeks or greater after COVID-19 infection, as per CDC guidelines.
- Data were collected from May 10 to August 4, 2023.

Results

- 92% of caregivers and 70% of children had received at least one COVID-19 vaccine (Table 1).
- 93% of children had no adverse events, and severe reactions were rare (2.7%) (Table 2).
- Caregivers who had not been vaccinated were more likely to think COVID-19 vaccines were developed too quickly, were unsafe, and were less likely to believe COVID-19 vaccination is important to protect the health of others or that they should be required for school attendance.
- The primary reasons caregivers avoided vaccinating children with PRDs are shown in Figure 1
- 552 COVID-19 infections were reported in 407 children (66%), and 15 children (3.7%) required hospitalization.
- 55 children (13.5%) reported at least one COVID-19 symptom lasting 28 days or longer. However, only 32 (7.8%) reported being formally diagnosed as having “long-COVID” or a post-COVID condition.
- MIS-C was reported in 14 children (3.4%), 8 of whom had autoinflammatory disease. 6 children continued to have symptoms related to MIS-C at the time of survey completion.

Table 1: Demographics of caregivers and children

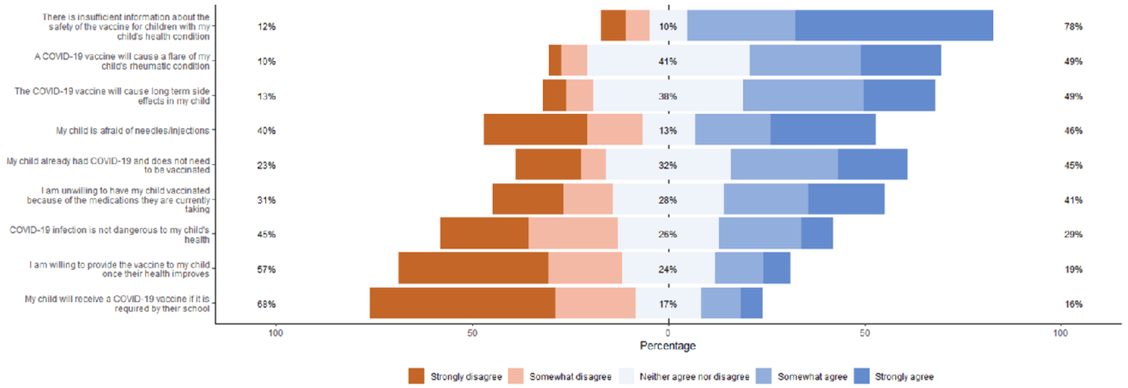
	Caregivers (n = 592)	Children (n = 616)
Demographics	**N (%)**	**N (%)**
Age, median (Q1, Q3)	43 (39, 48)	12 (9, 16)
Female sex at birth	546 (92.2)	445 (72.2)
Prefer not to say	5 (0.8)	6 (1)
Female gender	545 (92.1)	436 (70.8)
Non-binary gender	7 (1.2)	13 (2.1)
World Health Organization (WHO) Region		
Region of the Americas	421 (71.11)	-
European Region	132 (22.3)	-
African Region	20 (3.38)	-
Eastern Mediterranean Region	1 (0.17)	-
South-East Asia Region	1 (0.17)	-
Western Pacific Region	15 (2.53)	-
COVID-19 Vaccination Status		
Received at least one dose of the COVID-19 vaccine	545 (92.1)	430 (69.8)

Table 2: Vaccination rates and adverse reactions

Diagnosis*	Number with disease (n=616) N (%)	Received COVID-19 vaccine (n=429) N (%)	No vaccine reactions (n=397 N (%)	Low risk reactions (n=20) † N (%)	High risk reactions (n=12) § N (%)
Juvenile idiopathic arthritis	330 (53.6)	229 (69.4)	212 (92.6)	10 (3.0)	7 (2.12)
Systemic juvenile idiopathic arthritis	103 (16.7)	73 (70.9)	69 (94.5)	2 (1.9)	2 (1.94)
Inflammatory myopathy	84 (13.6)	56 (66.7)	54 (96.4)	2 (2.38)	0 (0)
Systemic lupus erythematosus	37 (6.0)	29 (78.4)	24 (82.8)	4 (10.81)	1 (2.7)
Autoinflammatory disease	28 (4.5)	24 (85.7)	22 (91.7)	1 (3.57)	1 (3.57)
Vasculitis	14 (2.3)	10 (71.4)	6 (60)	2 (14.29)	2 (14.29)
Chronic recurrent multifocal osteomyelitis	10 (1.6)	7 (70)	7 (100)	0 (0)	0 (0)
Sjogrens syndrome	8 (1.3)	4 (50)	3 (75)	1 (12.5)	0 (0)
Bechet’s disease	7 (1.1)	6 (85.7)	5 (83.3)	0 (0)	1 (14.29)
Systemic Sclerosis	5 (0.8)	4 (80)	3 (75)	1 (20)	0 (0)
IgG4-related disease	4 (0.6)	4 (100)	3 (75)	1 (25)	0 (0)
Sarcoidosis	3 (0.5)	2 (66.6)	1 (50)	0 (0)	1 (33.33)

* Children may have more than one diagnosis.
† Low risk reactions = rash, fever, chills, myalgias, fatigue, headache, nausea, vomiting, anorexia, chest pain, palpitations.
§ High risk reactions = anaphylaxis, flare of existing rheumatic disease, development of new rheumatic disease, pericarditis, multisystem inflammatory syndrome in children (MIS-C).

Figure 1: Vaccination perceptions among caregivers of unvaccinated children with PRDs



Conclusion

Our study provides real-world data regarding the safety of COVID-19 vaccination among children with PRDs and the rarity of severe and long-term outcomes of COVID-19 infection in this group.

- COVID-19 vaccination among children with PRD were significantly higher than reports of otherwise healthy children (70% vs 37%).[5]

  High vaccination rates may be due to close relationships between rheumatologist and their patients, and the perception that these children are at higher risk for COVID-19 complications.

- Caregiver vaccine hesitancy among unvaccinated children was primarily related to concerns about the safety of the vaccines and their potential effects specifically on children with PRD. However, vaccine adverse events were rare.

  Including immunocompromised patients in vaccine studies and delivering accurate and timely safety information may help increase vaccine uptake.

- Post-COVID conditions were less common in children with PRD (13.5%), than in otherwise healthy children (25%),[7] though many went undiagnosed.

  High vaccination rates in our cohort may have protected against post-COVID conditions. However, greater provider awareness could improve diagnosis and treatment.

- MIS-C was more common than expected, especially among children with autoinflammatory diseases.

  It’s unclear if this group is at higher risk of MIS-C or if it was difficult to distinguish between MIS-C and rheumatic disease flares.

- Limitations include participation bias, as caregivers active on social media and patient support groups with greater internet access were more likely to participate. Respondents were primarily from North America and Europe and ethnic and racial diversity was limited. The survey relied on caregiver-reported data.

  Targeted recruitment, community collaboration, and offline methods may be necessary to include a diverse patient population in research studies.

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Disclosures: Hausmann (Novartis), Lalonde (Merck/MSD), Grainger (AbbVie/Abbott, Novartis), Machado (AbbvVie, BMS, Celgene, Eli Lilly, Galapagos, GSK, Janssen, MSD, Novartis, Orphazyme, Pfizer, Roche, UCB Pharmacy), Wallace (Amgen, BioCryst, MedPace, PPD, Sanofi, Zenas), Yazdany (AstraZeneca, Aurinia, BMS, UCB).