# Long-Term Impairments and Functional Limitations Related to Long COVID: What do we know about Children and Adolescents?

National Academy of Sciences, Engineering and Medicine

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3/22/2022

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# Objectives

| Contrast | Identify | Examine | Recognize | Predict |
| --- | --- | --- | --- | --- |
| Contrast Long COVID in children and adults | Identify the symptoms of Long COVID in children and adolescents | Examine the limitations of the available pediatric literature on Long COVID | Recognize potential impacts of Long COVID in the pediatric population | Predict possible long-term challenges for pediatric patients with Long COVID |

# What is *different* about children and adolescents?

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| Children are far less likely to be hospitalized and have severe disease |
| Children (generally) have fewer comorbidities |
| Children are often previously healthy; thus, the symptoms of PASC can represent a stark departure from baseline for children and their families, compounding the risk to quality of life |
| Young children or those with developmental delay may have difficulty articulating their concerns |
| Histories from vested parties (parents, caregivers, coaches, teachers) may be relied upon to understand symptomatology and guide treatment and management |

# How *common* is Long COVID in children?

Early studies likely overestimated the prevalence of Long COVID with reports of 8%- 52% of children with microbiologically documented SARS-CoV-2 infection developing symptoms that persisted beyond 1-4 mo [3,5,10,15]

Later studies including control groups estimated 0.8%-2% of children develop PASC [2,6,8]

Younger children (0-5y) are less frequently affected and have fewer symptoms than older children and adolescents [2,6,10]

# What are the *symptoms* of Long COVID in children?

- Fatigue*
- Post-exertional fatigue*
- Exercise Intolerance
- Dyspnea*
- Cough
- Sore throat
- Chest pain
- Palpitations
- Dizziness*
- Headaches
- Memory and concentration problems (“brain fog”)
- Insomnia
- Muscle weakness
- Muscle pain
- Joint pain
- Abdominal pain
- Nausea
- Weight loss
- Anorexia
- Anxiety
- Skin rashes
- Anosmia/hyposmia and ageusia/dysgeusia *

# *Pediatric research* and Long COVID

- Zimmerman, et al[15] reviewed 14 studies published on Long COVID-19 in pediatric patients
- Major limitations of almost all the studies published
- Heterogeneity between studies and methodological flaws
- Of the 5 studies that had control groups, 2 found that symptoms were not more prevalent in children with evidence of SARS-CoV-2 infection
- Underscores the need for well designed studies with appropriate controls to better define PASC and assess the the persistence and long-term health impact of post COVID-19 conditions in the pediatric population

# What are potential *impacts* of Long COVID on children and adolescents?

- Psychological/ toxic stress
- School absenteeism
- School performance
- Social activities
- Socioeconomically disadvantaged and ethnic minority groups
- Parental job loss

# How *long* is long?

- Follow up times after COVID-19 diagnoses in published studies are limited
- Many studies show a decrease in the number of symptomatic patients and burden of disease over study periods
- Persistence of COVID-19 related morbidity is unknown
- ME/CFS:
  - Half of adolescents report severe fatigue and physical impairment 2 y after diagnosis of CFS [4]
  - Health care utilization is high, and school and work attendance is low in this population[4]
  - Follow-up of 35 adolescents found 20% of patients had ongoing significant symptoms and activity limitation 13 y after illness onset[1]

# What can we *predict*?

- As of 3/10/2022: Almost 12.8 million children in the U.S. tested positive for COVID-19 since onset of  pandemic [16]
- 4.9 million child cases were reported since the beginning of January secondary to the Omicron variant [16]
- Using the lower prevalence estimates of 0.8 %-2% of SARS-CoV-2+ children developing Long COVID there will be *100,000-250,000* children affected
- If 20% of children with Long COVID have symptoms persisting beyond a decade than 20,000-50,000 children will transition into adulthood with ongoing health care needs
- CDC report estimates that 60% of American children have had COVID-19

# Final thoughts

- Children may experience significant long-term physical, cognitive, social and emotional limitations due to Long COVID
- Early recognition and treatment of symptoms and support of return to school and other activities with appropriate accommodations is essential to the overall recovery of children
- Identification of family stressors (e.g., financial, housing, un/employment, safety, social isolation) and availability of support systems may provide emotional and logistical support and guide medical therapies
- Further research aimed at understanding the long-term impact of Long COVID on children as they transition into adulthood is greatly needed

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