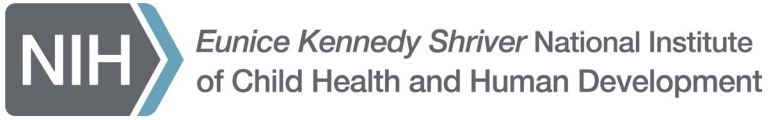
COVID-19 in Children
NIH Tribal Advisory Committee

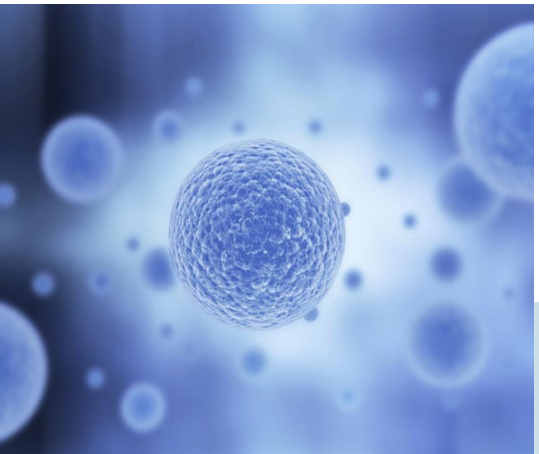
Rohan Hazra, MD

October 26, 2021



Mission Statement

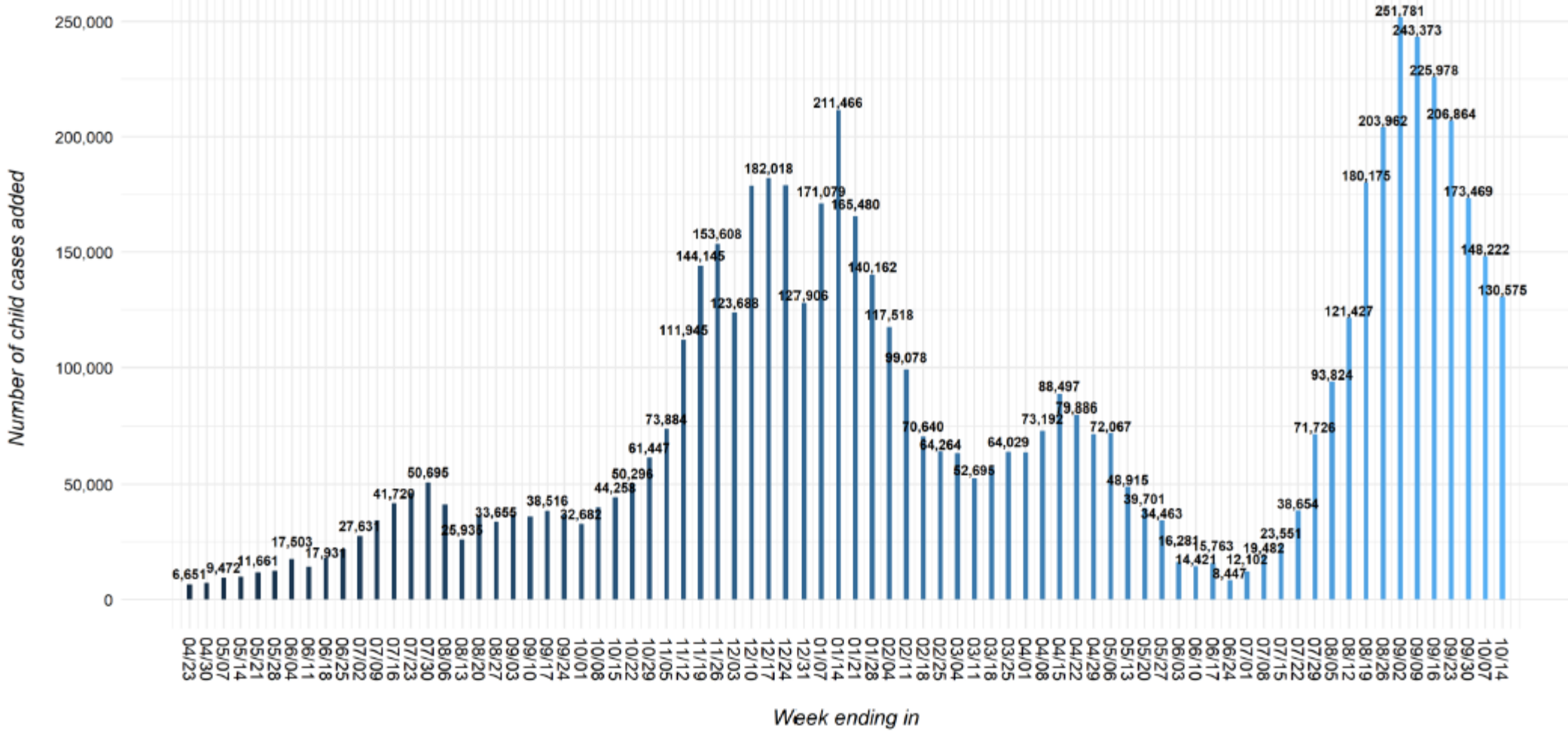
The NICHD leads research and training to understand human development, improve reproductive health, enhance the lives of children and adolescents, and optimize abilities for all.





COVID-19 AND CHILDREN

Fig 6. United States: Number of Child COVID-19 Cases Added in Past Week*

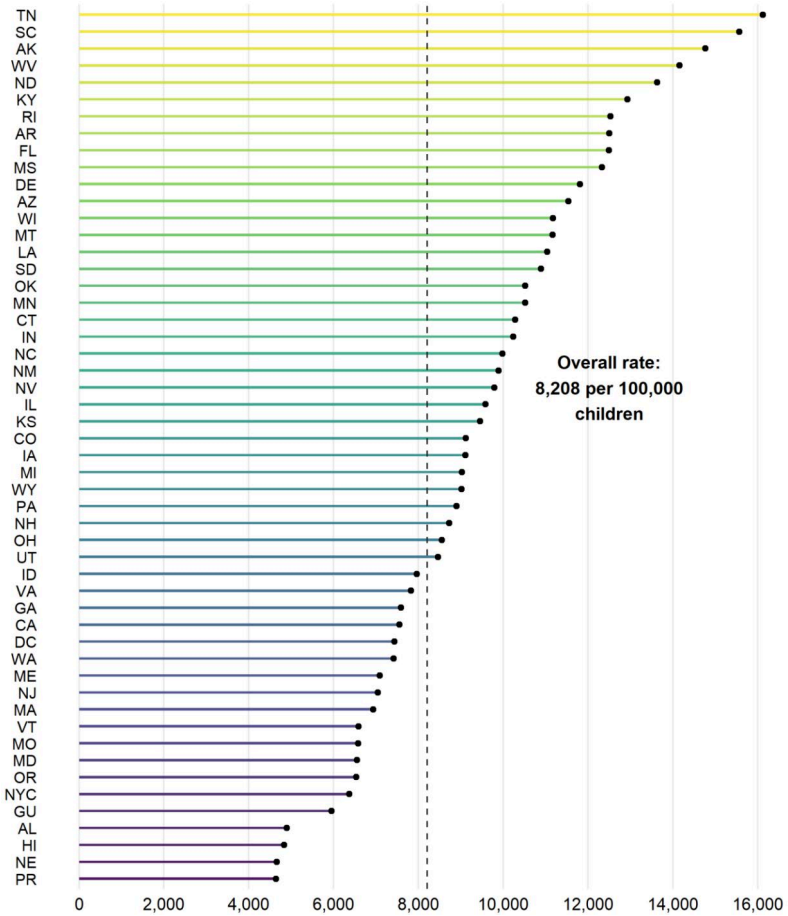


** Note: 5 states changed their definition of child cases: AL as of 8/13/20, HI as of 8/27/20, RI as of 9/10/20, MO as of 10/1/20, WV as of 8/12/21*
TX reported age for only a small proportion of total cases each week (eg, 3-20%); TX cumulative cases through 8/26/21
As of 6/30/21, NE COVID-19 dashboard is no longer available; NE cumulative cases through 6/24/21
Due to available data and changes made to dashboard, AL cumulative cases through 7/29/21
Due to available data and calculations required to obtain MA child cases, weekly estimates fluctuate
See detail in Appendix: Data from 49 states, NYC, DC, PR and GU
All data reported by state/local health departments are preliminary and subject to change; Analysis by American Academy of Pediatrics and Children's Hospital Association

CHILDREN'S HOSPITAL ASSOCIATION
American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN®

WEEKLY STATE-LEVEL DATA REPORT (AAP/CHA)

- **6,177,946** total child COVID-19 cases, representing **16.4%** of all cases
- **130,575** new child COVID-19 cases were reported the past week, representing **25.5%** of new weekly cases. Over the past two weeks, there was an **5% increase** in the cumulated number of child COVID-19 cases
- Children ranged from **1.6%-4.2%** of total cumulated hospitalizations, and **0.1%-2.0%** of child COVID-19 cases resulted in hospitalization
- Children were **0.00%-0.25%** of all COVID-19 deaths, and **0.00%-0.03%** of all child COVID-19 cases resulted in death*



Cumulative COVID-19 Cases per 100,000 Children

https://aap.org/en/pages/2019-novel-coronavirus-covid-19-infections/children-and-covid-19-state-level-data-report/

Data as of: 10/14/21

NEW HOSPITAL ADMISSIONS: AGE 0-17

65,795
Total Admissions
Aug 01, 2020 - Oct 18, 2021

178
Current 7-Day Average
Oct 12, 2021 - Oct 18, 2021

186
Prior 7-Day Average
Oct 05, 2021 - Oct 11, 2021

371
Peak 7-Day Average
Aug 29, 2021 - Sep 04, 2021

-4.5%
Percent change from prior 7-day avg. of Oct 05, 2021 - Oct 11, 2021

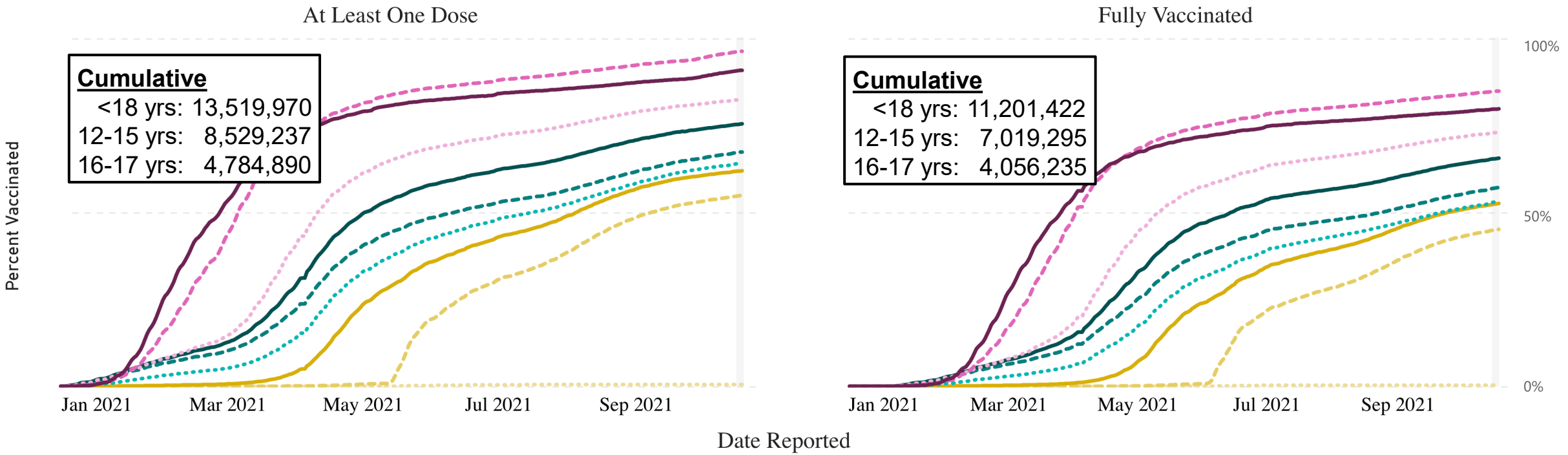
-52.1%
Percent change from peak 7-day avg. of Aug 29, 2021 - Sep 04, 2…

https://covid.cdc.gov/covid-data-tracker/#new-hospital-admissions

Data as of: 10/18/21

PERCENT RECEIVED COVID-19 VACCINE BY AGE

	<12 yrs	12-15 yrs	16-17 yrs	18-24 yrs	25-39 yrs	40-49 yrs	50-64 yrs	65-74 yrs	75+ yrs
At Least One Dose	0.5%	56.1%	63.4%	65.6%	68.9%	77.1%	84.3%	98.5%	92.9%
Fully Vaccinated	0.3%	46.2%	53.7%	54.3%	58.5%	67.1%	74.6%	86.8%	81.5%



https://covid.cdc.gov/covid-data-tracker/#vaccination-demographics-trends

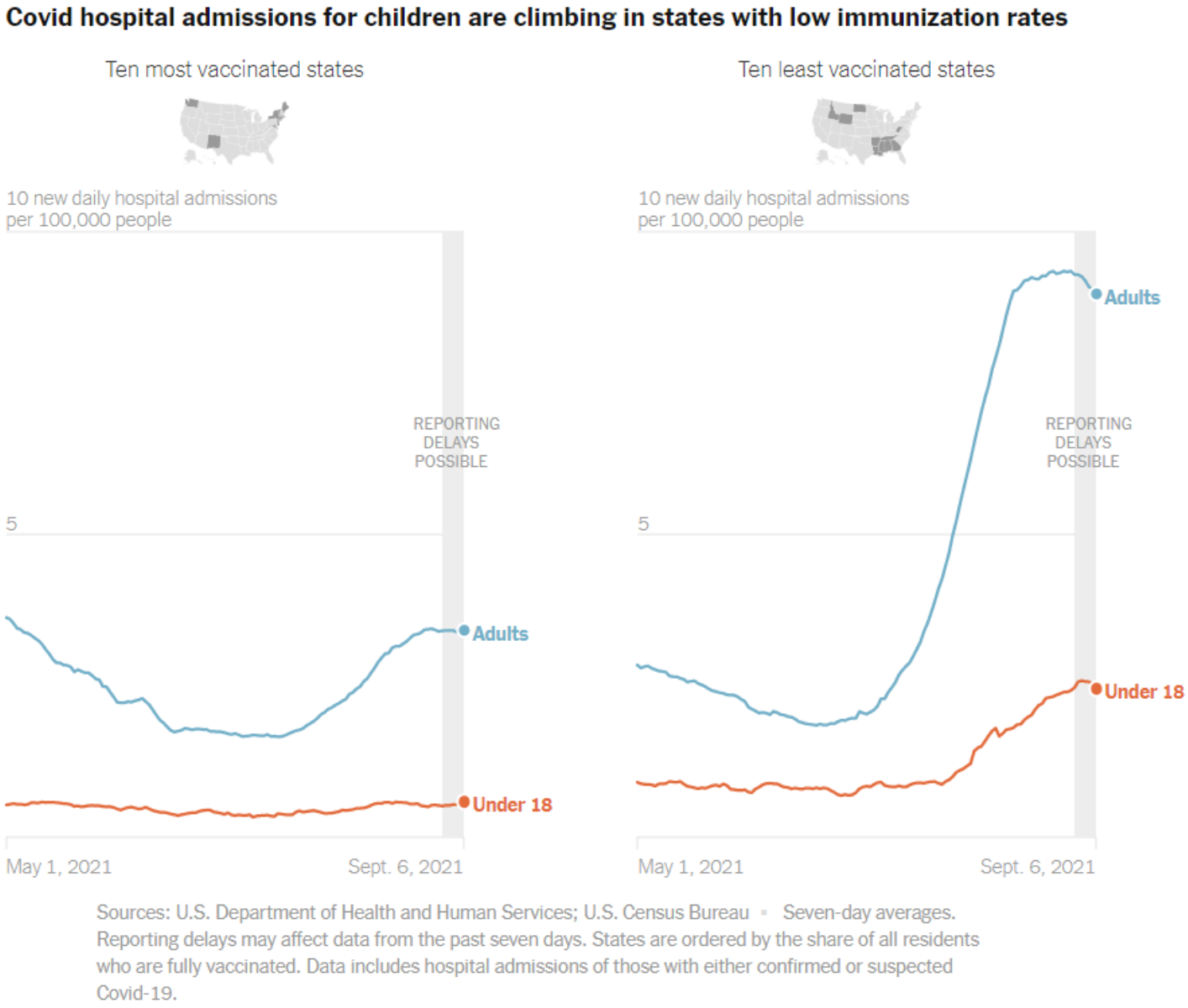
Data as of: 10/19/21

Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Early Release / Vol. 70
September 3, 2021

Trends in COVID-19 Cases, Emergency Department Visits, and Hospital Admissions Among Children and Adolescents Aged 0–17 Years — United States, August 2020–August 2021

David A. Siegel, MD[1]; Hannah E. Reses, MPH[1]; Andrea J. Cool, MPH[2]; Craig N. Shapiro, MD[1]; Joy Hsu, MD[1]; Tegan K. Boehmer, PhD[1]; Cheryl R. Cornwell, MSPH[3]; Elizabeth B. Gray, MPH[1]; S. Jane Henley, MSPH[1]; Kimberly Lochner, ScD[1]; Amitabh B. Suthar, PharmD[1]; B. Casey Lyons, MPH[1]; Linda Mattocks, MPH[1]; Kathleen Hartnett, PhD[1]; Jennifer Adjemian, PhD[1]; Katharina L. van Santen, MSPH[4]; Michael Sheppard, MS[1]; Karl A. Soetebier, MAPW[1]; Pamela Logan, MD[1]; Michael Martin, MD[1]; Osatohamwen Idubor, MD[1]; Pavithra Natarajan, BMBS[1]; Kanta Sircar, PhD[1]; Eghosa Oyegun, MPH[1]; Joyce Dalton, MEd[5]; Cria G. Perrine, PhD[1]; Georgina Peacock, MD[6]; Beth Schweitzer, MS[1]; Sapna Bamrah Morris, MD[1]; Elliot Raizes, MD[1]

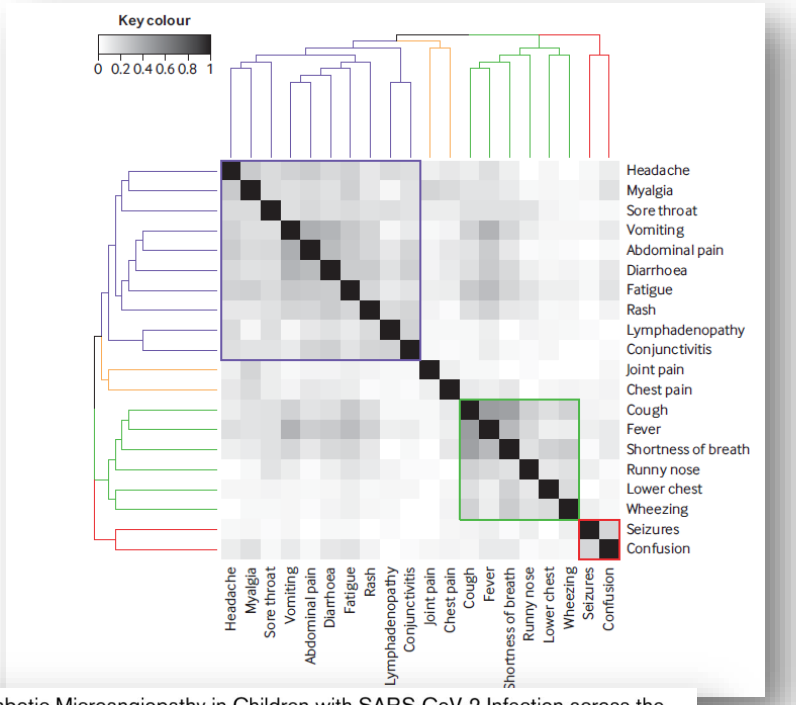
"The rate (per 100,000 persons) of COVID-19 admissions in August 2021 in the quartile of states with the lowest vaccination coverage was 3.7 times that in the quartile of states with the highest vaccination coverage."

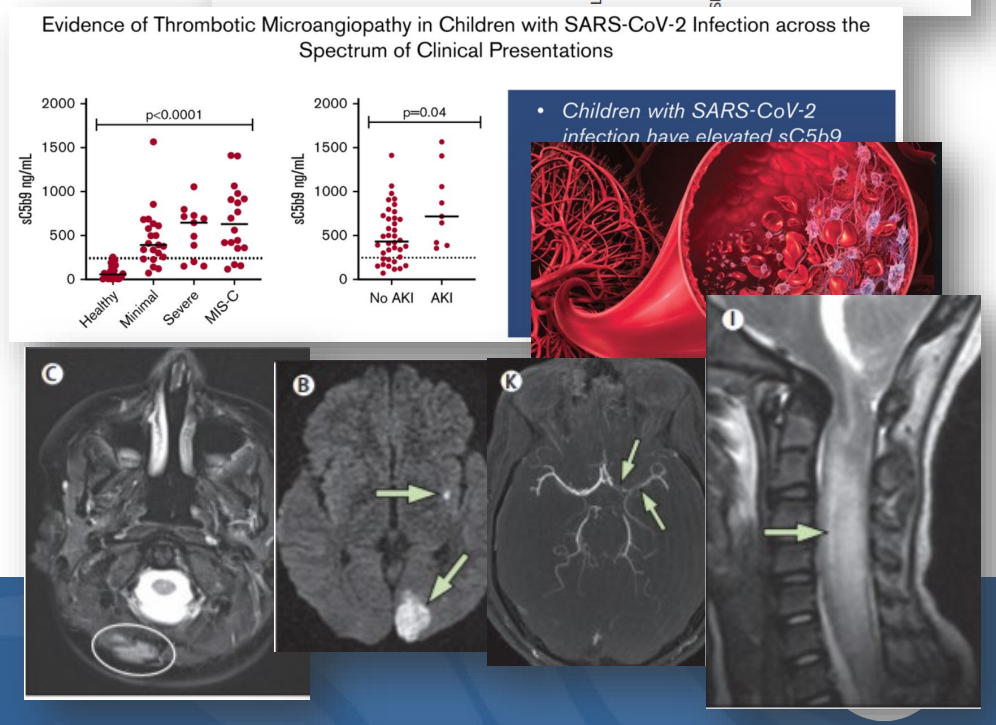


Source: https://www.nytimes.com/interactive/2021/09/09/us/covid-children-cases-icu.html?

Children and SARS-CoV-2 illness

- **SARS-CoV-2 exhibits a wide range of clinical outcomes**
  - Asymptomatic/mild disease
  - Severe viral pneumonia/RDS
  - GI, musculoskeletal & mucocutaneous disease
  - Serious cardiac, cerebrovascular and vascular complications
  - Acute kidney injury, shock syndrome, coagulopathy
  - MIS-C
- **Risk of severe illness/hospitalization**
  - Genetic, heart disease, neurologic & metabolic comorbidities
  - Obesity, diabetes, asthma/chronic lung disease, SCD
  - R/E minorities





Effects of the Pandemic

- Family and economic stress
- Loss of caregivers/grief
- Missed routine vaccinations
- Undetected abuse and neglect
- Neurodevelopmental/cognitive/educational impacts
- Mental health
- Substance use
- Decreased physical activity/obesity

Multisystem Inflammatory Syndrome in Children (MIS-C) and other forms of Post-Acute Sequelae of SARS-CoV-2 (PASC)

Multisystem Inflammatory Syndrome in Children (MIS-C)

Coronavirus Live updates U.S. map World map Reopening tracker Lives lost Your life at home Your money

Health

Children are falling ill with perplexing inflammatory syndrome thought to be linked to covid-19

Number of cases remains small, but officials are on high alert because of severity

Health

Young adults are also affected by Kawasaki-like disease linked to coronavirus, doctors say

CDC Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

Search Coronavirus Advanced Search

Coronavirus Disease 2019 (COVID-19)

CDC > Coronavirus Disease 2019 (COVID-19) > Daily Life & Coping > Caring for Children

Coronavirus Disease 2019 (COVID-19)
Symptoms
Testing

For Parents: Multisystem Inflammatory Syndrome in Children (MIS-C) associated with COVID-19

Other Languages Print Page

EurekAlert! AAAS

HOME COVID-19 NEWS RELEASES MULTIMEDIA MEETINGS PORTALS ABOUT

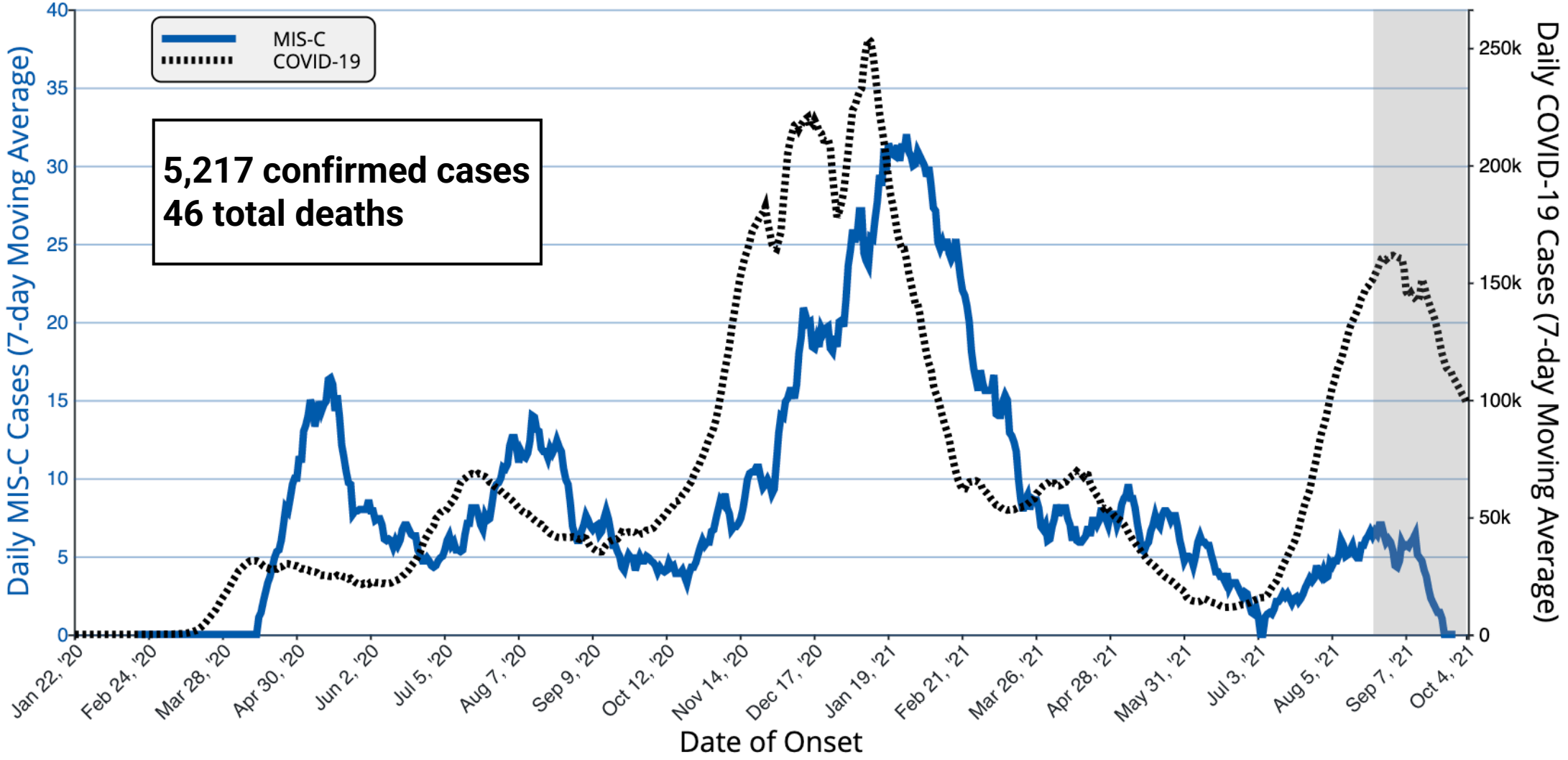
NEWS RELEASE 28-APR-2020

Boston Children's Hospital to lead nationwide study on COVID-19 in children

CDC-funded study will seek factors that increase vulnerability to the novel coronavirus

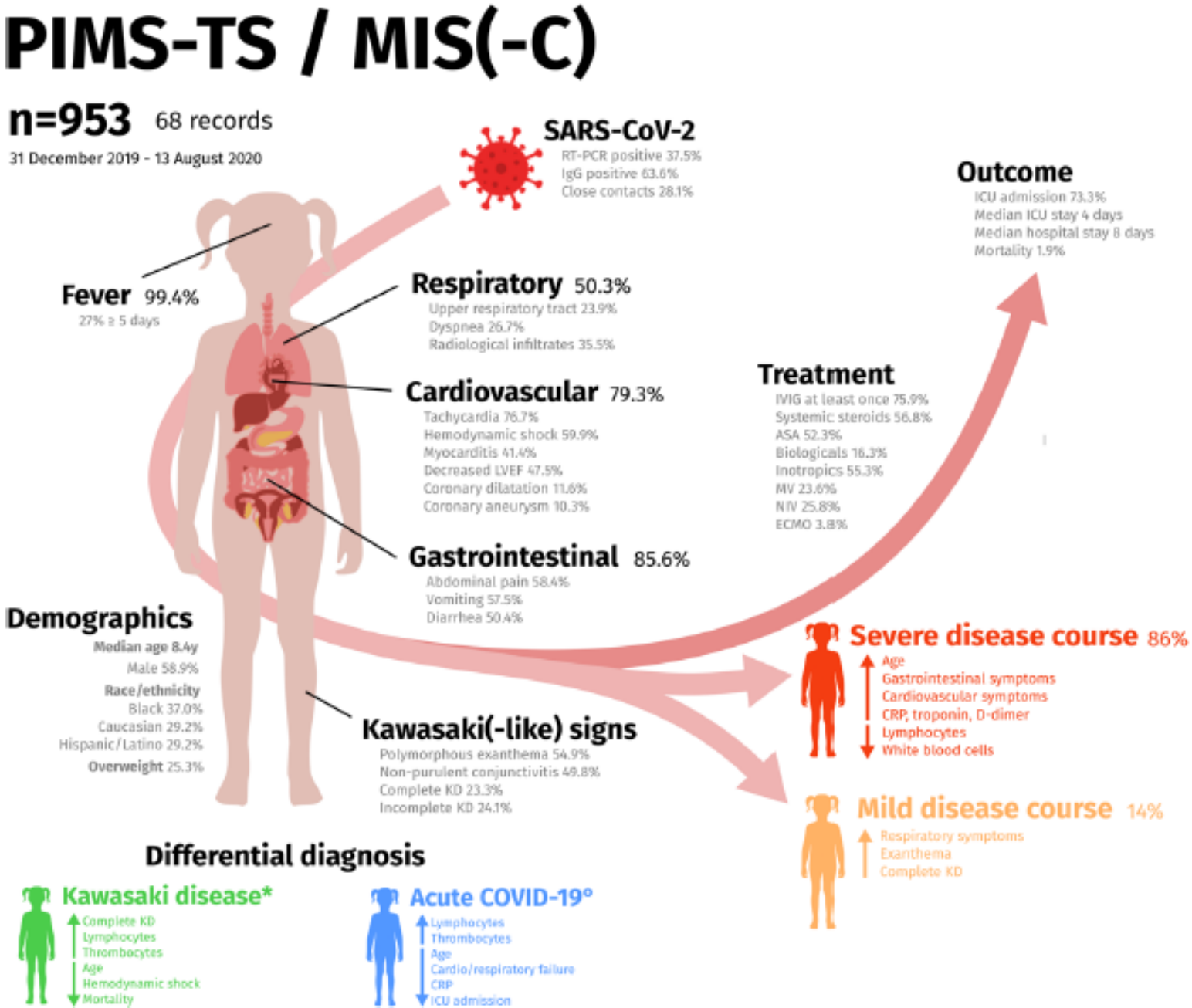
BOSTON CHILDREN'S HOSPITAL

DAILY MIS-C AND COVID-19 CASES



https://www.cdc.gov/mis/cases/index.html

Data as of: 10/04/21



Hoste, *Eur J Peds*, 2021

CARING for Children with COVID

(Collaboration to Assess Risk and Identify loNG-term outcomes for Children with COVID)

- Two approaches
- Leverages resources and networks from 3 NIH ICs to capture data from patients with MIS-C
- Trans-NIH effort through RADx-rad to enhance diagnostic and predictive efforts
- https://caring4kidswithcovid.nih.gov/

CARING for Children with COVID

(Collaboration to Assess Risk and Identify loNG-term outcomes for Children with COVID)

- Leverages networks from NICHD, NHLBI, NIAID to study MIS-C
  - Capitalizes on strengths of each network: immune profiling (NIAID); long-term cardiac effects (NHLBI); PK/PD of drugs used to treat COVID-19 but not labeled for children (NICHD)
  - **Clinical data will be harmonized** across MIS-C cohort studies
  - A searchable data set with common data elements will be created for **interoperable sharing across different platforms**
  - Aim to follow children for up to five years through longitudinal protocol
  - Currently >1000 children are enrolled across three protocols
  - First data release!

The first batch of data (representing 57 participants) from the *CARING for Children with COVID: POP-02* study has been released through the Kids First FHIR API

- View/filter the *CARING* data alongside Kids First and other interoperable datasets
- Users can develop their own tools/applications
- Next batch of data due soon
- https://portal.kidsfirstdrc.org/explore?id=7op
- http://www.ncbi.nlm.nih.gov/projects/gap/cgi-bin/study.cgi?study_id=phs002577.v1.p1
- https://www.ncbi.nlm.nih.gov/bioproject/?term=PRJNA759601

NIH Rapid Acceleration of Diagnostics (RADx)[SM]

Project	Description
RADx Tech	Highly competitive, rapid three-phase challenge to identify the best candidates for at-home or point-of-care tests for COVID-19
RADx-Advanced Testing Program (RADx-ATP)	Rapid scale-up of advanced POC technologies to accelerate and enhance and validate throughput – and support of ultra-high throughput machines and facilities
RADx-Radical (RADx-rad)	Develop and advance novel, non-traditional approaches or new applications of existing approaches for testing
RADx-Underserved Populations (RADx-UP)	Interlinked community-engaged projects focused on implementation strategies to enable and enhance testing of COVID-19 in underserved and/or vulnerable populations

Predicting Viral-Associated Inflammatory disease severity in children with Laboratory diagnostics and artificial Intelligence (PreVAIL kIds)

RADx℠ Radical (RADx-rad)

RADx-rad will support new, non-traditional approaches, including rapid detection devices and home-based testing technologies, that address current gaps in COVID-19 testing. The program will also support new or non-traditional applications of existing approaches to make them more usable, accessible, or accurate. These may lead to new ways to identify the current SARS-CoV-2 virus as well as potential future viruses.

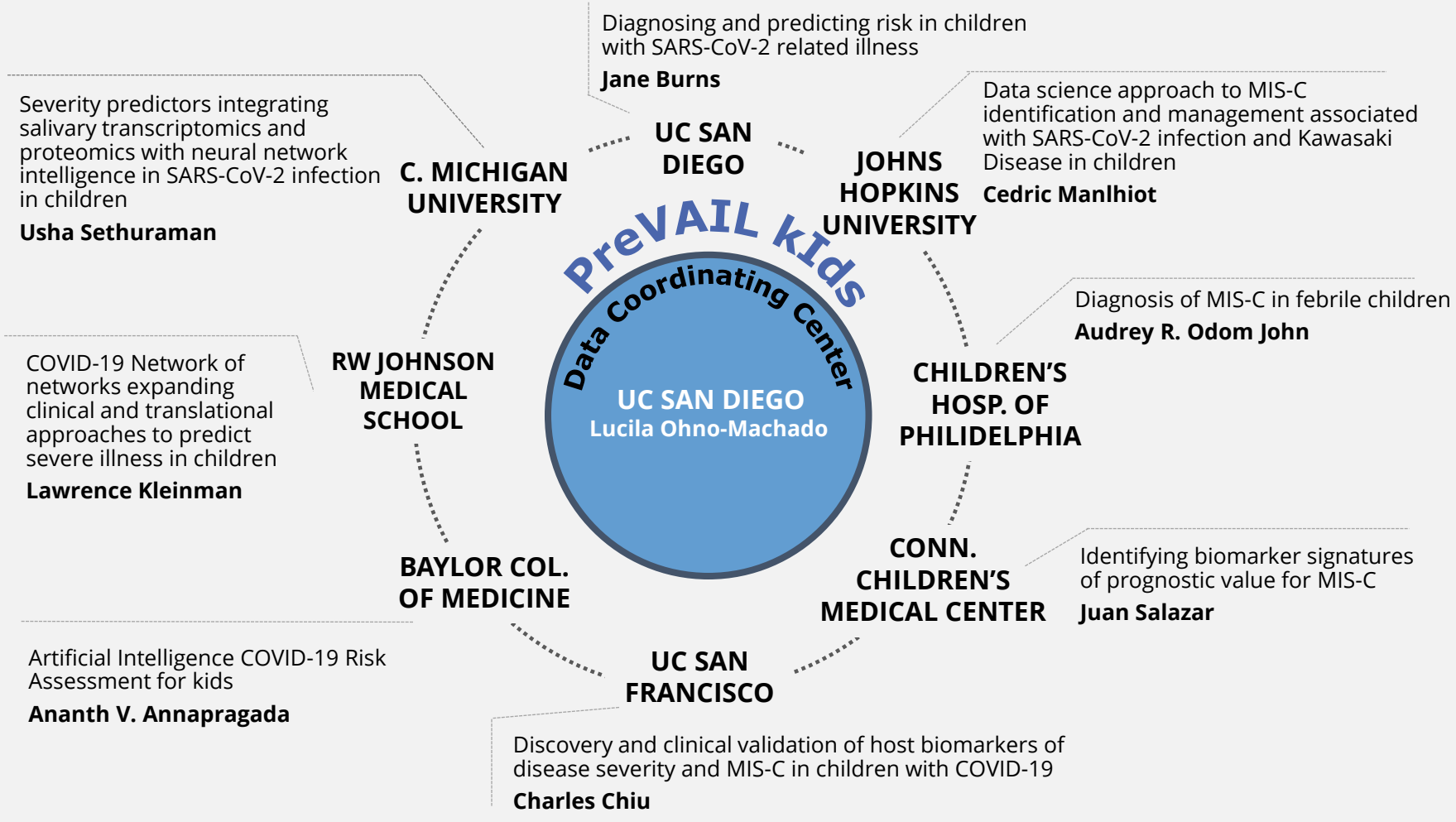
Budget: $200 Million

Develop translational tools to understand the spectrum of pediatric SARS-CoV-2 illness, rapidly diagnose and characterize MIS-C associated with SARS-CoV-2, and ***predict the longitudinal risk of disease severity*** after exposure to and/or infection by SARS-CoV-2

- Genetics; Omics; Other biomarkers
- Viral Dynamics and Immune Profiling Studies
- Digital Health Platforms Leveraged for Children
- Artificial Intelligence

- Milestone-driven award (R61/R33); up to **4 years**
- https://www.nichd.nih.gov/newsroom/news/122120-prevail-kids

Predicting Viral-Associated Inflammatory disease severity in children with Laboratory diagnostics and artificial Intelligence



- 8 Teams w/ **multi-disciplinary expertise** to address Program aims
- Access to diverse patient populations in **> 75 sites** across **30 US States**
- **International collaborations** in UK, Canada, Asia, & S. America
- Enrolling **>16,000** children with substantial racial and ethnic diversity
- Leveraging established biorepositories
- The studies **include both prospective and retrospective enrollments**

The New York Times

At 12, She's a Covid 'Long Hauler'

Although most young people recover quickly, doctors are seeing some children and teens with lingering fatigue and other chronic problems.

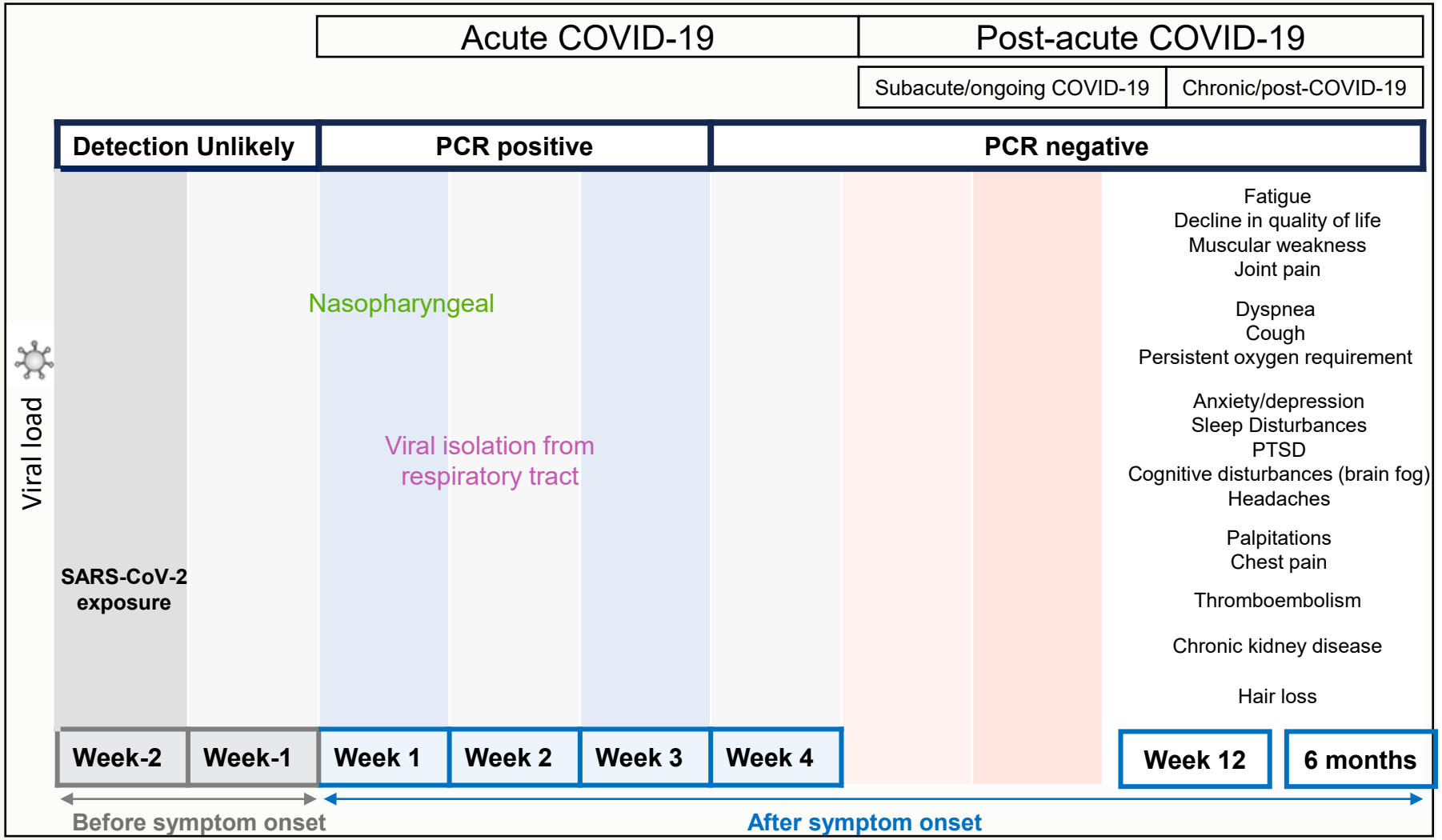
'This Is Really Scary': Kids Struggle With Long Covid

Lingering physical, mental and neurological symptoms are affecting children as well as adults, including many who had mild reactions to the initial coronavirus infection.

Understanding the Full Spectrum of PASC: A Multi-System Disorder

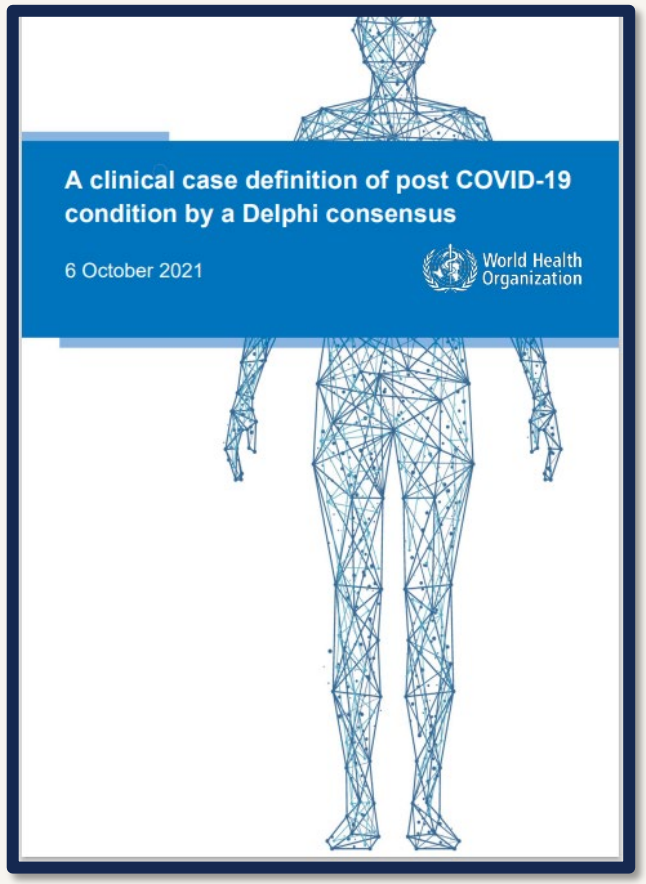
PASC: Refining the Case Definition

- Descriptions include: **"persistent symptoms and/or delayed or long-term complications of SARS-CoV-2 infection beyond 4 weeks from the onset of symptoms."**[1]
- Potential **overlap with other disorders** and conditions (e.g., ME/CFS; Post-ICU).



[1]Nalbandian et al. (2021)

WHO Clinical Case Definition: Post COVID-19 Condition

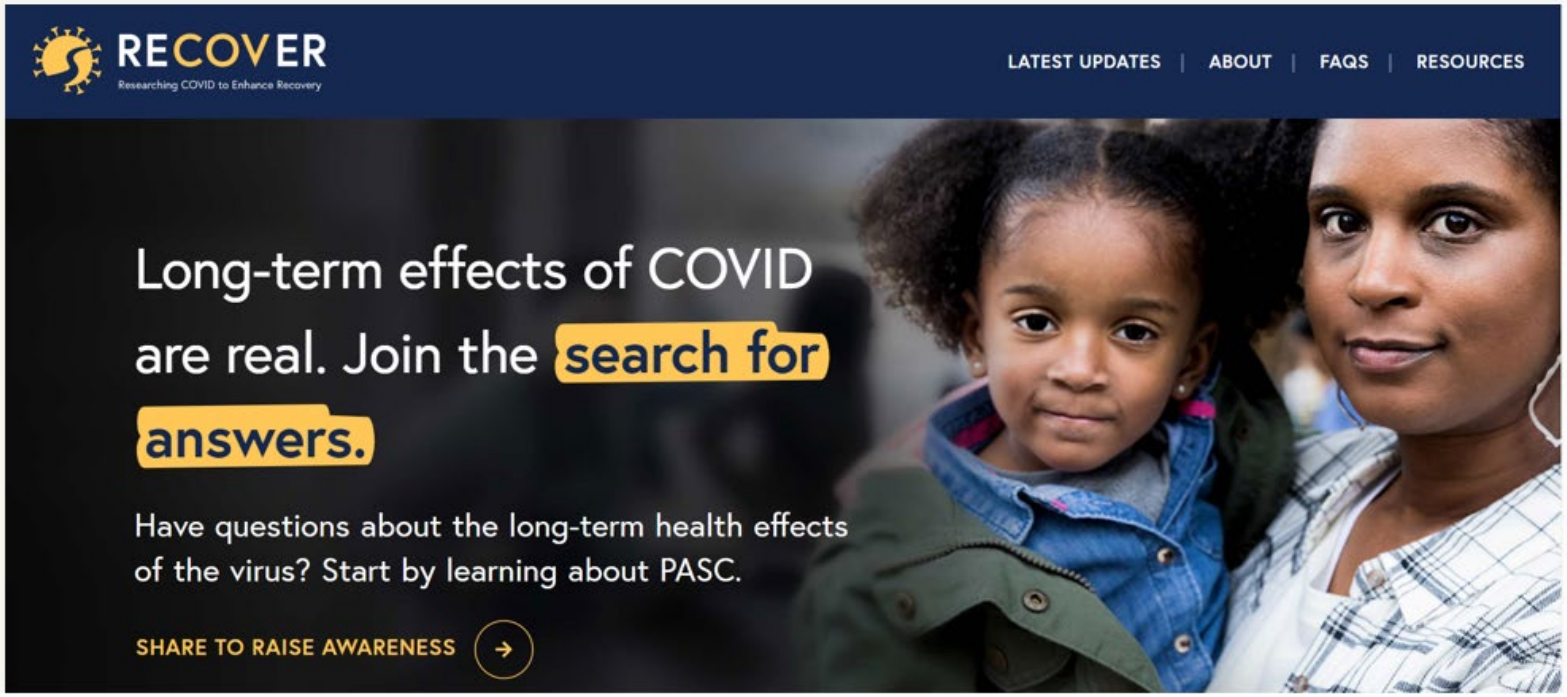


- Post COVID-19 condition occurs in individuals with a **history of probable or confirmed SARS-CoV-2** infection, **usually 3 months from the onset of COVID-19 with symptoms that last for at least 2 months and cannot be explained by an alternative diagnosis.**
- Common symptoms include **fatigue, shortness of breath, cognitive dysfunction** but also others which generally have an **impact on everyday functioning.**
- Symptoms may be **new onset**, following initial recovery from an acute COVID19 episode, or **persist** from the initial illness.
- Symptoms may also **fluctuate** or **relapse** over time.
- A separate definition may be applicable for children.

October 6, 2021. This definition may change as new evidence emerges and our understanding of the consequences of COVID-19 continues to evolve.
https://apps.who.int/iris/bitstream/handle/10665/345824/WHO-2019-nCoV-Post-COVID-19-condition-Clinical-case-definition-2021.1-eng.pdf

REsearching COVid to Enhance Recovery (RECOVER)

RECOVER Website – www.recovercovid.org



recoverCOVID.org

Keeping up with NICHD and COVID

- https://www.nichd.nih.gov/research/supported/COVID

Questions?

National Portrait Gallery, David Lenz, 2009