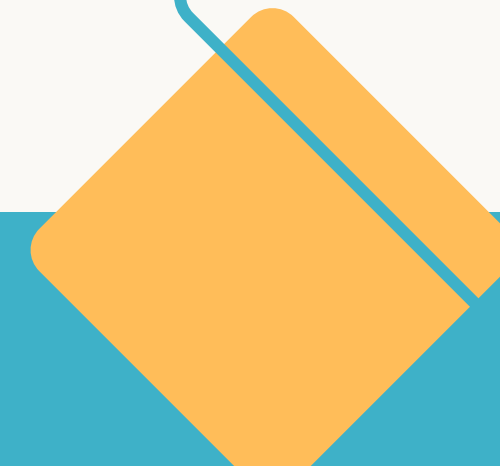
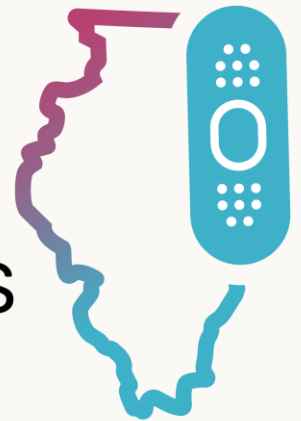


Long COVID Panel

June 21, 2024

I-VAC
ILLINOIS VACCINATES
AGAINST COVID-19

A project led by the Illinois Chapter
of the American Academy of Pediatrics



CME Accreditation Statement



The Illinois Chapter, American Academy of Pediatrics is accredited by the Illinois State Medical Society (ISMS) to provide continuing medical education for physicians.

The Illinois Chapter, American Academy of Pediatrics designates this live webinar for a maximum of *1.50 AMA PRA Category 1 Credit(s)*[™]. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

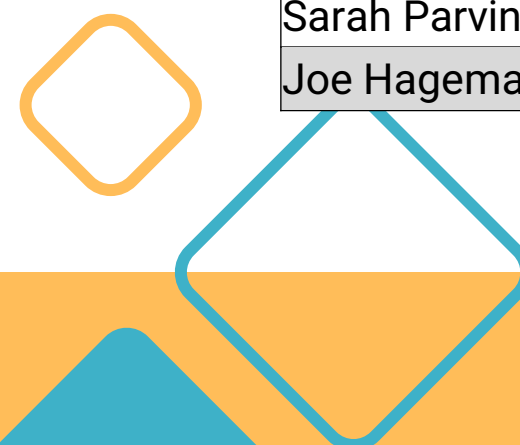
Nurses and Nurse Practitioners can submit Certificates of Attendance to their accrediting board for credit for participation in this live training.



Disclosure Grid

Hanieh Razzaghi, PhD, MPH	Faculty/Presenter	No	N/A
Ziyad Al-Aly, MD, FASN	Faculty/Presenter	Yes	Consulting Fees - Pfizer and Tonix
Katrine Wallace PhD CPH	Faculty/Presenter	No	N/A
Marielle Fricchione MD	Planning Committee Member	No	N/A
Edward Linn MD	Faculty/Presenter Planning Committee Member	No	N/A
Christina Wells	Faculty/Presenter Planning Committee Member Content Reviewer	No	N/A
Daniel Johnson. MD	Faculty/Presenter Planning Committee Member Content Reviewer	No	N/A
Michael Hanak	Planning Committee Member	No	N/A
Edward Linn MD	Faculty/Presenter Planning Committee Member	No	N/A
Corinne E Kohler, M.D.	Planning Committee Member	No	N/A
Caroline Werenskjold	Staff	No	N/A
Shefali Parikh	Staff	No	N/A
Erin Moore	Staff, Content Reviewer	No	N/A
Sarah Parvinian, MD	CME Reviewer	No	N/A
Joe Hageman, MD	CME Reviewer	Yes	Royalties - Owlet Inc

All disclosures have been mitigated.





Our Panelists



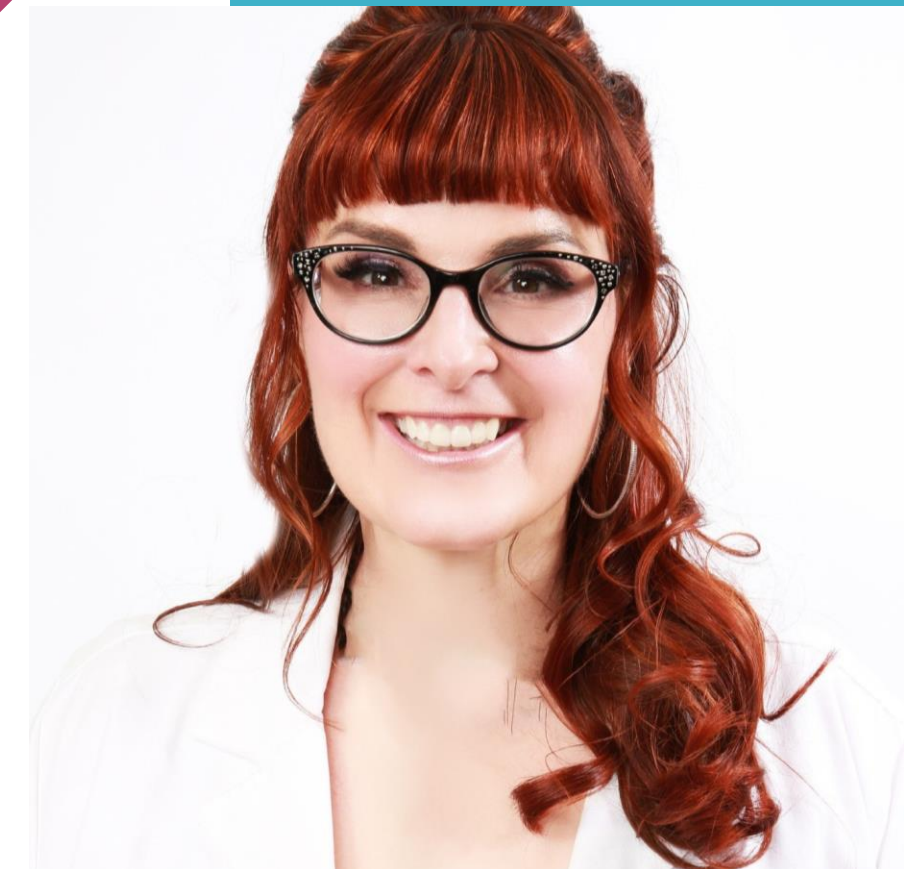
Hanieh Razzaghi, PhD, MPH

- PEDSnet Data Coordinating Center
- Children's Hospital of Philadelphia
- [Vaccine Effectiveness Against Long COVID in Children](#)



Katrine L Wallace, PhD, CPH

- University of Illinois Chicago, School of Public Health
- Thomas Jefferson University College of Population Health
- [@epidemiologistkat](#) debunks misinformation and educates about public health on her social media channels



Learning Objectives

Upon completion of this webinar, participants will be able to:



Recognize the symptoms of Long COVID and distinguish it from acute COVID-19.



Summarize the prevalence of and risk factors for Long COVID.



Identify the anticipated benefits of COVID-19 vaccination in protecting against Long COVID.



Illustrate strategies for discussing Long COVID and COVID-19 vaccines with patients/the public and navigating misinformation.



Background



BACKGROUND

- In February of 2020, the WHO had reported that the recovery from COVID-19 took between 2-6 weeks.
- Shortly thereafter anecdotal reports from patients started to emerge of persistent symptoms lasting longer.
- Support groups subsequently formed on social media and these patients labeled themselves “COVID long haulers”.
- It has since become a national initiative; In 2021 the National Institutes of Health began the \$1.15 billion dollar RECOVER program to sponsor studies to learn more about the long-term effects of COVID-19.





Prevalence and Risk Factors for Long COVID



No Standard Clinical Case Definition for Long Covid

All of these institutions have their own operational case definitions for long COVID:

- Office of Assistant Secretary for Health (OASH)
- Centers for Disease Control and Prevention (CDC)
- National Institutes of Health (NIH)
- World Health Organization (WHO)—Adults
- World Health Organization (WHO)—Pediatrics
- National Institute for Health and Care Excellence (NICE)
- AND MORE!



2024 NASEM Proposed Long COVID Definition

BOX S-1 2024 NASEM Long COVID Definition

Long COVID (LC) is an infection-associated chronic condition (IACC) that occurs after SARS-CoV-2 infection and is present for at least 3 months as a continuous, relapsing and remitting, or progressive disease state that affects one or more organ systems.

LC manifests in multiple ways. A complete enumeration of possible signs, symptoms, and diagnosable conditions of LC would have hundreds of entries. Any organ system can be involved, and LC patients can present with

- **single or multiple symptoms, such as** shortness of breath, cough, persistent fatigue, post-exertional malaise, difficulty concentrating, memory changes, recurring headache, lightheadedness, fast heart rate, sleep disturbance, problems with taste or smell, bloating, constipation, and diarrhea.
- **single or multiple diagnosable conditions, such as** interstitial lung disease and hypoxemia, cardiovascular disease and arrhythmias, cognitive impairment, mood disorders, anxiety, migraine, stroke, blood clots, chronic kidney disease, postural orthostatic tachycardia syndrome (POTS) and other forms of dysautonomia, myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS), mast cell activation syndrome (MCAS), fibromyalgia, connective tissue diseases,

hyperlipidemia, diabetes, and autoimmune disorders such as lupus, rheumatoid arthritis, and Sjogren's syndrome.

Important Features of LC:

- LC can follow asymptomatic, mild, or severe SARS-CoV-2 infection. Previous infections may have been recognized or unrecognized.
- LC can be continuous from the time of acute SARS-CoV-2 infection or can be delayed in onset for weeks or months following what had appeared to be full recovery from acute infection.
- LC can affect children and adults, regardless of health, disability, or socioeconomic status, age, sex, gender, sexual orientation, race, ethnicity, or geographic location.
- LC can exacerbate pre-existing health conditions or present as new conditions.
- LC can range from mild to severe. It can resolve over a period of months or can persist for months or years.
- LC can be diagnosed on clinical grounds. No biomarker currently available demonstrates conclusively the presence of LC.
- LC can impair individuals' ability to work, attend school, take care of family, and care for themselves. It can have a profound emotional and physical impact on patients and their families and caregivers.



Methodological issues studying Long COVID prevalence

- In addition to knowledge gaps on this relatively new condition, lack of a standard case definition, and its variable presentation, there is also heterogeneity between the studies in the published literature.
 - variety of different study designs used,
 - varying time frames for what constitutes “long”
 - differences in the actual clinical case definitions between studies (symptoms)
 - underreporting of the condition in real-world data
 - a lack of definitive testing (need to rely on a spectrum of symptoms which can also meet the criteria for other conditions), studies in inpatient vs outpatient settings include very different sets of patients
 - limited duration of follow-up time since the condition is still relatively new.



Prevalence of Long COVID

- Ranges greatly and is likely undercounted...
- CDC 5-30%
 - As many as 23 million Americans may have symptoms of Long COVID.
 - June 2022: 7.5% among the overall U.S. adult population, irrespective of history of previous COVID-19.
 - June 2022: 18.9% among U.S. adults reporting previous COVID-19.
- Decreases acknowledged between 2022 and 2023.
- Reports of ever having experienced Long COVID among respondents in U.S. states and territories ranged from 1.9% in the U.S. Virgin Islands to 10.6% in West Virginia ([2022 BRFSS](#)).
- March 2024: 7% of all adults reported currently having long COVID.
- 41.9% of children who had tested positive for COVID also demonstrated at least 1 post-COVID symptom.
 - Disease burden is expected to be less than in adults.



3-year Prevalence of Long COVID

- Study analyzed data from 2020 COVID-19 infections.
 - Assessed risks and long-term effects of COVID-19 on health over three years.
- -Over 114,000 veterans with mild COVID-19.
 - Over 20,000 hospitalized COVID-19 patients.
 - 5.2 million veterans without COVID-19.
- Study Period:
 - Patients enrolled from March 1, 2020, to December 31, 2020.
 - Follow-up lasted until December 31, 2023.

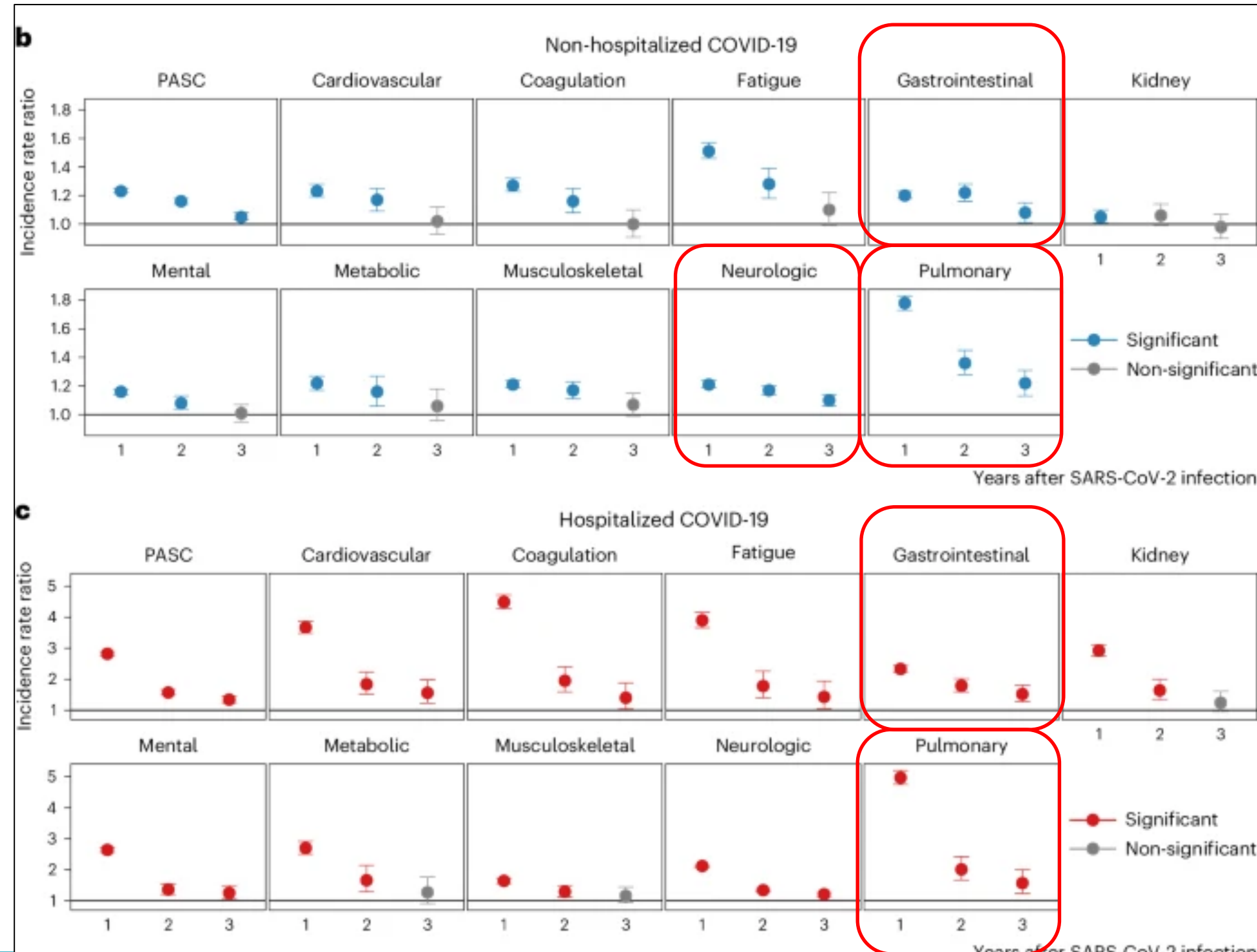


3-year Prevalence of Long COVID

- Hospitalized Patients:
 - 29% higher risk of death in the year 3 post-infection compared to non-COVID individuals.
 - Decreased from higher risks observed at one year (182%) and two years (57%).
 - Experienced a 34% increased health risk across all organ systems in the third year.
- Mild COVID-19 Cases:
 - Continued to face health issues three years post-infection.
 - 5% increased risk of long COVID in the third year, equating to 41 additional health problems per 1,000 persons.
 - Affected primarily the gastrointestinal, pulmonary, and neurological systems.



3-year Prevalence of Long COVID





Other research has estimated the cost in health expenses, lost productivity, and lost well-being from long COVID at \$2.6 trillion.

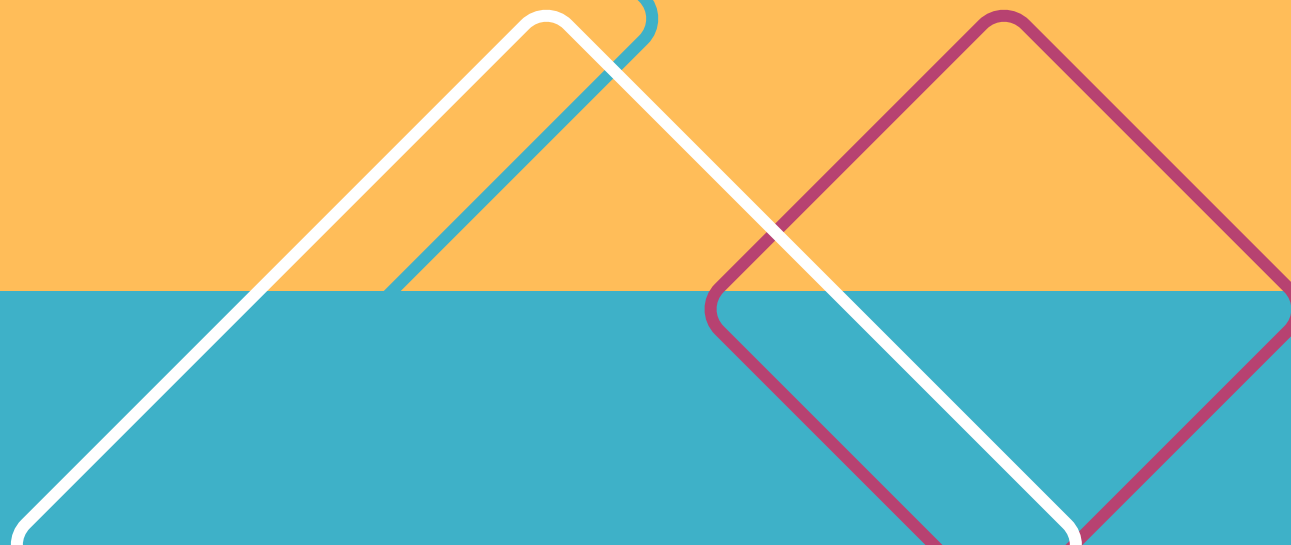
Risk Factors for Long COVID

- People with certain underlying health conditions.
- Older adults (65+).
- People who did not get a COVID-19 vaccine.
- Previous COVID-infection.
- Female sex.
- Hispanic and Latino people.
- People who have experienced more severe COVID-19 illness, especially those who were hospitalized or needed intensive care.
- Health inequities: disability, economic, geographic, etc.





Symptoms of Long COVID



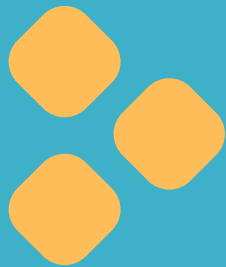
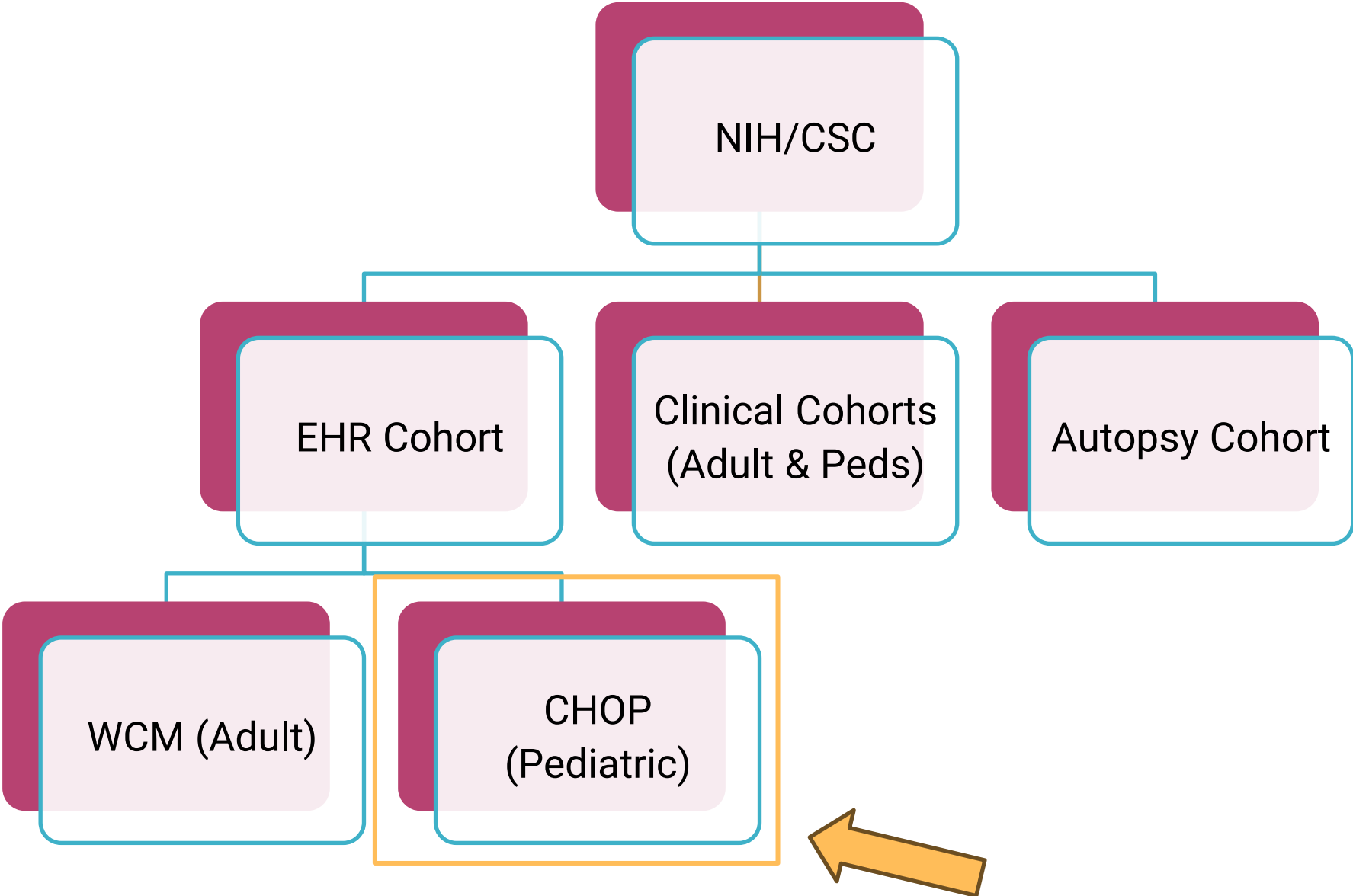
RECOVER: Researching COVID to Enhance Recovery

- The National Institutes of Health (NIH) created the RECOVER Initiative to learn about the long-term effects of COVID.
- Goal is to understand, prevent, and treat PASC (post-acute sequelae of SARS-CoV-2), including Long COVID.

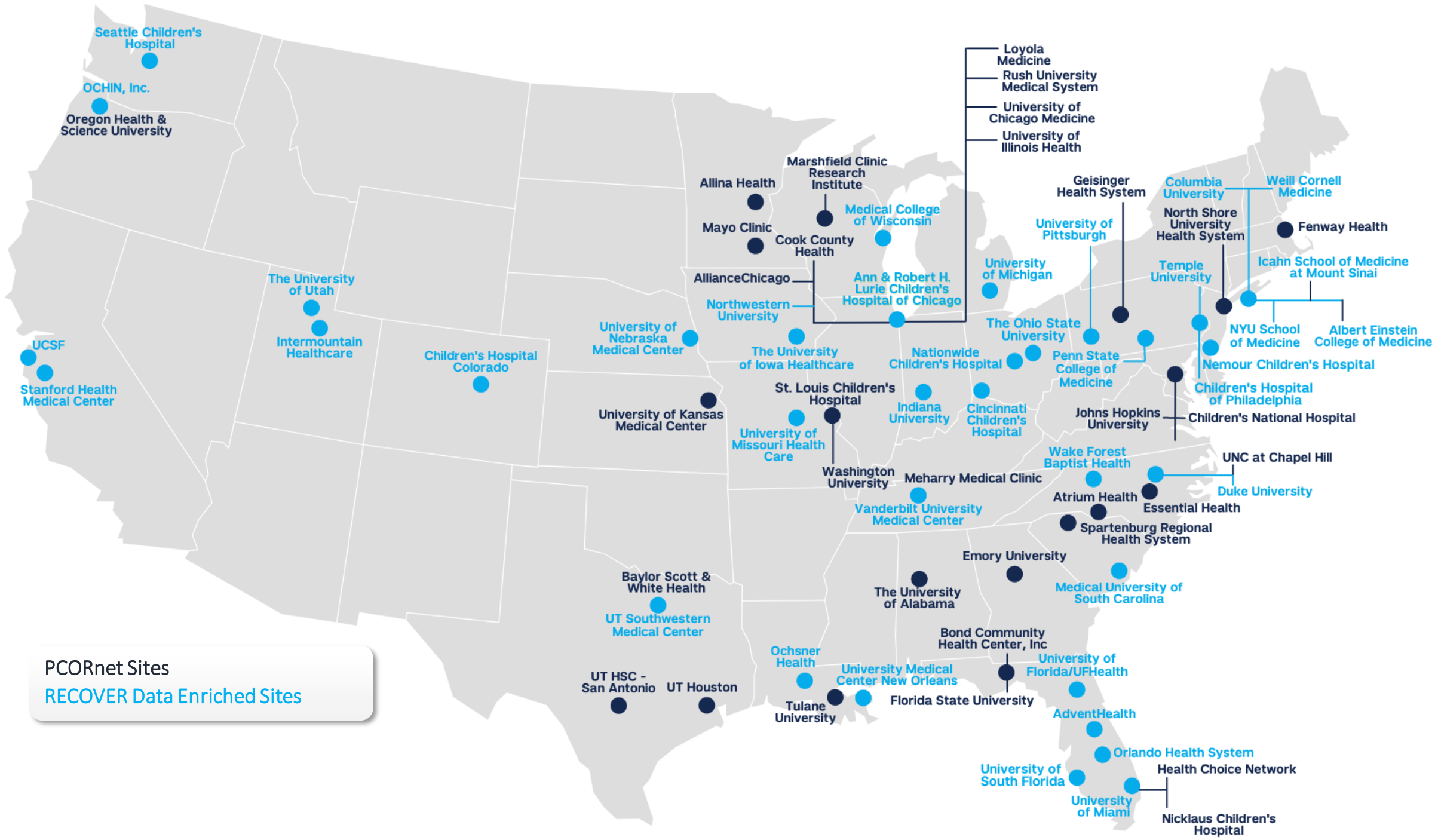
This content in this presentation is solely the responsibility of the speaker and does not necessarily represent the official views of the RECOVER program, NIH, or other funders.



RECOVER Structure



PCORnet & RECOVER Sites



Early Findings...

Research

JAMA Pediatrics | Original Investigation

Clinical Features and Burden of Postacute Sequelae of SARS-CoV-2 Infection in Children and Adolescents

Suchitra Rao, MBBS, MSCS; Grace M. Lee, MD, MPH; Hanieh Razzaghi, MPH; Vitaly Lorman, PhD; Asuncion Mejias, MD, PhD; Nathan M. Pajor, MD; Deepika Thacker, MD; Ryan Webb, MS; Kimberley Dickinson, BS; L. Charles Bailey, MD, PhD; Ravi Jhaveri, MD; Dimitri A. Christakis, MD, MPH; Tellen D. Bennett, MD, MS; Yong Chen, PhD; Christopher B. Forrest, MD, PhD

Supplemental content

IMPORTANCE The postacute sequelae of SARS-CoV-2 infection (PASC) has emerged as a long-term complication in adults, but current understanding of the clinical presentation of PASC in children is limited.

OBJECTIVE To identify diagnosed symptoms, diagnosed health conditions, and medications associated with PASC in children.

DESIGN, SETTING AND PARTICIPANTS This retrospective cohort study used electronic health records from 9 US children's hospitals for individuals younger than 21 years who underwent antigen or reverse transcriptase-polymerase chain reaction (RT-PCR) testing for SARS-CoV-2 between March 1, 2020, and October 31, 2021, and had at least 1 encounter in the 3 years before testing.

EXPOSURES SARS-CoV-2 positivity by viral test (antigen or RT-PCR).

MAIN OUTCOMES AND MEASURES Syndromic (symptoms), systemic (conditions), and medication PASC features were identified in the 28 to 179 days following the initial test date. Adjusted hazard ratios (aHRs) were obtained for 151 clinically predicted PASC features by contrasting viral test-positive groups with viral test-negative groups using proportional hazards models, adjusting for site, age, sex, testing location, race and ethnicity, and time period of cohort entrance. The incidence proportion for any syndromic, systemic, or medication PASC feature was estimated in the 2 groups to obtain a burden of PASC estimate.

RESULTS Among 659 286 children in the study sample, 348 091 (52.8%) were male, and the mean (SD) age was 8.1 (5.7) years. A total of 59 893 (9.1%) tested positive by viral test for SARS-CoV-2, and 599 393 (90.9%) tested negative. Most were tested in outpatient testing facility settings (322 813 [50.3%]) or office settings (162 138 [24.6%]). The most common syndromic, systemic, and medication features were loss of taste or smell (aHR, 1.96; 95% CI, 1.16-3.32), myocarditis (aHR, 3.10; 95% CI, 1.94-4.96), and cough and cold preparations (aHR, 1.52; 95% CI, 1.18-1.96), respectively. The incidence of at least 1 systemic, syndromic, or medication feature of PASC was 41.9% (95% CI, 41.4-42.4) among viral test-positive children vs 38.2% (95% CI, 38.1-38.4) among viral test-negative children, with an incidence proportion difference of 3.7% (95% CI, 3.2-4.2). A higher strength of association for PASC was identified in those cared for in the intensive care unit during the acute illness phase, children younger than 5 years, and individuals with complex chronic conditions.

CONCLUSIONS AND RELEVANCE In this large-scale, exploratory study, the burden of pediatric PASC that presented to health systems was low. Myocarditis was the most commonly diagnosed PASC-associated condition. Acute illness severity, young age, and comorbid complex chronic disease increased the risk of PASC.

Author Affiliations: Author

Clinical features and burden of post-acute sequelae of SARS-CoV-2 (PASC) in children and adolescents

Multi-site retrospective cohort study

March 1, 2020 — **659,286** tested for SARS-CoV-2 (Children < 21 years) — October 31, 2021



MOST COMMON SYMPTOMS

- Changes in smell/taste
- Hair loss
- Chest pain
- Abnormal liver enzymes
- Generalized pain

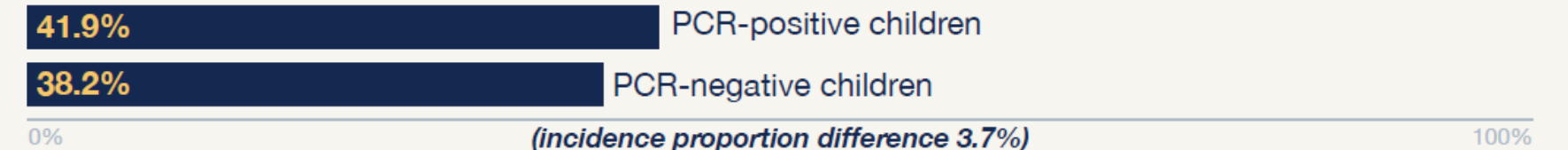
MOST COMMON CONDITIONS

- Myocarditis
- Acute respiratory distress
- Myositis
- Mental health treatment
- Disorders of teeth/gingiva

MOST COMMON MEDICATIONS

- Cough and cold preparations
- Nasal decongestants
- Corticosteroids with antiseptics
- Opioids
- Decongestants

Any PASC feature:




CONCLUSIONS

Presentation of PASC in children has features distinct from adults. Risk factors for PASC include acute COVID illness severity, young age (<5 years), and complex chronic conditions. Relative difference in incidence of PASC presenting to health systems was 3.7%.

Data Mining for Long Covid Symptoms

JOURNAL ARTICLE

Understanding pediatric long COVID using a tree-based scan statistic approach: an EHR-based cohort study from the RECOVER Program

Vitaly Lorman , Suchitra Rao, Ravi Jhaveri, Abigail Case, Asuncion Mejias, Nathan M Pajor, Payal Patel, Deepika Thacker, Seuli Bose-Brill, Jason Block ... [Show more](#)
[Author Notes](#)

JAMIA Open, Volume 6, Issue 1, April 2023, ooad016,
<https://doi.org/10.1093/jamiaopen/ooad016>

Published: 14 March 2023 **Article history** 

Cases
U09.9

Comparator 1
SARS CoV-2 +

Comparator 2
SARS CoV-2 -

Major systemic findings, or conditions (general and specific)	
Diseases of the nervous system	migraines, headache syndromes, sleep disorders, chronic pain, dysautonomia, and post-viral fatigue syndrome
Mental and behavioral disorders	anxiety disorders
Diseases of the respiratory system	asthma, ARDS/respiratory failure, diseases of vocal cords and larynx
Diseases of the circulatory system	arrhythmias, cerebrovascular disease, thromboembolic disease
Disease of the musculoskeletal system and connective tissue	pain in joints, pain in limbs, dorsalgia, myalgias, hypermobility syndrome
Diseases of the digestive system	gastritis and duodenitis
Diseases of blood	purpura and other hemorrhagic conditions
Endocrine, nutritional and metabolic diseases	nutritional deficiencies, obesity and overweight, disorders of mineral metabolism, volume depletion or fluid overload
Syndromic findings, or symptoms	
Circulatory and respiratory signs and symptoms	Tachycardia, palpitations, cough, dyspnea, shortness of breath, chest pain, hypoxemia
GI signs/symptoms	abdominal pain, nausea/vomiting
CNS/musculoskeletal signs/symptoms	lack of coordination, abnormalities of gait and mobility
Cognition, perception, emotional state	dizziness, smell/taste disturbances
General signs and symptoms	Fatigue/malaise, headache, weakness, syncope and collapse

Conceptual model for Long Covid in Children

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN®



PEDIATRICS
OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS
MARCH 2024 • VOLUME 153 • NUMBER 3
www.pediatrics.org



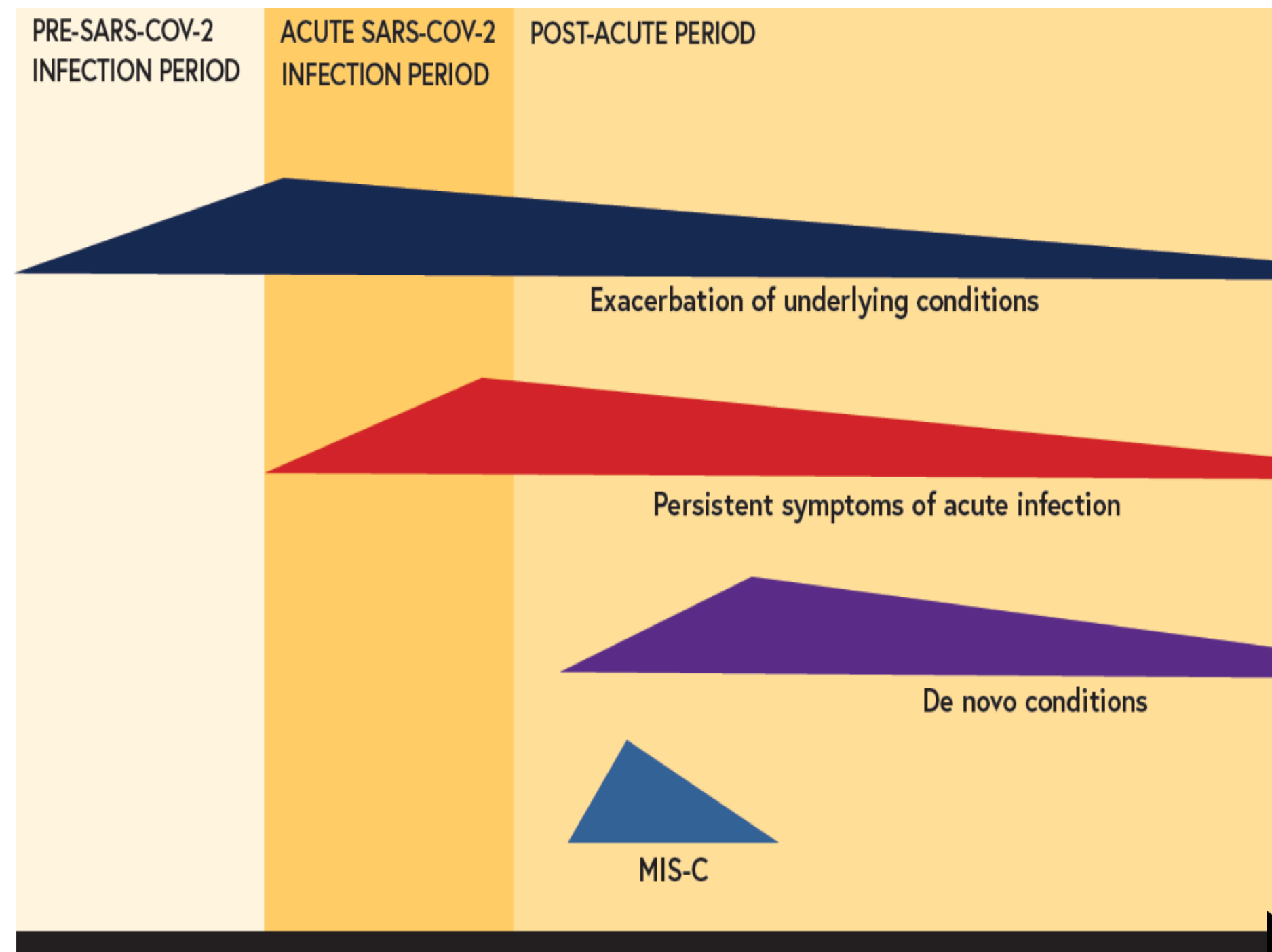
ARTICLES
Adolescent Spending to Teens and Young Adults
Parental Mental Stress and Child Out-of-Home Care
Childhood Parental Connection and Adult Well-Being
Children and Domestic Violence Protection Orders
Characteristics of SIBD
Disparities in Hospital Safety Events
Smoking Susceptibility Among Nonsmoking Adolescents
Teens Meeting Metabolic and Bariatric Surgery Criteria
The COVID-19 Pandemic and Adolescent Sexual Health
Cool-Driven Meas and Child Safety Net Access
Maternal COVID-19 Vaccination and Infection in Infants
Remdesivir for COVID-19 in Hospitalized Children
RSV Hospitalizations Among US Children <5 Years Old
Advice From Parents at Extreme Prematurity
TB Infection Care Facilitators and Barriers
Resident Advocacy Work From 2008-2021
Pediatricians' Satisfaction and Wellbeing
PEDIATRICS PERSPECTIVES
Parental and Newborn Rights and Governmental Overreach
Storytelling and the Electronic Health Record
FEATURE
Who Watches the Watchers?
EQUITY, DIVERSITY, INCLUSION, AND JUSTICE
Race-Conscious Medicine in Pediatrics
ADVOCACY CASE STUDY
An Initiative to Help Children Who Are Homeless

RESEARCH BRIEFS
Child Deaths With Alcohol-Impaired Drivers
Specificity of the Modified Jones Criteria
COMMENTARIES
Antidepressant Prescriptions and Mental Health
Parental Mental Health and Child Maltreatment
REVIEW ARTICLES
Suicide Risk Screening Accuracy for Pediatric Patients
Brief Interventions for Suicidal Youth
DIAGNOSTIC DILEMMAS
A 6-Year-Old Girl With Fever, Weakness, and Ataxia
STATE-OF-THE-ART REVIEW
PASC in Children? A State-of-the-Art Review
SPECIAL ARTICLES
Fall 2023 AGP Update
Misuse Data in Perinatal and Neonatal Trials
QUALITY REPORTS
Reducing C. difficile Infections and Stool Testing
Reducing Physical Restraint Use in the NICU
CASE REPORTS
Coronary Bypass in an Adolescent With SLE
Juvenile Dermatomyositis With Interstitial Lung Disease
Survival After ECMO and Kidney Support Therapy
FROM THE AMERICAN ACADEMY OF PEDIATRICS
Protecting Children During a Time of War
Climate Change and Children's Health
Environmental Health and Climate Change
Disasters
Section on Minority Health, Equity, and Inclusion
Child Fatality Review
Review and Prevention, Council on Injury, Violence, and Poison Prevention, Council on Child Abuse and Neglect

American Academy
of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN®

Postacute Sequelae of SARS-CoV-2 in Children

Suchitra Rao, MBBS, MSCS,^a Rachel S. Gross, MD, MS,^{b,c} Sindhu Mohandas, MD,^{e,f} Cheryl R. Stein, PhD,^d Abigail Case, MD,^g Benard Dreyer, MD,^f Nathan M. Pajor, MD,^h H. Timothy Bunnell, PhD,ⁱ David Warburton, MD,^f Elizabeth Berg, MD,^j Jonathan B. Overvest, MD,^j Mark Gorelik, MD,^j Joshua Milner, MD,^j Sejal Saxena, BA,^j Ravi Jhaveri, MD,^k John C. Wood, MD, PhD,^f Kyung E. Rhee, MD, MSc, MA,^l Rebecca Letts, BA,^o Christine Maughan, BS,^o Nick Guthe, BA,^o Leah Castro-Baucom, MA,^c Melissa S. Stockwell, MD, MPH,^m



Organ-Specific Focus

GI Complications*

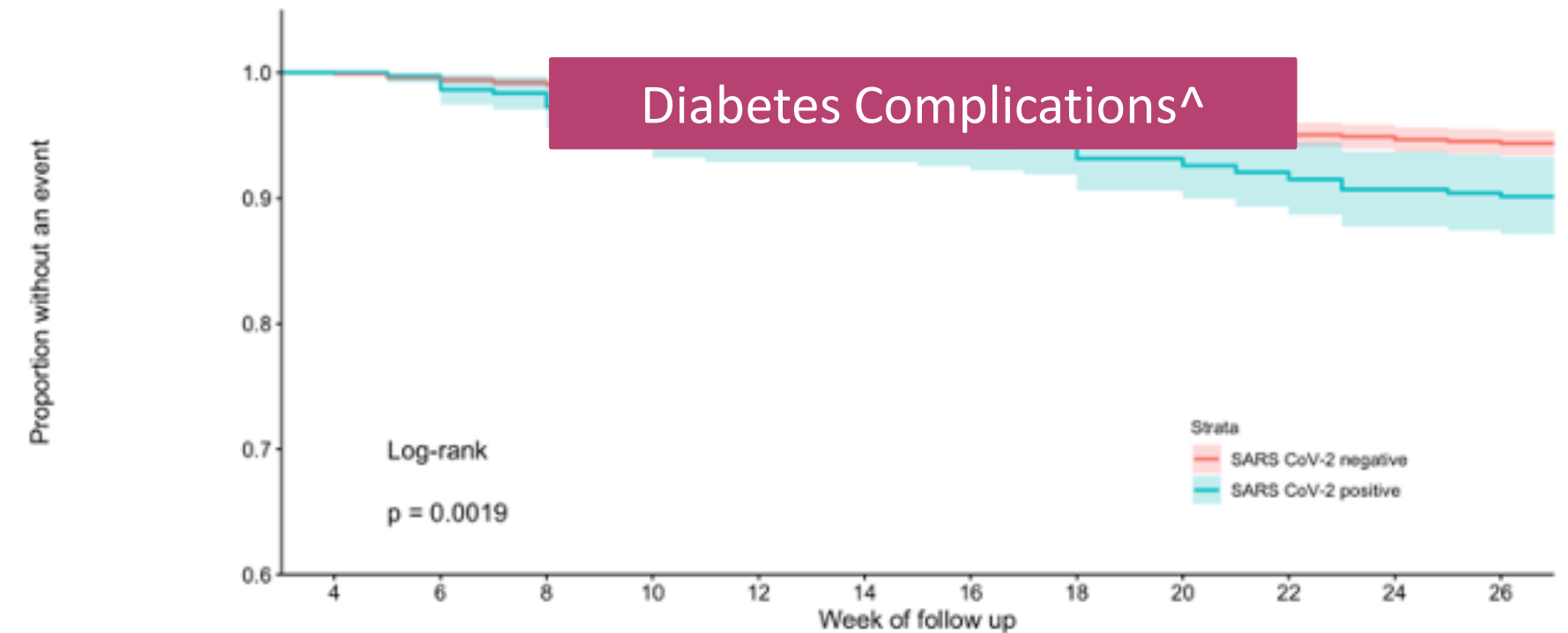
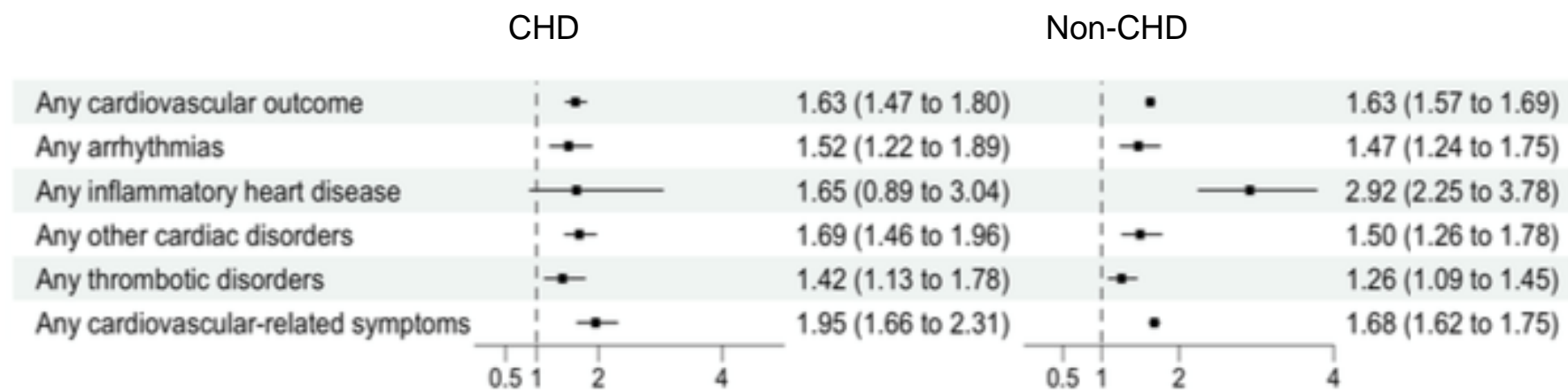
Symptoms or Signs

- Abdominal Pain
- Bloating
- Constipation
- Diarrhea
- Nausea
- Vomiting

Diseases

- Functional dyspepsia (**chronic phase**)
- GERD
- IBS (**chronic phase**)

Cardiovascular Complications**



Patients with Type 1 Diabetes with COVID-19 infection more at risk for serious diabetic event (severe hypoglycemia, ketoacidosis)

Patients with CHD more likely to experience any cardiovascular outcome, such as hypertension, heart failure, cardiomyopathy, and thrombotic disorders. They are also likely to experience chest pain, palpitations, and syncope.

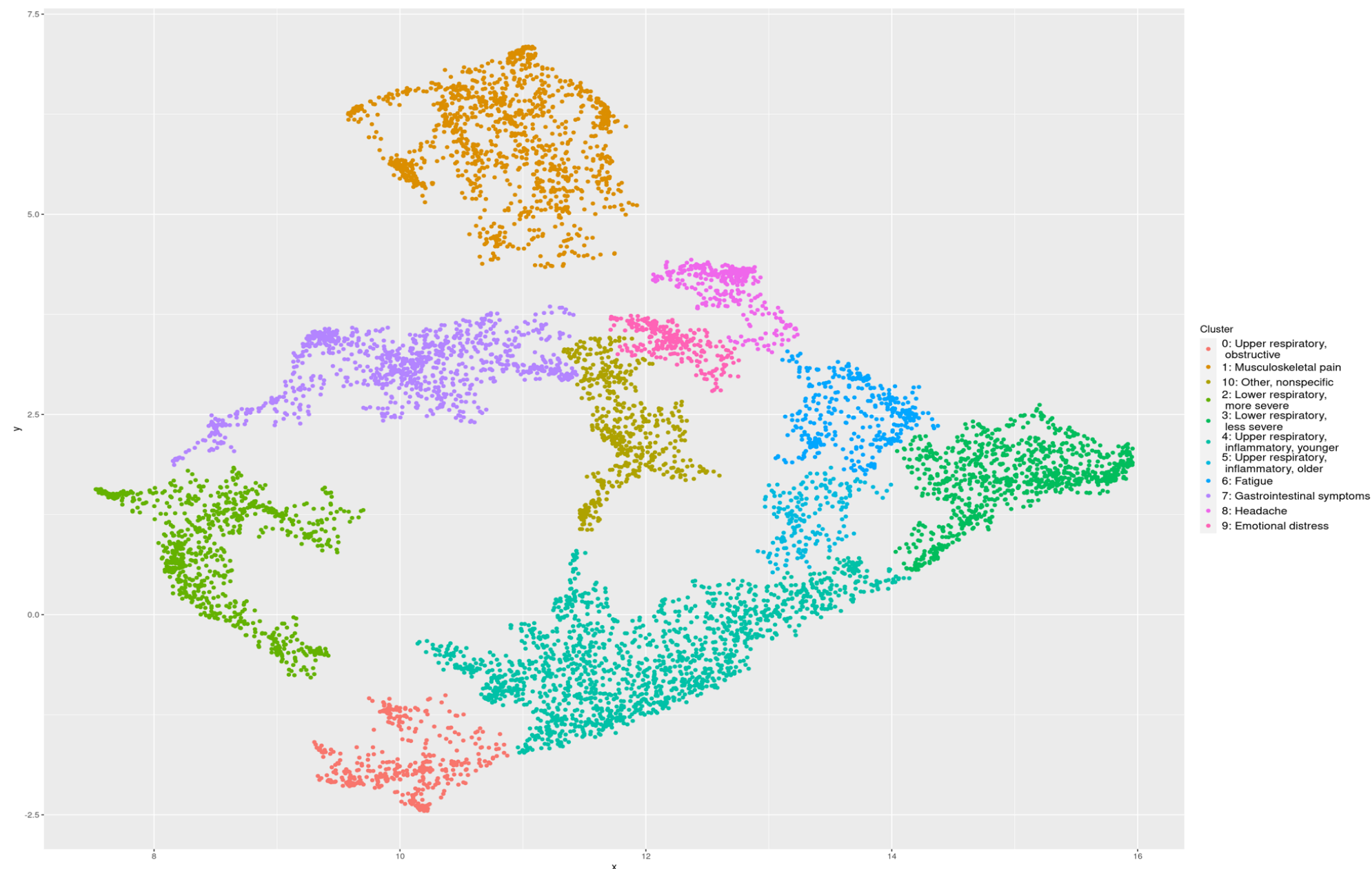
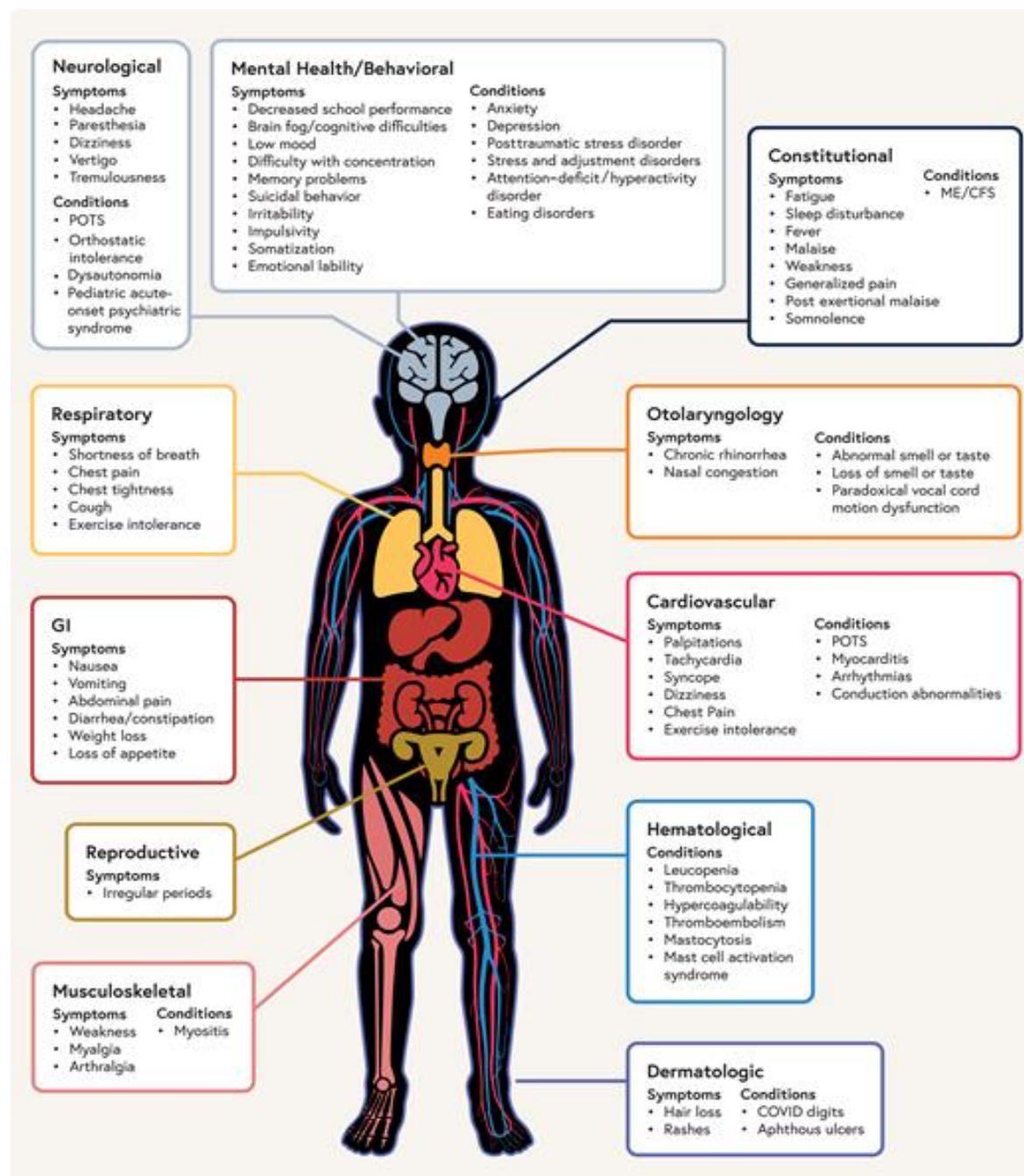
Patients with non-CHD more likely to experience inflammatory heart disease such as myocarditis and pericarditis.

*Zhang et al, Pediatric Gastrointestinal Outcomes During the Post-Acute Phase of COVID-19: <https://www.medrxiv.org/content/10.1101/2024.05.21.24307699v1>

**Zhang et al, Post-Acute Cardiovascular Outcomes of COVID-19 in Children and Adolescents: An HER Cohort Study from the RECOVER Project: <https://www.medrxiv.org/content/10.1101/2024.05.14.24307380v1>

^Pralhad, Priya, Lorman, Vitaly, Wu, Qiong, Razzaghi, Hanieh, Chen, Yong, Pajor, Nathan, Case, Abigail, Bose-Brill, Seuli, Block, Jason, Patel, Payal B., Rao, Suchitra, Mejias, Asuncion, Forrest, Christopher B., Bailey, L. Charles, Jhaveri, Ravi, Thacker, Deepika, Christakis, Dimitri A., Lee, Grace M., Consortium, on behalf of the RECOVER, Impact of SARS-CoV-2 Infection on Disease Trajectory in Youth with T1D: An EHR-Based Cohort Study from the RECOVER Program, *Pediatric Diabetes*, 2023, 8798997, 10 pages, 2023. <https://doi.org/10.1155/2023/8798997>

Organ System Involvement / Sub-types

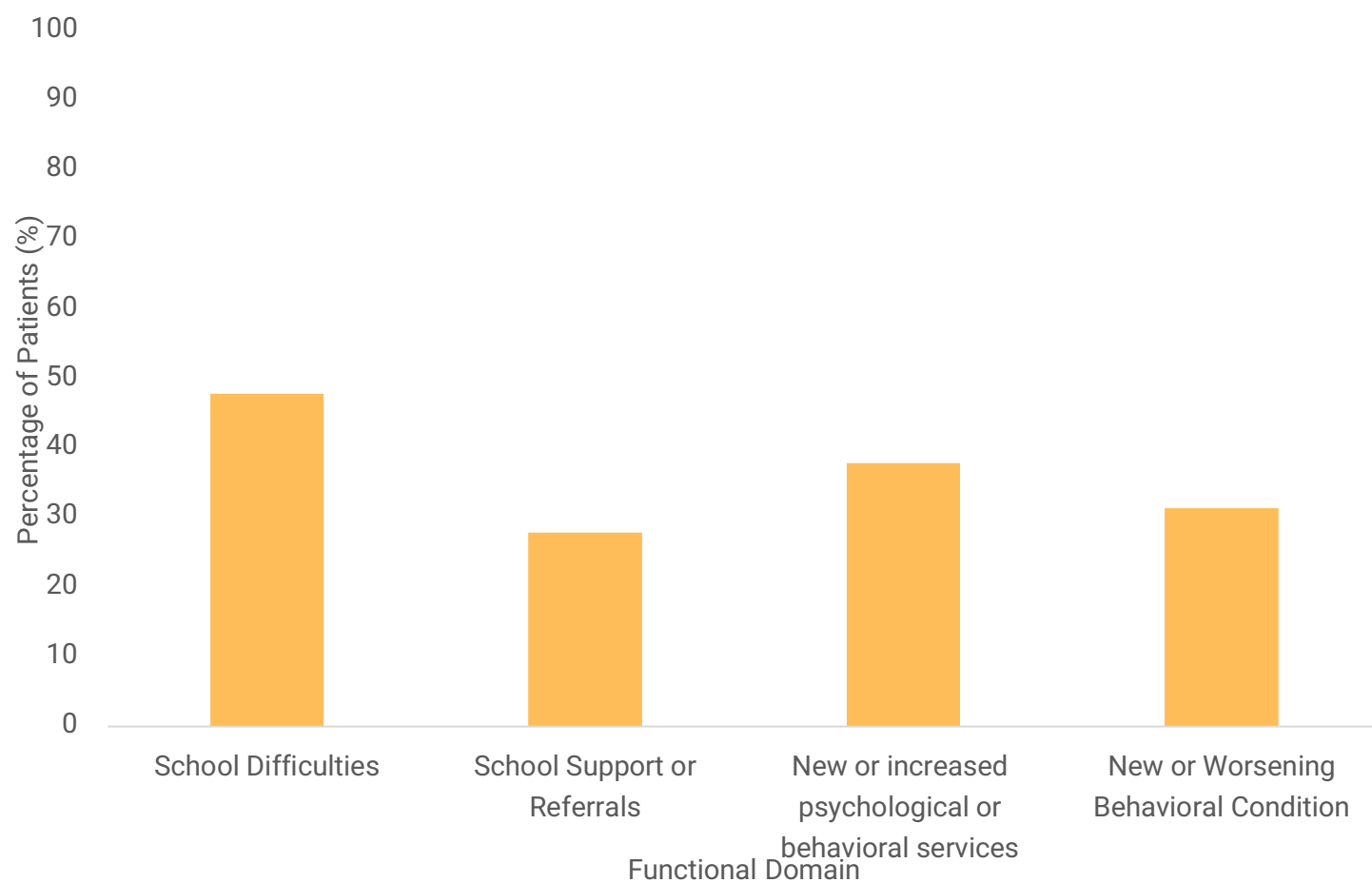


Rao S, Gross RS, Mohandas S, Stein CR, Case A, Dreyer B, Pajor NM, Bunnell HT, Warburton D, Berg E, Overdeest JB, Gorelik M, Milner J, Saxena S, Jhaveri R, Wood JC, Rhee KE, Letts R, Maughan C, Guthe N, Castro-Baucom L, Stockwell MS. Postacute Sequelae of SARS-CoV-2 in Children. *Pediatrics*. 2024 Mar 1;153(3):e2023062570. doi: 10.1542/peds.2023-062570. PMID: 38321938; PMCID: PMC10904902.

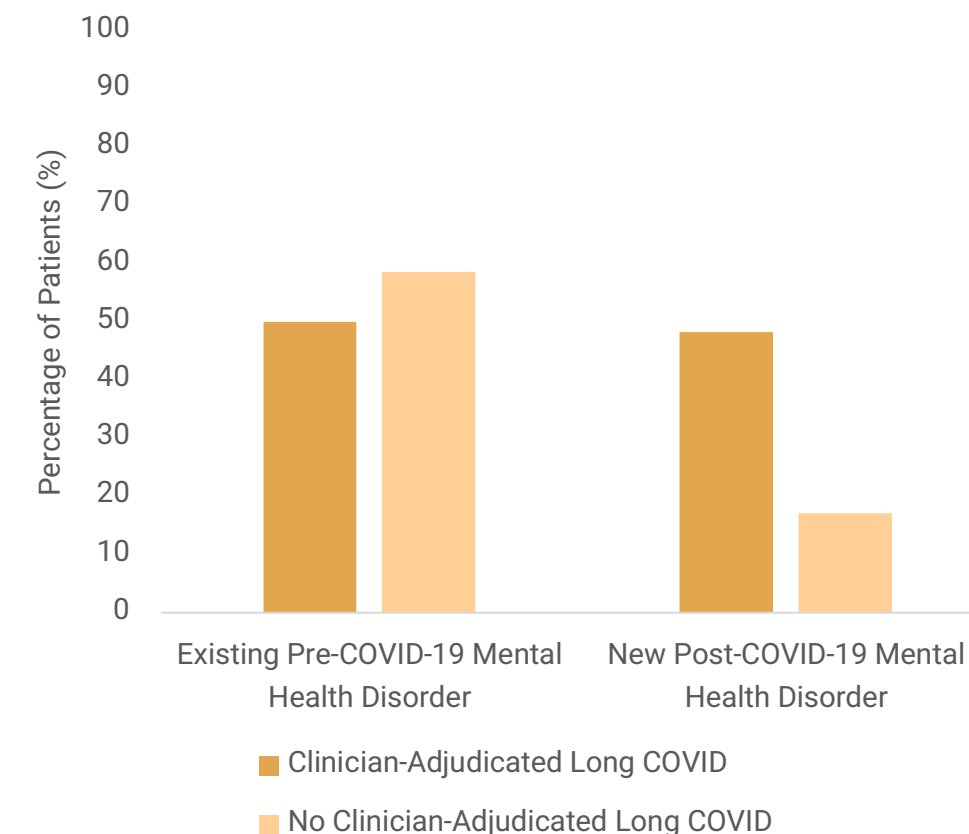
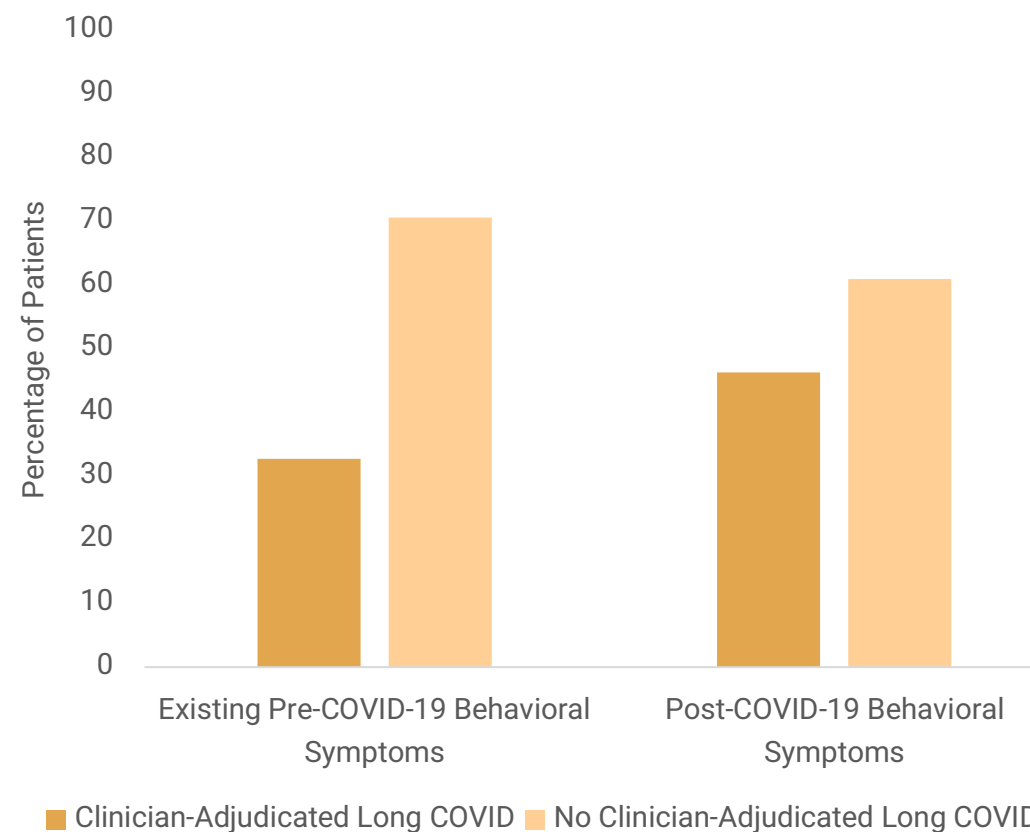
Lorman et al, Pediatric Long COVID Subphenotypes: An EHR-based study from the RECOVER program; *In Preparation*

Functional Outcomes: Review of Medical Charts

Percentage of patients with documented functional limitations post COVID-19 infection in 4 functional domains, n =140



New or worsening behavioral and mental health conditions post COVID-19 infection



Case et al, Functional Outcomes of Children After SARS-CoV-2 Infection: An EHR-based cohort study from the RECOVER program, *In Preparation*

Findings from Clinical Notes

Top features most common in note data

Concept	Odds ratio (95% CI) Occurrences in notes vs discrete data
Excessive thirst	10.28 (3.01, 69.23)
Excessive sweating	8.14 (3.77, 21.44)
Irritability	6.51 (4.83, 8.98)
Depression	4.77 (3.93, 5.83)
Anosmia/ageusia	4.07 (2.57, 6.75)

Top features in patients with long covid diagnosis or feature from clinical notes

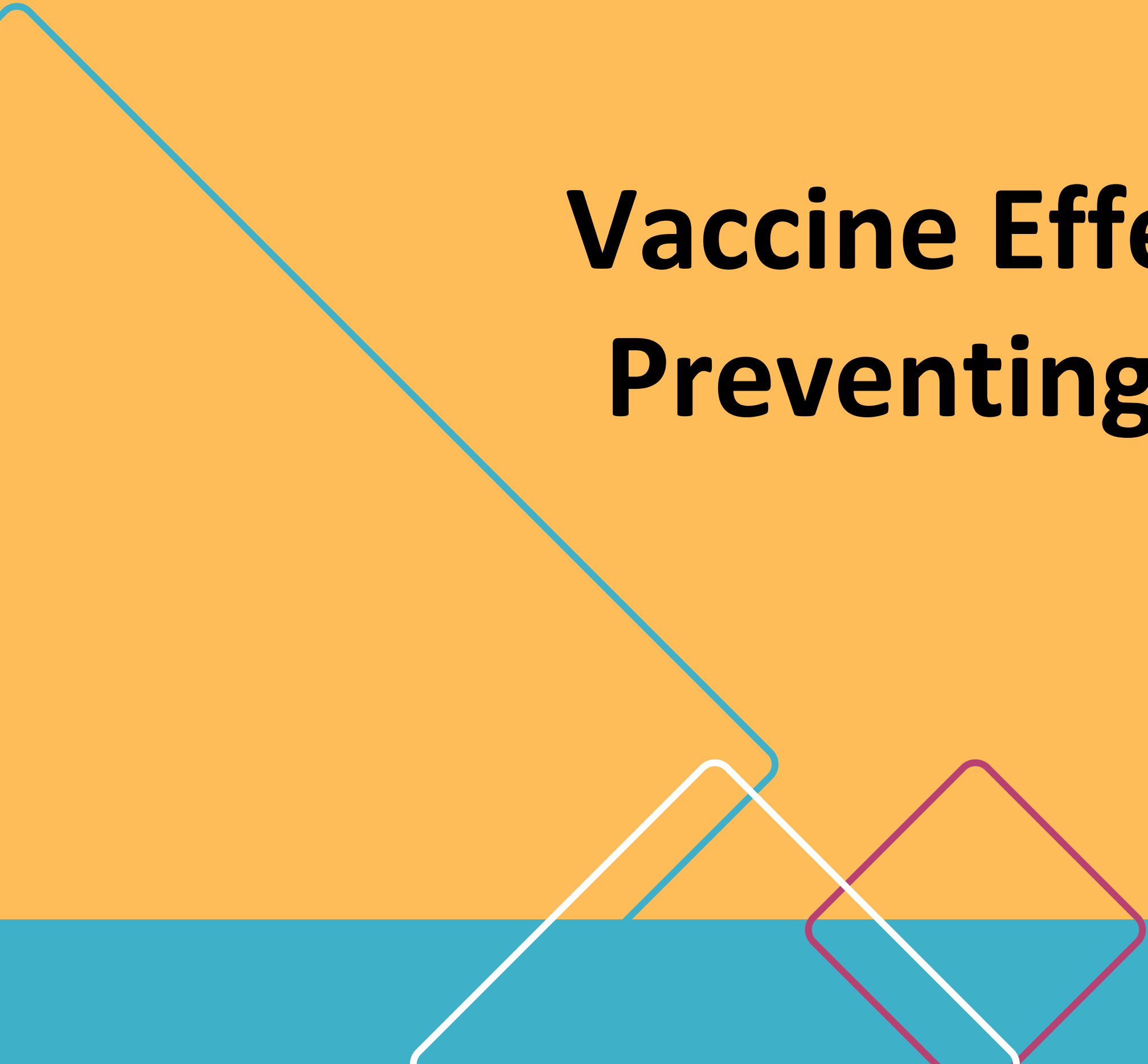
Concept	Odds ratio (95% CI) Occurrences of PASC vs COVID-19 diagnosed patients
Physical impairments	5.67 (2.41, 16.82)
Excessive sweating	5.42 (2.71, 12.46)
Anosmia/ageusia	4.70 (2.83, 8.34)
Heart problems	4.55 (3.45, 6.12)
Hair loss	4.33 (2.94, 6.59)

Dental/gum problems, physical impairments, school difficulties identified in note data only





Vaccine Effectiveness in Preventing Long Covid



COVID-19 Vaccine Effectiveness

Shown in clinical trials to impact acute infection

Fewer infections

- Stronger effect against pre-omicron viral variants

Reduced severity

- Strong effect throughout testing

Durability

- Potential waning due to time or change in viral variants

Does the vaccine protect against long COVID?

Razzaghi H, Goodwin-Davies, A., Boss, S., Bunnell, T., Chen Y., Chrischilles E., Denburg M., Dickinson K., Forrest, C., Hanauer D., Huang Y., Ilunga S., Katsoufis C., Lehmann H., Lemas, D., Marsolo, K., Matthews, K., Mendonca, E.A., Morse, K., Ranade, D., Rosenman, M., Taylor, B., Walters, K., Bailey, L.C. Systematic Data Quality Assessment of Electronic Health Record Data to Evaluate Study-Specific Fitness: Report from the PRESERVE Research Study. PLOS Digital Health 2024 (in press).

Two Approaches to Identifying Long COVID

Diagnosed

Recurring presence of a diagnosis for post-COVID-19/post-viral condition

More specific determination of link to COVID-19

Frequency (0.7%) is 5x or more less than estimates of long COVID

Bias toward older patients and respiratory symptoms

Probable

Recurring presence of diagnoses more common after COVID-19

- Clustered by organ system
- 28 – 180 days after COVID-19

Frequency (5%) is close to prior estimates in children

May identify patients with other causes



Vaccine Records: Finding Complete Data

Administered at
health system

Patient reported

Vaccine registry

compared to

CDC county-level vaccination rates

Selected health systems with rates $\geq 60\%$ of CDC estimate

Methods

Vaccinated patients observed from date of vaccine
Unvaccinated patients observed from data of random visit

Cohorts matched on age group (5-11, 12-17 – *different vaccine availability*) &
180-day window of entry (*different viral variants and rates*)

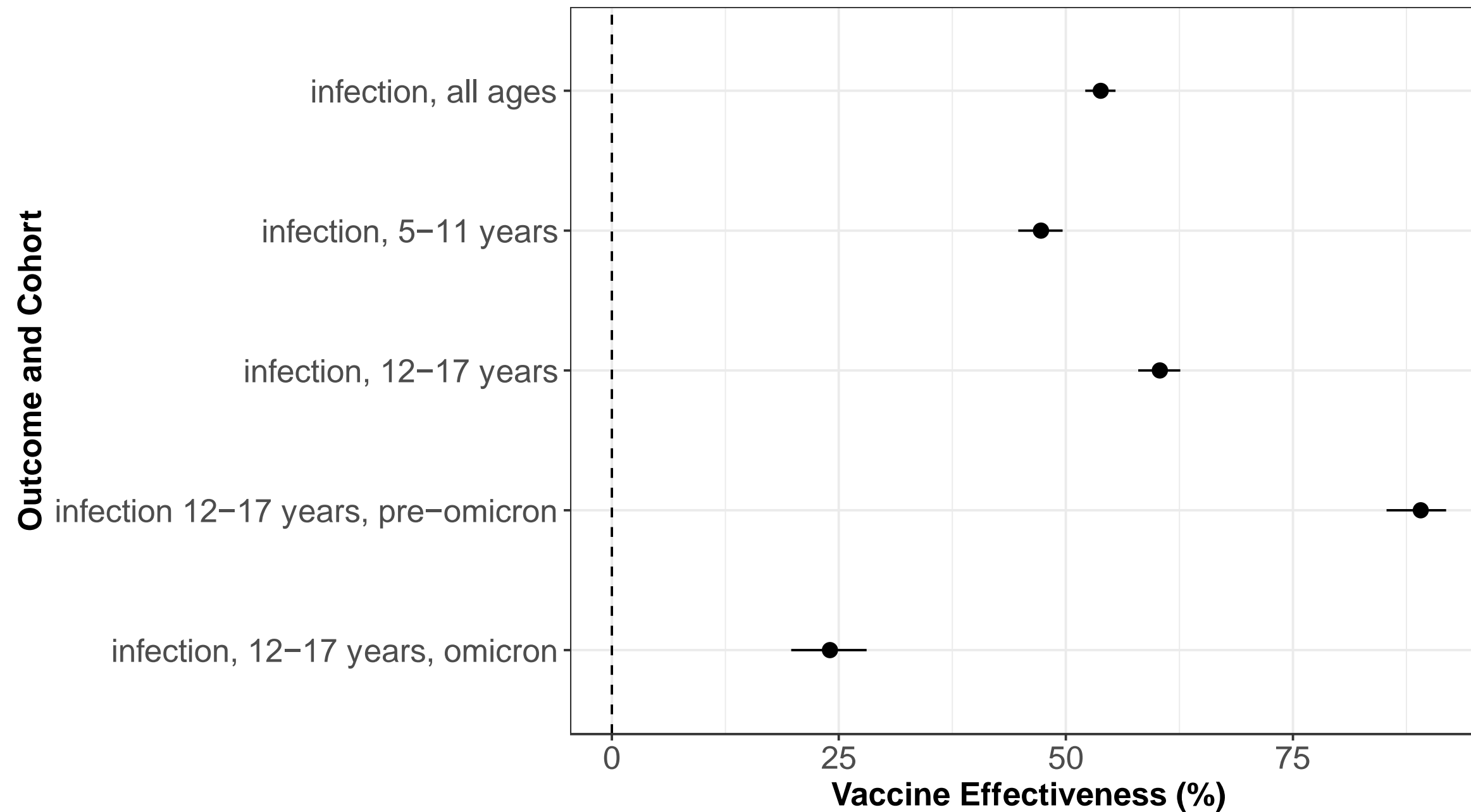
Conditional logistic regression

Adjustment for sex, ethnicity, health system, comorbidity burden, and pre-exposure
health care utilization

Vaccine effectiveness measured as % reduction in outcome (acute or long COVID)



Vaccine effect on acute infection



Infection defined as

- positive NAA test
- positive Ag test
- specific COVID-19 diagnosis

12 month follow-up

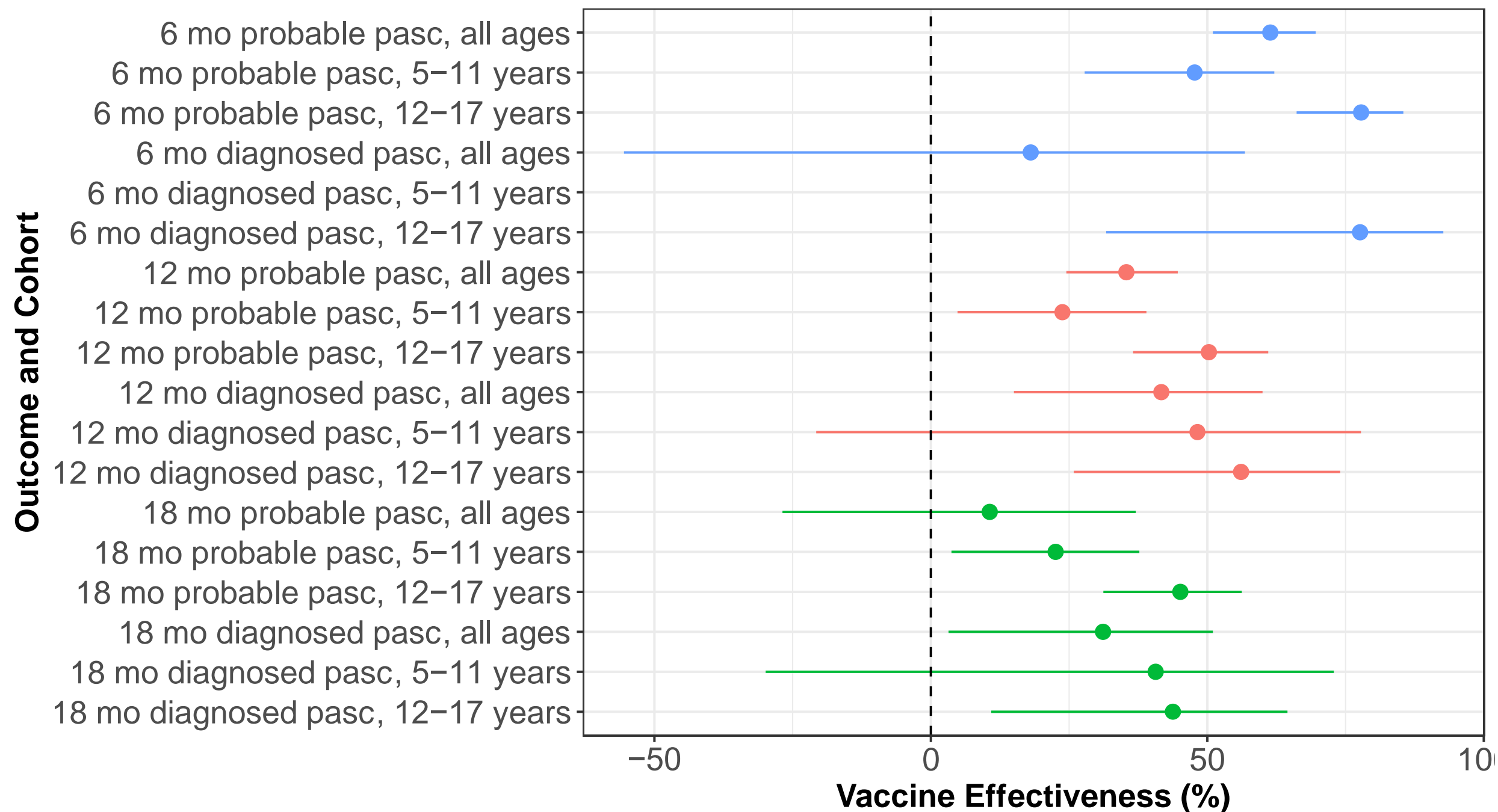


Vaccine Effect on Long COVID

	N ^a	Vaccine Effectiveness (%), 95% CI	
		Unadjusted	Adjusted ^b
Symptom-based or Diagnosed long COVID			
Child (5-11 y), omicron	753	19.7 (7.1 – 30.6)	23.8 (4.9 – 39.0)
Adolescent (12-17 y), all patients	961	28.7 (18.8 – 37.4)	50.3 (36.6 – 61.0)
Adolescent (12-17 y), pre-omicron	676		25.4 (-18.1 – 52.9)
Adolescent (12-17y), omicron	289		49.6 (29.2 – 64.1)
All ages (5-17 y)	1,669	25.3 (17.6 – 32.2)	35.4 (24.5 – 44.7)
Diagnosed long COVID only			
Child (5-11 y)	82	16.0 (-32.7 – 46.9)	48.2 (-20.8 – 77.8)
Adolescent (12-17 y)	194	41.7 (21.4 – 57.0)	56.1 (25.8 – 74.0)
All ages (5-17 y)	270	35.6 (17.4 – 50.0)	41.7 (15.0 – 60.0)

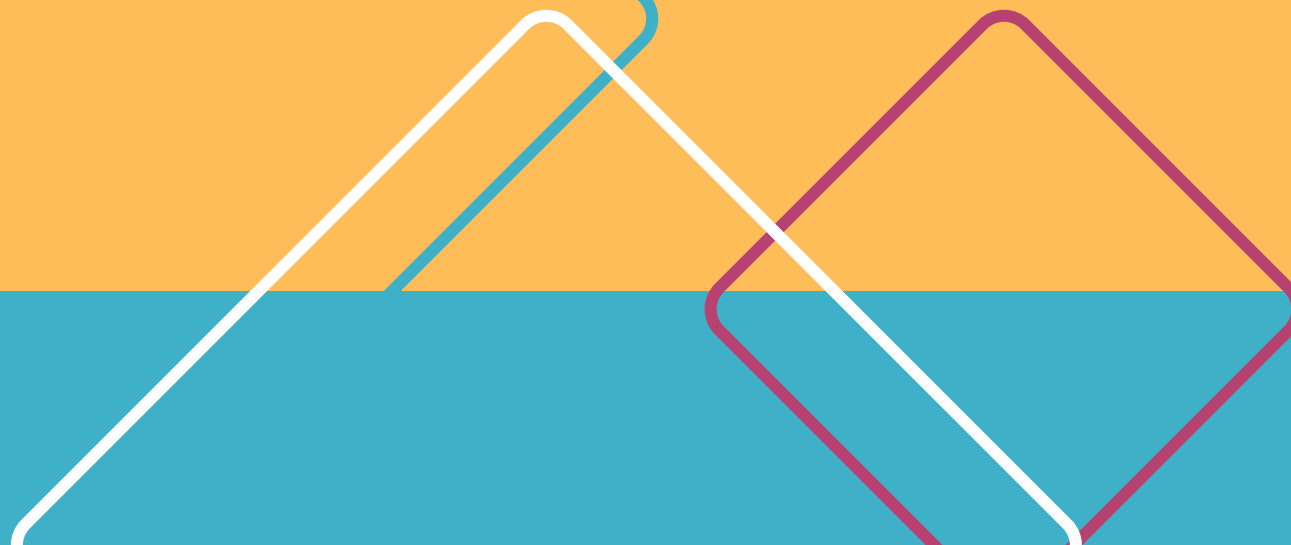


Vaccine Effect on Long COVID Over Time





Discussing Long Covid and Vaccine Misinformation with Patients and Parents



Listen with empathy

✔ LISTEN

SCENARIO: Your patient's parent is worried about potential harmful side effects of the COVID vaccine that they read about online. You know the source they read it on is not reliable.

1. Listen to their fears and beliefs
2. Focus on the wider issue and how they feel
3. Remember that 'fact-check' can often shut down a conversation



Listen with empathy

✓ EMPATHIZE

- Emphasize the fact that you understand why people find it difficult to trust
- Ask questions to understand
- Admit that you also read the data when the vaccine was new
- Talk about a time when you believed misinformation



Point to Credible Sources

- Underscore that finding accurate information is hard
- Emphasize the need to find credible sources
- Remind them that an expert on one topic might not be the best in another topic
- Point them to accurate information
- Explain that you care about their well-being without shaming



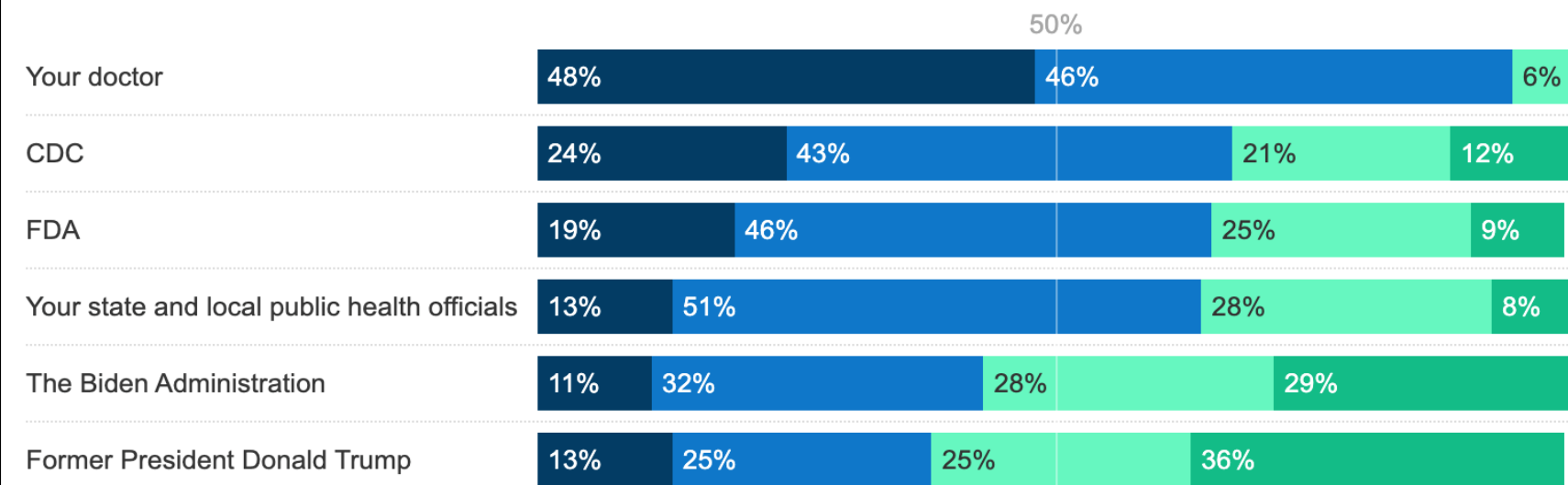
Doctors are Trusted Messengers

Most Adults Have At Least A Fair Amount Of Trust In The CDC, FDA, To Make Right Recommendations, Though There Are Notable Partisan Differences

Total Party ID

How much do you trust each of the following to make the right recommendations when it comes to health issues?

A great deal A fair amount Not much Not at all



NOTE: See topline for full question wording.
SOURCE: KFF Health Misinformation Tracking Poll Pilot (May 23-June 12, 2023) • PNG

KFF

JAMA Data Brief

April 26, 2024

False Health Claims Abound, but Physicians Are Still the Most Trusted Source for Health Information

Melissa Suran, PhD, MSJ¹; Karen Bucher, MA, CMI²



Conclusion



CONCLUSION

- Long COVID is an infection-associated chronic condition that affects one or more organ systems and varies widely in its clinical presentation
- The prevalence of long COVID is not precisely known due to heterogeneous case definitions and variability between population-based epidemiology studies
- Providers should promote COVID-19 vaccines as a means of preventing Long COVID.
- Doctors should listen with empathy to parental concerns about vaccines and share valid sources of information
- Healthcare providers can help patients with Long COVID by validating their symptoms and connecting them to additional care, services, and supports, as appropriate.

