



Update: Epidemiologic Characteristics of Long COVID

Sharon Saydah, PhD, MHS, CDR USPHS
Coronaviruses and Other Respiratory Viruses Division,
Epidemiology Branch
Post COVID Conditions-Longer Term Sequelae Team Lead
September 12, 2023

A general framework for Post-COVID Conditions

Wide range of physical and mental health consequences continue or develop at **least 4 weeks after initial COVID-19 or SARS-CoV-2 infection**

Post acute sequelae of SARS-CoV-2 infection

- System specific pathology (e.g. lung fibrosis, stroke)
- Clinically significant symptoms with unclear pathology (e.g. ME/CFS*-like, dysautonomia)
- On-going symptoms following MIS-C**

General consequences of illness and hospitalization

- Post ICU syndrome
- Other complications of treatment or illness

Conditions frequently overlap
Patients may experience any combination

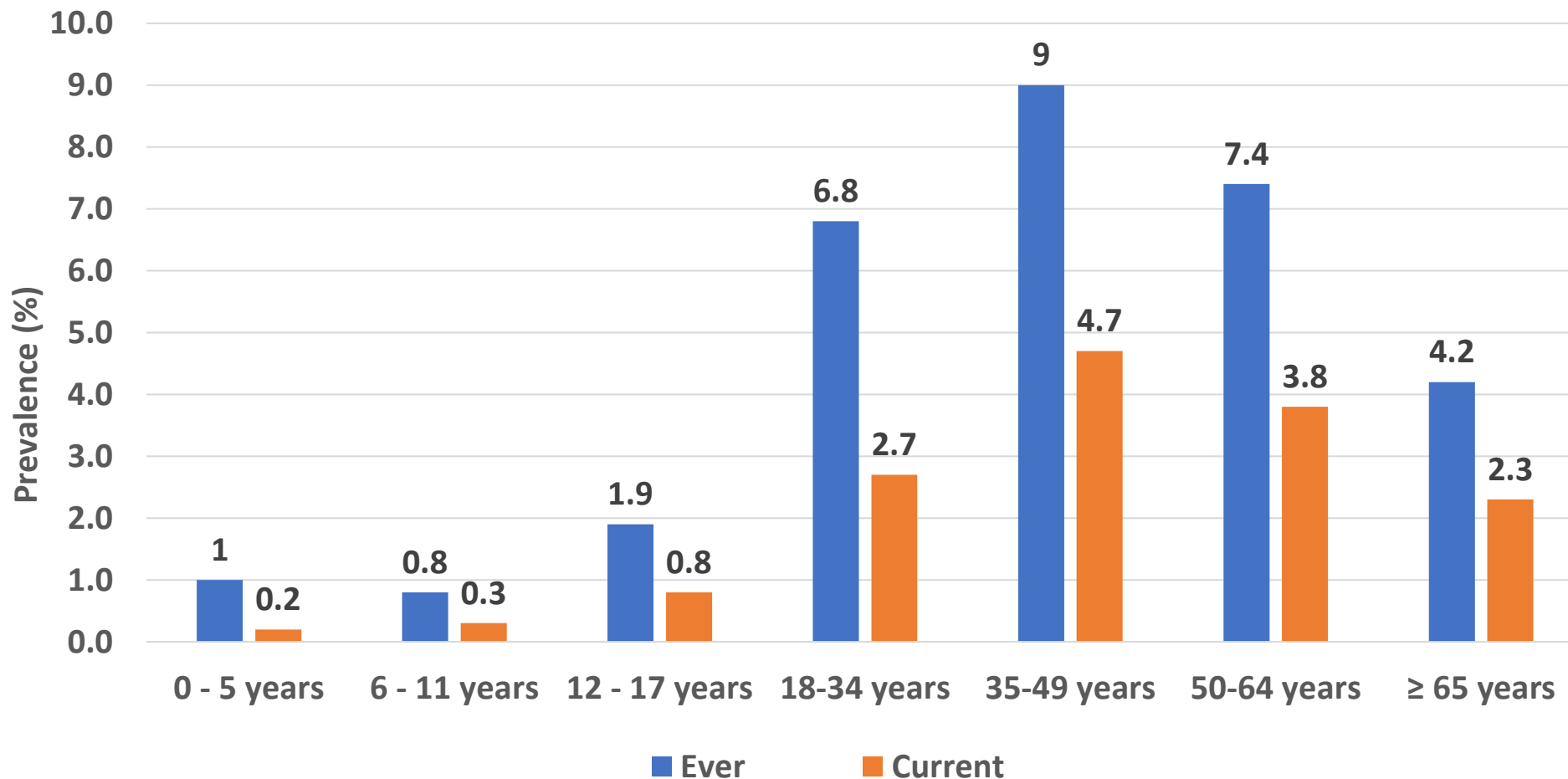
Long COVID commonly used term for Post-COVID
Conditions

*ME/CFS: Myalgic Encephalomyelitis/Chronic Fatigue Syndrome

** MIS-C: Multisystem Inflammatory Syndrome in Children

Estimating the Occurrence of Post-COVID Conditions

Prevalence of on-going symptoms lasting at least 3 months after COVID-19 by age, regardless of COVID status: U.S.



Nationally representative of non-institutional population in the U.S., statistical software was used to account for NHIS's complex sampling design.

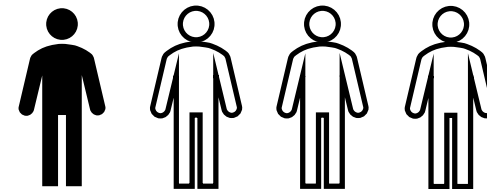
UNPUBLISHED CDC DATA – Preliminary estimates from 2022 National Health Interview Survey

Trends of Long COVID and significant activity limitations among adults- United States, June 1–13, 2022, to June 7–19, 2023

The prevalence of Long COVID (currently reporting symptoms lasting \geq 3 months) among non-institutionalized adults:

- Decreased from June 2022 to January 2023
- Remained unchanged through June 2023

Almost 1 in 4 adults with Long COVID report significant activity limitations



SARS-CoV-2 infection associated with diagnosis of incident conditions

Using electronic health records and comparing patients with COVID-19 to those without evidence of COVID-19:

- **Among children and adolescents, increased risk of four symptoms and eight conditions** 31–365 days following COVID-19 ^{1,2}
 - Associated with an increased risk of heart conditions, kidney failure, blood clots, diabetes, fatigue, smell and taste disorders, neurological conditions
- **Among adults, 1 in 5 COVID-19 survivors** may have a health condition associated with previous COVID-19 in the 31 – 365 days following COVID-19 ³
 - Associated with an increased risk of cardiovascular events, kidney disease, respiratory conditions, diabetes, and neurological conditions ^{2,4,5,6}

1) [Post-COVID-19 Symptoms and Conditions Among Children and Adolescents — United States, March 1, 2020–January 31, 2022 | MMWR \(cdc.gov\)](#)

2) [Hernandez-Romieu AC et al. JAMA Netw Open. 2022; 5\(2\)](#)

3) [Bull-Otterson et al. Post-COVID Conditions Among Adult COVID-19 Survivors Aged 18–64 and ≥65 Years – United States, March 2020–November 2021. MMWR May 27, 2022.](#)

4) [Post –acute sequelae of COVID-19 and cardiac outcomes in U. S. military members - ScienceDirect](#)

5) [Risk of persistent and new clinical sequelae among adults aged 65 years and older during the post-acute phase of SARS-CoV-2 infection: retrospective cohort study | The BMJ](#)

6) [Long-term neurologic outcomes of COVID-19 | Nature Medicine](#)

Post-COVID Conditions symptoms and duration

In a prospective study of adults testing positive and negative for COVID-19:

- Following acute-COVID-like illness among adults, on-going symptoms decrease after 3 months, but 16% continue to experience on-going symptoms at 12 months
- Many adults reported new emerging or re-emerging symptoms at 6, 9, and 12 months following acute COVID-like illness
- Symptoms were not unique to SARS-CoV-2 infection

In the Veterans Affairs patient population:

- Post-COVID Conditions decreased 90 days after acute COVID-19, with increased risk of new conditions continuing for up to 2 years.

[Prevalence of Symptoms \$\leq\$ 12 Months After Acute Illness, by COVID-19 Testing Status Among Adults — United States, December 2020–March 2023 | MMWR \(cdc.gov\)](#)

[Postacute sequelae of COVID-19 at 2 years | Nature Medicine](#)

Groups associated with a higher likelihood of developing Long COVID

- Female sex
- Older age (sometimes)
 - Adolescents compared to younger children
 - Middle-aged adults compared to younger and older adults for symptoms
 - Older adults compared to younger adults for incident conditions
- Severity of COVID-19 illness
- Underlying health conditions prior to COVID-19
- Lower socio-economic status
- Did not get COVID-19 vaccine

[Maglietta G et al. Prognostic Factors for Post-COVID-19 Syndrome: A Systematic Review and Meta-Analysis. JCM 2022](#)

[Socioeconomic inequalities of Long COVID-UK. Shabnam et al. 2023 \(sagepub.com\)](#)

[Hastie. et al. Outcomes among confirmed cases and matched comparison group in the Long COVID in Scotland Study. Nature 2022](#)

[Epidemiology of Long Coronavirus Disease in US Adults | Clinical Infectious Diseases | Oxford Academic \(oup.com\)](#)

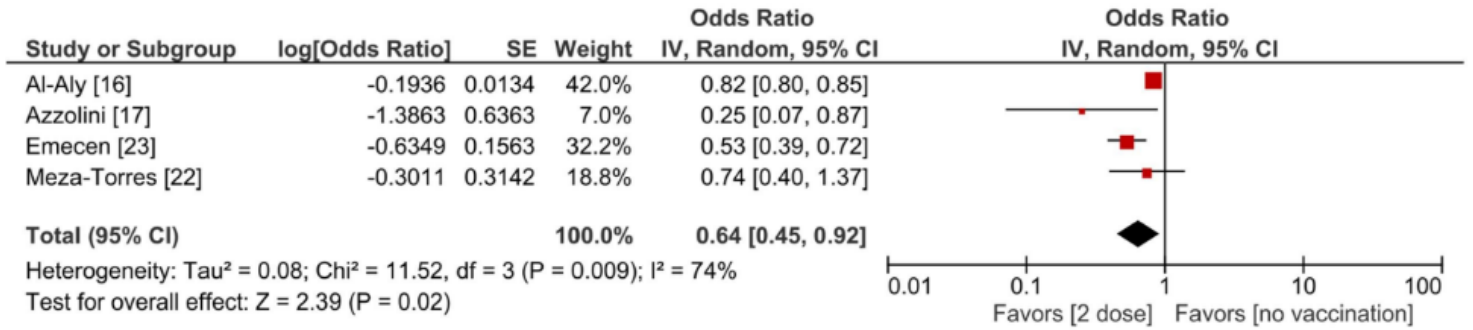
[Frontiers | Hospital admission and vaccination as predictive factors of long COVID-19 symptoms \(frontiersin.org\)](#)

COVID-19 Vaccines and Post-COVID Conditions

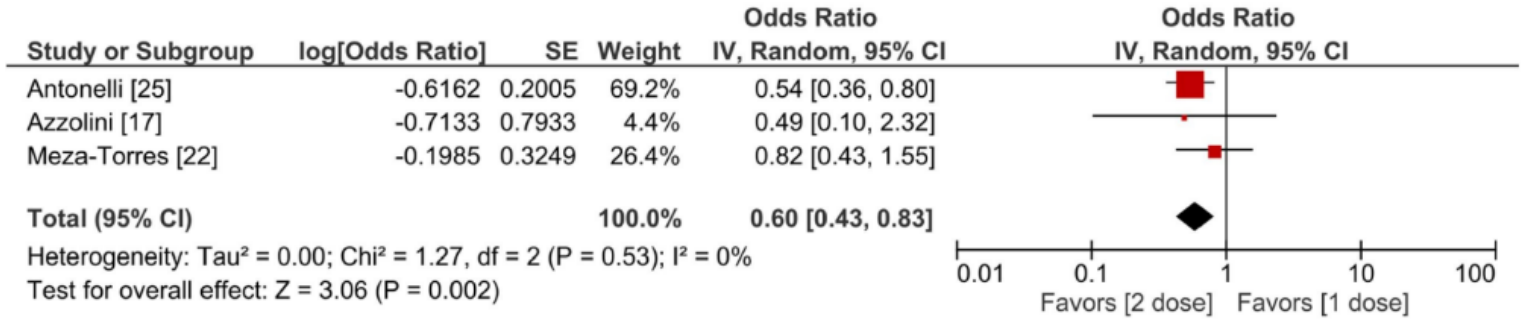
COVID-19 vaccination (1 or 2 doses) reduces Post-COVID Conditions compared to no vaccination among those with SARS-CoV-2 infection

[Protective effect of COVID-19 vaccination against long COVID syndrome: A systematic review and meta-analysis - ScienceDirect](#)

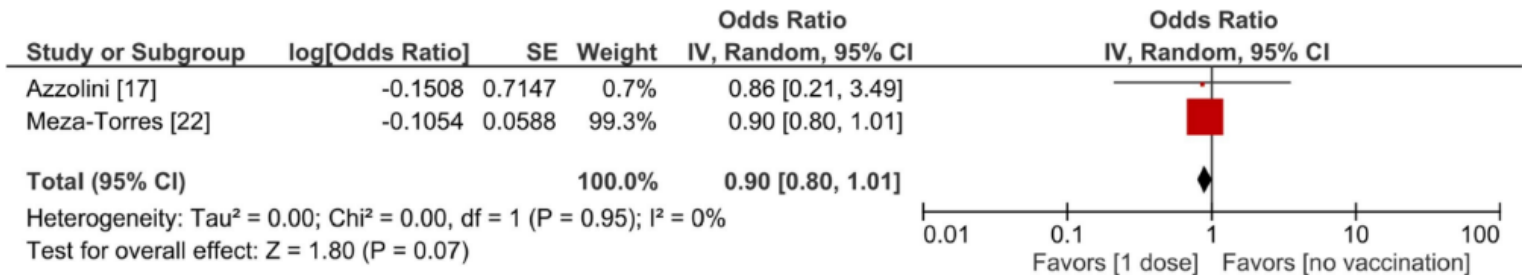
a) two-dose vaccination vs. no vaccination

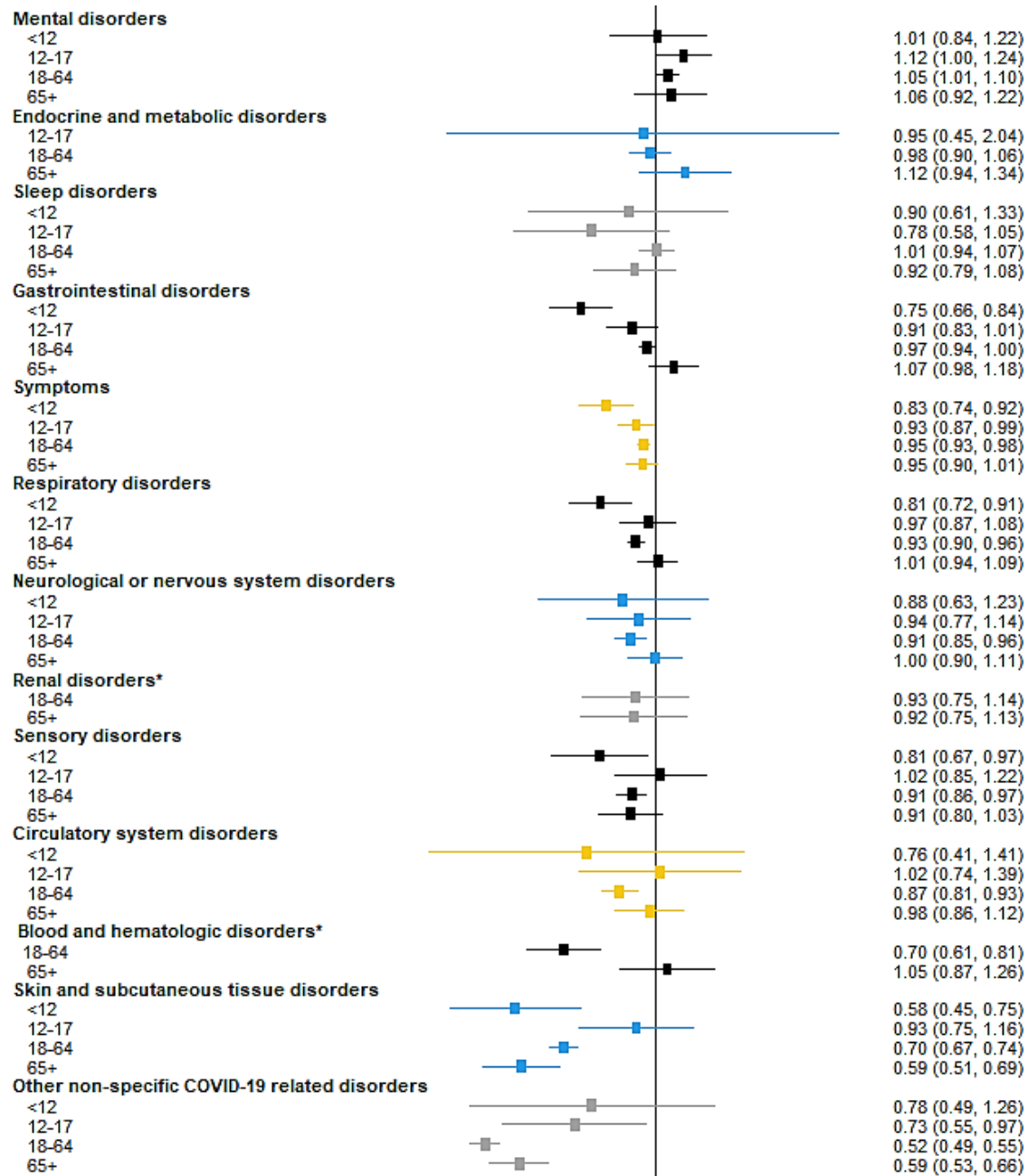


b) two-dose vaccination vs. one-dose vaccination



c) one-dose vaccination vs. no vaccination





Adjusted RR (95% CI)

Associations of prior COVID-19 vaccination and risk of PCC categories 6 months following SARS-CoV-2 infection, by age group: Mar 2021-Feb 2022

- COVID-19 cases diagnosed from March 2021 – February 2022, followed through August 2022
- 161,531 with COVID vaccination prior to infection matched 1:1 with patients without vaccination

UNPUBLISHED DATA
Vaccine Safety Datalink

COVID-19 mRNA vaccination associated with reduced occurrence of Post COVID Conditions following SARS-CoV-2 infection in a US cohort of adult essential workers, June 2021--September 2022

	Total (N =936)		Unvaccinated (n= 157)		Vaccinated 2 doses (≥ 14 days) (n= 301)			Vaccinated 3 doses (≥ 7 days) (n=478)		
	N	(Col %)	N	(Row %)	N	(Row%)	aOR (95% CI) ^a	N	(Row%)	aOR (95% CI) ^a
1 or more symptoms	221	(23.6)	42	(19.0)	74	(33.5)	1.00 (0.80 - 1.27)	105	(47.5)	0.84 (0.67 - 1.06)
2 or more symptoms	158	(16.9)	27	(17.1)	62	(39.2)	1.22 (0.94 - 1.59)	69	(43.7)	0.76 (0.58 - 0.99)
Cardiovascular symptoms	107	(11.4)	19	(17.8)	44	(41.1)	1.32 (0.98 - 1.78)	44	(41.1)	0.73 (0.54 - 0.99)
Gastrointestinal symptoms	46	(4.9)	12	(26.1)	17	(37.0)	1.04 (0.67 - 1.61)	17	(37.0)	0.60 (0.39 - 0.94)
General symptoms	142	(15.2)	26	(18.3)	58	(40.8)	1.22 (0.94 - 1.60)	58	(40.8)	0.81 (0.62 - 1.05)
Neurological symptoms	128	(13.7)	26	(20.3)	44	(34.4)	1.08 (0.81 - 1.43)	58	(45.3)	0.75 (0.57 - 0.99)
Other symptoms	80	(8.5)	19	(23.8)	29	(36.3)	1.08 (0.77 - 1.51)	32	(40.0)	0.68 (0.48 - 0.95)

Unpublished data from the HEROES/RECOVER cohort. [HEROES Protocol](#); [RECOVER Protocol](#)

COVID-19 mRNA vaccination associated with reduced occurrence of Post COVID Conditions following Omicron SARS-CoV-2 infection in a US cohort of children aged 5-17 years, July 2021--September 2022

	Unvaccinated, 148 (row %)	Vaccinated ¹ , 474 (row %)	OR (95% CI)	Adjusted OR ² (95% CI)
1 or more PCC symptoms	12 (43)	16 (57)	0.63 (0.43 - 0.93)	0.66 (0.43 - 0.99)
2 or more PCC symptoms	11 (52)	10 (48)	0.52 (0.34 - 0.81)	0.52 (0.32 - 0.83)
Respiratory PCC symptoms	10 (53)	9 (47)	0.52 (0.33 - 0.82)	0.53 (0.32 - 0.86)
Non-Respiratory PCC symptoms	10 (42)	14 (58)	0.64 (0.42 - 0.98)	0.70 (0.45 - 1.10)
PCC Impact on function	9 (56)	7 (44)	0.51 (0.22 - 1.15)	0.62 (0.21 - 1.83)

Unpublished data from the PROTECT cohort. [PROTECT Protocol](#)

Summary

Important take home messages

- Post-COVID Conditions are common following SARS-CoV-2 infection, decrease with time since infection, and has decreased since the start of the pandemic
- Symptoms and conditions associated with Post-COVID Conditions are not unique to having had SARS-CoV-2 infection
- Post-COVID Conditions are associated with increased health care utilization and significant activity limitations
- Accumulating evidence that COVID-19 vaccination reduces Post-COVID Conditions among both children and adults

Questions?

For more information:

Sharon Saydah, PhD, MHS zle0@cdc.gov

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

