Post-COVID Conditions: CDC Science
How CDC is using science to learn more about Post-COVID Conditions (or Long COVID)
Updated Mar. 31, 2023

For the General Public: Long COVID (Post-COVID Conditions)

CDC is analyzing healthcare data, partnering with clinicians, and working with researchers to learn more about Post-COVID Conditions (Long COVID).

Post-COVID Conditions (PCC, or Long COVID) are a wide range of new, returning, or ongoing health problems people can experience four or more weeks after first being infected with the virus that causes COVID-19.

What CDC Is Doing to Learn about Post-COVID Conditions

CDC and partners are doing research on Post-COVID Conditions in a variety of populations and settings. These partnerships are essential for expanding the base of evidence needed for addressing Post-COVID Conditions. CDC and its partners are working to:

- **Characterize and assess Post-COVID Conditions** to estimate both the risk of experiencing Post-COVID Conditions and the numbers of people experiencing these conditions by demographic group.
  - Identify risk factors to better understand how to prevent Post-COVID Conditions.
  - Identify groups disproportionately affected by Post-COVID Conditions.
  - Assess the burden (health and financial costs) of Post-COVID Conditions.

- **Identify successful interventions** to prevent and lessen the effect of Post-COVID Conditions. This research includes
  - Assessing if COVID vaccinations reduce the occurrence of Post-COVID Conditions, and
  - Promoting equity in healthcare access and utilization for people with Post-COVID Conditions.

- **Disseminate clinical guidance and other education materials** for healthcare providers, patients, and the public to improve understanding of Post-COVID Conditions.

Science at CDC
Scientific articles and manuscripts about COVID-19 and Post-COVID Conditions

MMWR COVID-19 Reports  CDC Scientific Publications on COVID-19

CDC and partners are collecting and analyzing information about Post-COVID Conditions and health problems through several public health activities, including
Prospective cohort studies that observe people over time,
Sentinel surveillance to collect information from select public health sources on cases of Post-COVID Conditions,
Medical chart abstraction to collect data on the health and medical care of patients with Post-COVID Conditions,
Analyses of electronic healthcare data and large patient databases,
State and national health surveys, and
Evaluation of models of care.

Inclusion of data and analyses of Post-COVID Conditions by race/ethnicity, age, sex, and other factors are a CDC priority.

Related Research

Select examples of research on Post-COVID Conditions conducted by CDC and partners

Prospective Cohort Studies

FindCOVID

Follows cases in children and adults infected with the virus that causes COVID-19 and their household members to measure initial clinical presentation, viral shedding, transmission, immune response, and ongoing symptoms from the time of infection up to 12 months.

**Population:** Children and adults

**Partner:** University of California, San Francisco (UCSF)

Immune Response to SARS-CoV-2 among patients in Louisiana

Follows cases in patients recovering from COVID-19 to assess longer term clinical and immunity related outcomes up to one year after the beginning of the illness. Follows a subgroup of cases in COVID-19 patients hospitalized for severe COVID-19 illness for one year following hospital admission.

**Population:** Adults, with a focus on persons at higher risk for severe COVID-19

**Partner:** Tulane University School of Medicine, Infectious Diseases

Applied Research to Address the Coronavirus (COVID-19) Emerging Public Health Emergency

Follows cases in participants who report on daily symptoms, testing, care seeking, and vaccination. Conducts monthly testing for antibodies to the virus that causes COVID-19 and analysis of electronic health records to assess ongoing clinical diagnoses, for a minimum of six months.

**Population:** Adults identified by the University of Maryland and Medstar Health in the mid-Atlantic area, Wake Forest University and Atrium Health System in the North Carolina area, Tulane University, and the University of Mississippi

**Partner:** COVID-19 Community Research Partnership, Vysnova Partners

COVID-19 within American Indian Communities at High Risk in the Southwest U.S.

Follows people who are infected with the virus that causes COVID-19 for up to 12 months to assess the development and duration of symptoms, complications from infection, and immune response over time.

**Population:** Navajo and White Mountain Apache communities
**Partner:** Johns Hopkins University, Bloomberg School of Public Health, Center for American Indian Health

**Longitudinal Study of COVID-19 Antibody Response in Children in Seattle, WA**

Follows cases in children and adolescents (up to 18 years old) who test positive for the virus that causes COVID-19, to assess the development and duration of the immune response, symptoms, and complications over time, for up to two years.

**Population:** Children and adolescents

**Partner:** University of Washington; Seattle Children's Hospital

**COVID: Research on COVID Long-Term Illness, Effects, and Risk Factors (COVID-RELIEF)**

Tracks electronic health records of patients who test positive and negative for the virus that causes COVID-19 and documents symptoms and medical conditions for an average of 2 years after infection. A subgroup of patients who previously tested positive for COVID-19 provides self-reported data on health and biospecimens to investigate genetic and other risk factors for delayed recovery.

**Population:** Adults receiving care in a university health system

**Partner:** University of Washington, Seattle, WA

**COVID-19: Understanding the Post-Viral Phase (COVID-UPP)**

Assesses participants' health over time using surveys and, for a subset of participants, using physical exams and medical tests to compare differences and similarities with myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS). Adults who tested positive for the virus that causes COVID-19 and continue to have symptoms more than three months after infection are compared with those who fully recovered.

**Population:** Adults, with a focus on Hispanic or Latino persons who tested positive for the virus that causes COVID-19 and continue to have symptoms more than three months after infection

**Partner:** Nova Southeastern University, Fort Lauderdale, FL

**Support for Patients With SARS-CoV-2 Infections Registry (INSPIRE)**

Follows cases in adults who test positive for COVID-19 and a comparison group of adults who test negative for SARS-CoV-2 every 3 months for up to 18 months. Participants complete detailed surveys, including information on social determinants of health, and provide linked electronic health information.

**Population:** Adults tested for SARS-CoV-2 infection

**Partners:** Rush University, Yale University, Jefferson Medical, University of Washington, UCLA, UCSF, UT Southwestern, UT Houston


Collects information from patients at risk of or who have Post-COVID Conditions about their health through online questionnaires, with follow up on their health one year later. Information will be used to identify and describe those who have long-term symptoms after having COVID and whose results on routine medical tests and physical examination are...
Population: Adults from a demographically diverse population receiving care in a large, integrated health system in northern and central California

Partners: Public Health Foundation Enterprises, Inc.; California Emerging Infections Program; Kaiser Permanente Northern California, Oakland, CA

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### Medical Chart Abstraction

#### Multi-Site Study of Post-COVID Conditions (MPCC)

Collects health data to describe the health and medical care of patients at clinics designed for Post-COVID care to help classify types of Post-COVID health problems and care needed and highlight unmet needs for care in other medical settings.

**Population:** Adult patients receiving care in Post-COVID clinics at participating medical centers through September 30, 2021

**Partners:** Rainmaker Strategic Solutions, LLC; University of Texas Southwestern Medical Center; Dallas, TX; Creighton University Medical Center, Omaha, NE; Mt. Sinai Health System, New York, NY

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### Electronic Healthcare Data and Patient Databases

#### Post-COVID Conditions among Patients Seen in Outpatient Settings – American Family Cohort

Analyzes electronic health record data from COVID-19 patients seen at over 800 primary care and family medicine practices to assess frequency of new symptoms and conditions among patients with COVID-19 diagnosis compared with patients with other respiratory diagnoses. Study will assess Post-COVID Conditions by race/ethnicity, age, sex, geography (urban/rural), and indices of social vulnerability.

**Population:** Children and adults

**Partner:** American Board of Family Medicine; Stanford University Center for Population Health Sciences

#### Post-COVID Conditions among Patients Seen in Outpatient and Inpatient Settings – PCORnet

Analyzes electronic health record data from COVID-19 patients seen in ambulatory, emergency department, and hospital settings in 40 U.S. healthcare systems to assess frequency of new symptoms and conditions among patients who tested positive for the virus that causes COVID-19 compared with patients who tested negative.

**Population:** Children and adults

**Partner:** PCORnet, the National Patient-Centered Clinical Research Network

#### Frequency of and Risk Factors for Post-COVID Conditions – Various Healthcare Data Sources

Analyzes several large healthcare data sources to provide estimates of new symptoms and conditions following COVID-19 diagnosis in outpatient and inpatient settings by patient demographic and clinical characteristics.

**Population:** Children and adults

**Data Sources:** Cerner HealtheDataLab, HealthVerity, Premier Healthcare Database Special COVID-19 Release
National Health Interview Survey

Collects information about symptoms of Post-COVID Conditions through a cross-sectional household survey to estimate the national prevalence of Post-COVID Conditions.

Population: Adults and children

Data Source: National Center for Health Statistics, CDC

Behavioral Risk Factor Surveillance System

Collects information about symptoms of Post-COVID Conditions through a survey to produce state/territorial-level estimates of prevalence.

Population: Adults

Data Source: National Center for Chronic Disease Prevention and Health Promotion, CDC; participating state and territorial health departments

Multi-state Long Covid Survey

Surveyed adults who tested positive for SARS-CoV-2 for self-reported acute and Post-COVID Conditions lasting four weeks or more to estimate prevalence of Post-COVID Conditions and identify demographic and disease-specific risk factors for developing Post-COVID Conditions.

Population: Adults who tested positive for the virus that causes COVID-19 in Maine, Wisconsin, New York, and New Jersey

Partners: State health departments

Models of Care

Long COVID and Fatiguing Illness Recovery Program (LC&FIRP)

Evaluates whether educational interventions for primary healthcare providers through a distance-learning platform improves health outcomes of patients with Post-COVID Conditions and other complex chronic conditions with similar symptoms, such as myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS) and other post-infectious fatiguing illnesses.

Population: Adults who are uninsured, with lower incomes, and who are medically underserved

Partners: Family Health Centers of San Diego (FHCSD), San Diego, California; Project ECHO, Albuquerque, NM; University of Washington Post-COVID Clinic Rehabilitation and Recovery, Seattle, WA; University of Colorado, Denver, CO; ATA Health Strategies, Washington, DC

Sentinel Surveillance

Tracking the Burden, Distribution, and Impact of Post COVID-19 Conditions in Diverse Populations for Children, Adolescents, and Adults (Track PCC)
TrackPCC is a multi-year sentinel surveillance project that will investigate the burden and impact of Post-COVID Conditions (PCC) in diverse populations within the United States. TrackPCC entails both passive and active surveillance and long-term follow-up of cohorts in collaboration with public health, academic, and healthcare partners.

As part of passive surveillance, TrackPCC investigators will collect information at four surveillance sites from electronic health records of patients who test positive for SARS-CoV-2 infection for up to five years to estimate incidence of symptoms and conditions occurring after SARS-CoV-2 infection. Every quarter, new cohorts of patients who tested positive for SARS-CoV-2 will be added to the surveillance system, and those who previously tested positive will be followed for the development of PCC symptoms and conditions.

As part of active surveillance, TrackPCC investigators will survey a sample of patients who test positive for SARS-CoV-2 from the four surveillance sites for on-going symptoms 3 months after infection and then every 6 months for up to 18 months. This will provide estimates of the prevalence of symptoms that continue for more than three months after COVID-19 illness and provide information on symptom duration, severity of symptoms, impact on day-to-day activities, and associated health disparities.

Population: Children and adults who test positive for SARS-CoV-2 infection

Partners: Abt Associates, Indiana University, Temple University, University of Arizona, and Comagine Health (Collaborative: Boise State University, Utah Health Information Network, and Bronx Regional Health Information Organization)

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How can I Participate in Long COVID Research?
The National Institutes of Health (NIH) created the RECOVER Initiative, a research project that aims to understand how people recover from a COVID-19 infection and why some people do not fully recover and develop Long COVID or post-acute sequelae of SARS-CoV-2 (PASC). Anyone can participate in the RECOVER project, including those who have COVID-19 now, had COVID-19 before, or never had COVID-19. People of all races and ethnicities, genders, ages, and locations will be included in the research project to better understand how Long COVID affects people.

To learn more, including enrollment, visit the RECOVER webpage.

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Clinical Outreach and Communication Activity (COCA) Calls
The purpose of COCA continuing education opportunities is to increase clinicians' knowledge of threats to the public's health and provide information on clinical evaluation management strategies to address these threats. COCA continuing education is free. Learn about receiving continuing education (CE) credit for COCA calls.

**Featured Webinars**
- **May 5, 2022:** Evaluating and Supporting Patients Presenting with Cognitive Symptoms Following COVID
- **September 30, 2021:** Evaluating and Supporting Patients Presenting with Fatigue Following COVID-19
- **June 17, 2021:** Evaluating and Caring for Patients with Post-COVID Conditions
- **January 28, 2022:** Treating Long COVID: Clinician Experience with Post-Acute COVID-19 Care

[More COCA Calls/Webinars]
CDC Publications

CDC is publishing the results of studies aimed at better understanding Post-COVID Conditions and how best to support people experiencing Post-COVID Conditions and health problems.

Select CDC publications on Post-COVID Conditions and related topics:

**Prospective Cohort Studies**


**Analysis of Electronic Healthcare Data**


**Health Surveys**


**Electronic Medical Chart Abstraction**


Commentary
