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Today

- What is long COVID?
 - Definition, Coding, Symptoms
 - History
 - Epidemiology
 - Risk factors
- Updates on treatment
- Long COVID and other sequelae of infectious diseases



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Long COVID

Also known as...

- Long-haul COVID
- Post-acute COVID
- Chronic COVID, etc.

What all these terms have in common is persistence of COVID-19 [symptoms](#) for days, months, years after the initial infection.



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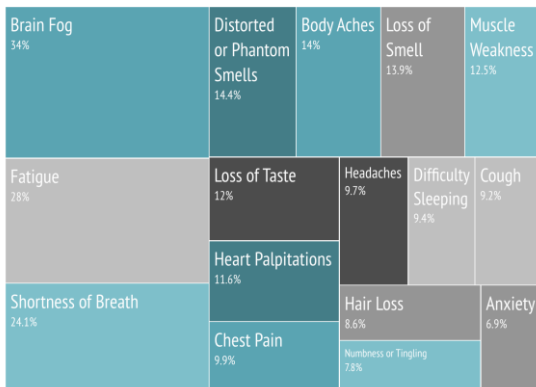
How Long is “Long”?

WHO: symptoms must persist for 3+ months

[CDC](#): symptoms must persist for 4+ weeks



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23andMe Long COVID study



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As of 2023, No Consistent Definition Exists

But there is an ICD-10-CM code: U09.9,
 “Post COVID-19 condition, unspecified”

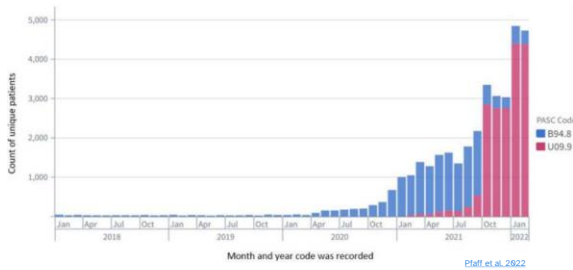
This code was created 1+ year after
 initial patient reports (October 2021)

Previously, code B94.8 was used instead:
 “Sequelae of other specified infectious
 and parasitic diseases”

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ICD-10-CM Code Use



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The Problem With The ICD-10-CM Definition

It necessarily only captures the experiences
 of patients who have sought contact with
 the medical system.

May exclude:

- milder cases
- experiences of individuals without access to healthcare
- experiences of individuals trying to avoid stigma

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Long COVID

History worth reviewing: it was patients who created the term “long COVID” (or “long-haul COVID”).

Possibly the first disease to be defined via patients finding each other on social media.

Just like COVID-19, it was **a new disease**.

[Callard & Perego 2021](#)

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The Newness of New Diseases

“In the 1960s and 1970s, most physicians were aware of the possibility of pandemics... However, the emergence of **a truly new infectious disease** that could dramatically affect society was still a purely hypothetical concept.

That all changed in the summer of 1981 with the recognition of the first cases of what would become known as AIDS.”

[Fauci 2022](#)

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Why Did The Patients Need to Define Long COVID?

Prior to May 2020: long-term effects were not considered; most patients believed to have mild disease and fast recovery

Inconsistent with people's actual experiences → social media groups like [Body Politic](#) emerged (later → Patient-Led Research for COVID-19)

May 2020: survey of 640 patients revealed first clues into comorbidities and epidemiology of long COVID

Citizen science project

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Multiple Forms of Patient Advocacy

05/05/2020: Dr. Garner's op-ed in the British Medical Journal

Paul Garner: For 7 weeks I have been through a roller coaster of ill health, extreme emotions, and utter exhaustion

May 5, 2020

Paul Garner, professor of infectious diseases at Liverpool School of Tropical Medicine, discusses his experience of having covid-19



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Patient-Led Research for COVID-19 Survey (May 2020)



Featured in the NIH Director's Blog in September 2020

<https://patientresearchcovid19.com/research/report-1/>

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And Yet...

Since July 2021: considered a disability under the ADA.

4 million full-time equivalent workers are believed to be unable to work due to long COVID.

That's **2.4% of the US working population.**

(Brookings Institution/ Lancet/ Federal Reserve/ NPR, 07/31/2022)

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And Yet...

August 2022: the US has set up the National Research Action Plan on Long COVID

→ NIH Researching COVID to Enhance Recovery (RECOVER) initiative (\$1.15B)



Image credit: The Guardian

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2023 Updates

Public health emergency set to **expire** on 05/11/2023

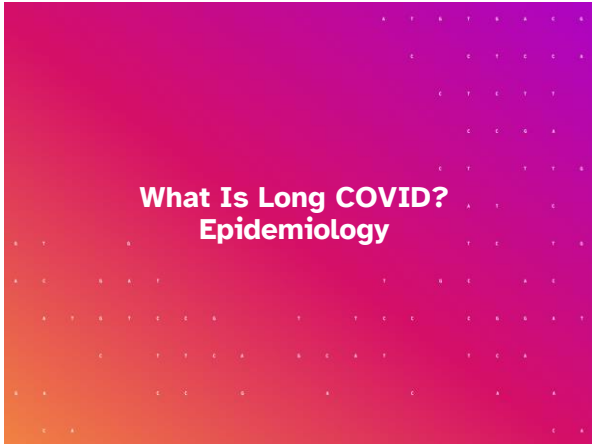
However:

Currently **~65 million people worldwide** are estimated to have long COVID symptoms.

Lancet Editorial Board 2023

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23andMe Long COVID Study

- In 2020, we sent out surveys to capture COVID-19 (not yet long COVID at that time) diagnoses in our US customer population
- ~1.1 million responses
- Identified genetic markers of COVID-19 risk and loss of smell/taste



Shelton et al. 2021

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23andMe Long COVID Study

- In 2021, we contacted the initial COVID-19 cases and deployed surveys to **better understand their long-term experience**
- Of ~100,000 respondents, **almost half reported symptoms lasting for a month or longer**
 - Estimates widely vary across studies
 - Sample comprised many early cases

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23andMe Long COVID Study

- We captured patients **across the spectrum of disease severity** (i.e. not only patients who went to the doctor)
- Risk factors for long COVID in our data:
 - **Hospitalization (~10x)**
 - XX karyotype (~2x)
 - Prior cardiometabolic disease (~1.9x)
 - Prior autoimmune disease (~2.5x)
 - Prior depression/anxiety (~2x)

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23andMe Study Was Uniquely Timed To Study Vaccine Effects

- **Vaccination helps prevent long COVID**, but likely **not cure it**:
 - The majority of our participants did not experience a change in their symptoms following vaccination
- Approximately twice as many people in our cohort reported improvement vs. worsening of LC following vaccination

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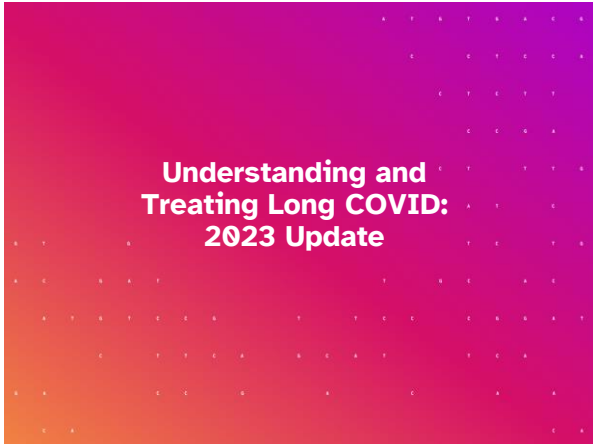
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23andMe Long COVID Study

- Our findings were largely consistent with other reports in literature
- Open questions:
 - Why are XX people more susceptible to this condition?
 - What is the role of mental and physical comorbidities?
 - What is the role of genetics in determining susceptibility?

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PNAS NEWS FEATURE

Lots of long COVID treatment leads, but few are proven

Lingering virus particles, microclots, and faulty immune signaling are likely culprits for many long-hauler symptoms. Anticoagulants, immune regulators, and antivirals show early promise

Leah Shaffer, Science Writer

NEWS | 31 March 2023

Long COVID exercise trials proposed by NIH raise alarm

Advocates ask the US biomedical agency to rethink the design of its RECOVER initiative, citing possible harm and funding waste.

Long Covid: Three years and no magic bullet

7 days ago

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Effective Treatment Requires:

- Understanding of the underlying pathophysiology (challenging with a new disease)
- Proper diagnostic tools
- Actual treatments targeting the disease processes

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An Incomplete List of Proposed Treatments*

- Paxlovid (for both prevention and treatment)
- SSRIs
- Exercise/quality of life interventions (controversial)
- Pacing/cognitive pacing
- IV immunoglobulin for immune dysfunction
- Probiotics
- Low dose naltrexone

NEWS | 31 March 2023
Long COVID exercise trials proposed by NIH raise alarm
Advocates ask the US biomedical agency to rethink the design of its RECOVER initiative, citing possible harm and funding waste.

*With --evidence of success

[Davis et al. 2023](#)

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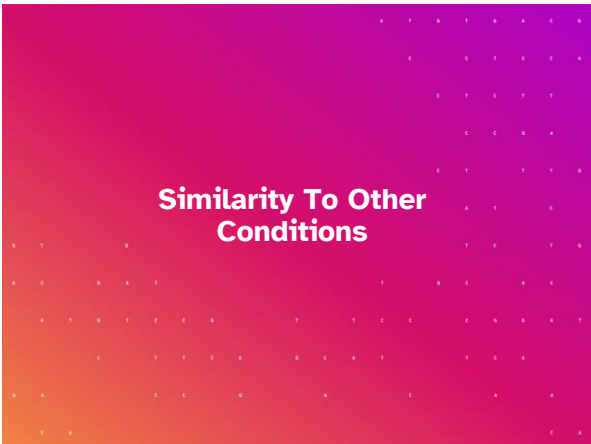
What About Variants and Repeated Infections?

- Evidence of different variants impacting long COVID risk is mixed and likely mediated by severity
- Increased risk of long COVID after 2nd and 3rd infections (regardless of vaccination status)

[Davis et al. 2023](#)

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Faces of ME/CFS: Whitney Dafoe Before and After



Affects ~1M Americans
Since 2016, NIH has been investing in ME/CFS understanding (not yet therapeutics)
Lessons from ME/CFS are likely to translate to long COVID

Image Credits: Washington Post, Health Rising



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Long COVID: Take Home Messages

Long COVID is a debilitating condition with diverse manifestations.

Its heterogeneity and lack of biomarkers/biological understanding so far have prevented effective universal treatments.

Take patient experiences seriously! They are the best resource for understanding this emerging condition.



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Acknowledgments

- 23andMe Research **participants**



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