



Long COVID-19

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Please note:

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The Research Team are unable to ensure that the information listed below provides an accurate & up-to-date snapshot of these matters

Research question: Based on latest research, would long covid be considered permanent and what is the prognosis? What are the most effective treatments? What are the outcomes of these treatments? What are the more common longer lasting effects? What is the prevalence of long COVID-19?

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2. Summary

Update (September, 2023): Heterogeneity of research data is still a significant barrier to determining the prevalence and incidence of long COVID, the persistence of disability associated with long COVID and any effective treatment and management techniques. Estimates of activity limitation for people with long COVID vary between 16% and 80%. Estimates of prevalence vary considerably, though studies coalesce around estimates in the range of either 10%-20% or 40%-55%. The evidence base for treatment and management techniques is growing with some evidence supporting physical therapy, multimodal and personalised approaches. No pharmacological or non-pharmacological technique has emerged as a preferred pathway.

Long COVID-19 is a collection of symptoms that persist after the initial acute phase of COVID-19 infection. While some consider 4 weeks the start of prolonged symptomology, 12 weeks is emerging as the point where long COVID-19 can be diagnosed. The prevalence of long COVID-19 is difficult to determine due to heterogeneity in the research data, however it is suggested to effect between 10-20% of people who survive a COVID-19 infection.

Management of long COVID-19 will likely follow the management protocols for other post-viral syndromes, such as myalgic encephalitis/chronic fatigue syndrome, or critical illness recovery paths, for example post-intensive care syndrome.

Permanence of long COVID-19 is difficult to determine at this point as the disease is in its infancy, however most people are expected to make a recovery over many months. Nonetheless, it is expected some people will continue to have physical and/or mental impairment that significantly impacts their functional capacity. As a consequence, the United States Department of Health and Human Services advises that long COVID-19 can be considered a disability after patients complete an individualised assessment that indicates they have severely impaired functional capacity.

3. Review, September 2023

3.1 Prolonged disability

Estimates of prevalence and incidence of long COVID, and estimates of the presence of impairment or activity limitation still vary widely. Centers for Disease Control and Prevention found approximately one quarter of adults with long COVID report significant activity limitations (Ford et al, 2023). Reviewing 35 studies, Oliveira-Almeida et al (2023) found activity limitations in between 16% and 80% of subjects.

The World Health Organisation still endorses a prevalence estimate of 10-20% (WHO, 2022). Woodrow et al (2023) reviewed 73 studies and found prevalence estimates between 0% and 93%. An international systematic review considered 194 studies including 735,006 participants and found 45% of COVID-19 survivors experience ongoing symptoms at 4 months (O'Mahoney et al, 2022). In a review involving 120,970 patients, Di Gennaro et al (2023) found an incidence of 56.9%. In contrast, 10 longitudinal studies from the UK found continuation of symptoms after 12 weeks in 8-17% of cases (Hallek et al, 2023). Hallek et al (2023) found 15% of unvaccinated adults infected with SARS-CoV-2 met criteria for post-COVID syndrome, with lower incidence among vaccinated COVID-19 survivors. Evidence from the US also supports the rate of around 15%. Between 14% and 16% of respondents to the Household Pulse Survey report experiencing long COVID (National Centre for Health Statistics, 2023).

Centers for Disease Control and Prevention found approximately 16% of adults with COVID-like symptoms reported ongoing symptoms after 12 months (Montoy et al, 2023). In contrast, Woodrow et al (2023) found prevalence estimate of 48.5% after 12 months. Woodrow et al conclude that the way in which long COVID is defined and measured affects prevalence estimates. Estimates are lower in studies using routine health records (13.6%) compared with self-report studies (43.9%). The highest estimates were found in studies systematically investigating pathology (51.7%).

3.2 Treatment and management

No pharmacological or non-pharmacological treatment or management strategy has emerged as the favoured method among researchers or clinicians (Chandon et al, 2023; Chee et al, 2023; Fawzy et al, 2023; Marshall-Andon et al, 2023; Hallek et al, 2023).

In their review of 37 practice guidelines, Marshall-Andon et al (2023) found some consensus around education, shared decision making and personalised care for patients with long COVID, including tailoring the modality and setting of treatment or management to the patient's situation.

A recent review of 12 studies found physical therapy (especially, moderate exercise and interventions related to respiratory muscles) was associated with a significant improvement in fatigue, dyspnea and quality of life in patients with long COVID (Sánchez-García et al, 2023).

4. What is long COVID-19?

There is no internationally agreed definition of long COVID-19, however signs and symptoms beyond 4 weeks is considered ongoing COVID-19 (Molhave et al, 2022). The World Health Organisation (WHO) recognised the existence of continuing symptoms and effects of COVID-19 after the initial infection period in September 2020, stating long COVID-19 is:

an illness that occurs in people who have a probable or confirmed SARS-CoV-2 infection; usually within 3 months of onset of the infection, with symptoms and effects that last for at least 3 months. These symptoms and effects cannot be explained by an alternative diagnosis (WHO, 2021a).

In the United States, Centers for Disease Control and Prevention (CDC) advise that post-COVID-19 conditions can be identified at least 4 weeks after the initial COVID-19 diagnosis (CDC, 2022). In the United Kingdom, the National Institute for Health Care and Excellence (NICE) proposes that 'acute COVID-19' is the period up to 4 weeks post infection diagnosis, 'COVID in progress' is the experience of signs and symptoms between 4-12 weeks post infection diagnosis, and post-COVID-19 syndrome are signs and symptoms that continue for more than 12 weeks after the initial infection and are not attributable to another diagnosis (NICE, 2022). A formal definition of long COVID-19 by the Australian Health Department could not be found.

The CDC suggests long COVID-19 is more common for people who had severe symptoms of COVID-19 during their initial infection (CDC, 2022), however the WHO advise there is no clear evidence of a relationship between initial severity of COVID-19 infection and the likelihood of developing long COVID-19 (WHO, 2021b). What is known, is people can suffer long COVID-19 regardless of whether they had mild or severe symptoms with the initial COVID-19 infection (Berger et al, 2021).

While research is continuing to try to identify those most at risk of long COVID-19, some risk factors may include (Berger et al, 2021; CDC, 2022):

- people who were in intensive care units during their initial COVID-19 infection
- people who have underlying health conditions prior to the infection including diabetes, heart failure, asthma, hypertension and epilepsy

- demographics with health inequities such as ethnic minority groups and people with disability
- people unvaccinated against COVID-19
- adults appear more vulnerable to long COVID-19 than children.

5. What is the prevalence of long COVID-19?

Despite the body of research emerging around long COVID-19, the prevalence is difficult to determine due to differences in study methodology, different outcome definitions and time frames, and different symptoms and levels of severity surveyed (Emecen et al, 2022). Additionally, prevalence is influenced by social determinants, such as poverty, racism and disability (Berger et al, 2021), therefore there is considerable inconsistency in the literature depending on participant demographics.

In one United Kingdom study, 18.2% of participants reported at least one symptom 6 months post initial COVID-19 infection (Emecen et al, 2022). This is in line with the WHO (2021b) estimate that around 10-20% of COVID-19 survivors experience mid- and long-term effects after the acute phase of illness has passed. However, a systematic review cited by Maglietta et al (2022), involving 57 studies and over 250,000 survivors of COVID-19, demonstrated more than half of these survivors experienced post-acute symptoms at 6 months post initial infection. I was unable to source clear data for the persistence of symptoms beyond this time point.

Further complicating prevalence data is the influence of different variants on recovery from COVID-19. Research from the United Kingdom comparing the Delta and Omicron variants suggests an increased risk of ongoing symptoms at 4 weeks post infection with Delta infection (10.8% participants) than an Omicron infection (4.5% participants) (Antonelli et al, 2022).

6. What are the most common symptoms of long COVID-19?

It has been noted that symptoms of long COVID-19 are similar to other post-viral fatigue syndromes such as myalgic encephalitis/chronic fatigue syndrome (Boaventrua et al, 2022; CDC, 2022), although the multisystem complications from long COVID-19 maybe broader and more intense than other post-viral syndromes (Boaventrua et al, 2022).

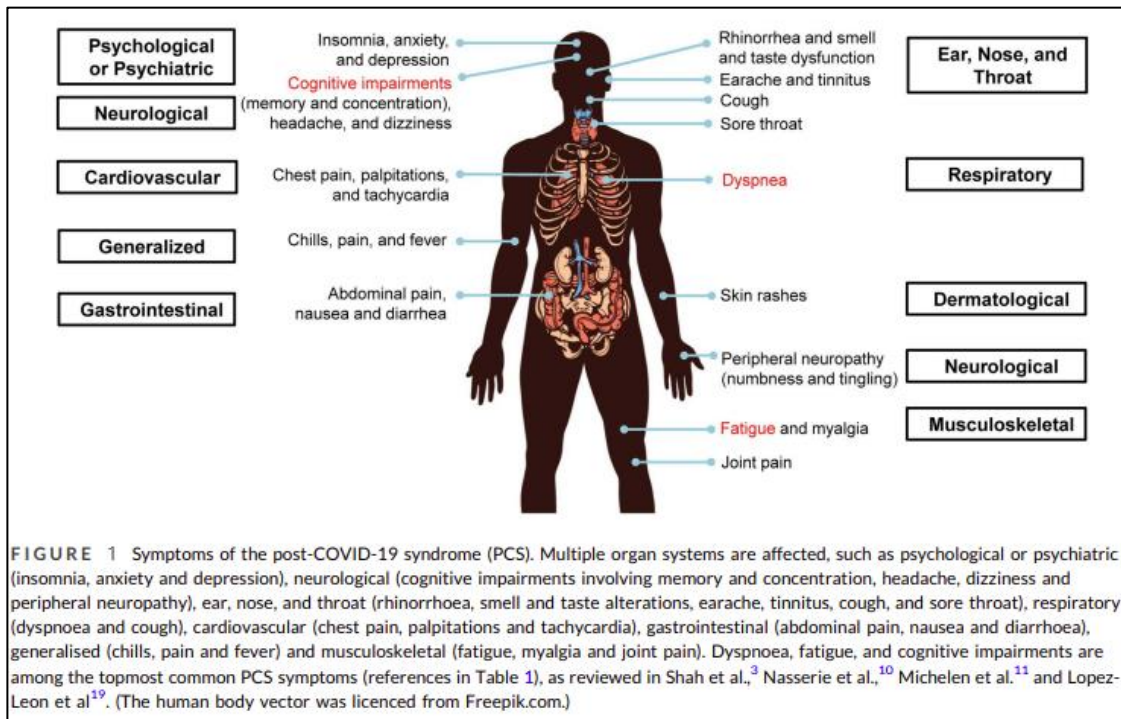
The most common symptoms of long COVID-19 reported in the literature include (Berger et al, 2021; CDC, 2022; Maglietta et al, 2022; Scordo et al, 2021; WHO, 2021b):

- Physical and mental fatigue that interferes with daily life
- Shortness of breath
- Memory and concentration problems ('brain fog')

- Headache
- Mental health impairment (e.g., anxiety, depression, mood swings)
- Abdominal pains
- Muscle weakness and joint pain
- Palpitations and chest pain
- Dizziness
- Gastrointestinal issues (e.g., diarrhea, stomach pain)
- Sleep problems
- Change in smell and/or taste
- Pins and needles feeling
- Skin lesions similar to chilblains

Long COVID-19 may affect people differently as different organ systems become involved, and an individual’s symptoms may fluctuate or relapse over time (Berger et al, 2021; WHO, 2021b).

Figure 1 below, an excerpt from research by Yong and Liu (2021), highlights the different organ systems that may be affected by long COVID-19:



7. What is the current management for long COVID-19?

There is no documented specific medication to treat long COVID-19 (Molhave et al, 2022) and much of the current literature describes medical management of long COVID-19. Effective management of long COVID-19 involves symptom relief and rehabilitation (Molhave et al, 2022; WHO, 2021b), and involvement of a multidisciplinary team for patients with multiple organ systems impacted may be required (Berger et al, 2021; Kokhan et al, 2022; Molhave et al, 2022; Scordo et al, 2021; Sundar Srethstha & Love, 2021).

Particular rehabilitation programs mentioned in the literature include physical rehabilitation to improve respiratory and cardiovascular function, which is best performed within 2 months of initial diagnosis of COVID-19 (Kokhan et al, 2022; Molhave et al, 2022). Also, cognitive therapy has been shown to be effective for patients with mental fatigue (Molhave et al, 2022).

As the existence of long COVID-19 is in its infancy, there is speculation, for example by Dr Anthony Fauci of the National Institute of Allergy and Infectious Diseases, that long COVID-19 may have a similar aetiology to other post-infectious conditions such as myalgic encephalomyelitis/chronic fatigue syndrome (Scordo et al, 2021; Sundar Shrestha & Love, 2021). Therefore, exploring the aetiology and management of myalgic encephalomyelitis/chronic fatigue syndrome may give some insight into long COVID-19 syndrome (Scordo et al, 2021). Current literature indicates cognitive behaviour therapy and graded exercise therapy are important in the management of myalgic encephalitis/chronic fatigue syndrome (Sharpe et al, 2021; Snook & Slowman, 2019). Cognitive behaviour therapy focusses on challenging fatigue related cognitions and planning social and occupational rehabilitation, while graded exercise therapy involves determining baseline ability and slowly increasing intensity and duration without exacerbating symptoms (Sharpe et al, 2021; Snook & Slowman, 2019).

Another significant medical condition that may be relevant to the understanding and management of long COVID-19 is post-intensive care syndrome (PICS) - the presence of health problems common to patients who have recovered from critical illness in intensive care units (Parker et al, 2021). Similar to long COVID-19, cognitive impairment ('brain fog'), extreme fatigue, muscle weakness, and shortness of breath are among the most common symptoms of PICS (Parker et al, 2021). Parker et al (2021) suggests applying the PICS post-acute phase framework to long COVID-19 patients could involve:

- Occupational therapy – provide energy conservation and work simplification strategies; address impact of cognitive impairments on work performance; monitor for residual impairment in gross and fine motor function, sensory integration or pain related to positioning (such as prolonged proning in ICU); strengthening and fine motor training using writing aids or assistive technology.
- Physical therapy – ICU acquired weakness can persist for years after the acute illness has resolved, therefore physical therapy can be beneficial to improve strength and physical function.

- Speech therapy – intubation injuries can extend from the voice and airway to dysphagia; dysphagia can persist for months, but most patients will recover with support.
- Social workers – many patients report persistent symptoms that impact their ability to return to work. Social workers can connect patients with job resources, conduct screening for mental health impairments, and provide psychoeducation and referrals.
- Primary health care – primary health practitioners should provide aftercare and care coordination for long COVID-19 patients.

8. Permanence of long COVID-19

For most people, the natural history of long COVID-19 appears to be a gradual improvement of symptoms over many months (Berger et al, 2021; CDC, 2022; WHO, 2021b). However, the long-term prognosis for some people is unknown, as it is not known whether damaged organ systems will fully recover or if there will be lasting effects (Berger et al, 2021; Scordo et al, 2021). Unfortunately, it appears some people with long COVID-19 will continue to have long-term organ compromise, long-term complex immune and homeostatic dysfunction with disabling symptoms and impaired functional levels (Sundar Srethstha & Love, 2021).

In July 2021, long COVID-19 became a recognised disability under the Americans with Disabilities Act, Section 504 and Section 1557 (CDC, 2022; United States Department of Health and Human Services, 2021). In the United States, as long COVID-19 causes physical and/or mental impairment, it can be considered a disability if it substantially limits one or more major life activities such as caring for oneself, performing manual tasks, eating, walking or concentrating. Table 1 summarises further information from the [United States Department of Health and Human Services](#) (2021) regarding long COVID-19 as a disability.

However, whether long COVID-19 can be considered a permanent disability requires an individualised assessment to determine if the long COVID-19 symptoms and effects substantially impact the individual’s functional capacity (United States Department of Health and Human Services, 2021).

Table 1

Information regarding long COVID-19 as a disability (United States Department of Health and Human Services, 2021)

ADA, Section 504, and Section 1557 if it substantially limits one or more major life activities. These laws and their related rules define a person with a disability as an individual with a physical or mental impairment that substantially limits one or more of the major life activities of such individual (“actual disability”); a person with a record of such an impairment (“record of”); or a person who is regarded as having such an impairment (“regarded as”). A person

with long COVID has a disability if the person's condition or any of its symptoms is a "physical or mental" impairment that "substantially limits" one or more major life activities.

a. Long COVID is a physical or mental impairment.

A physical impairment includes any physiological disorder or condition affecting one or more body systems, including, among others, the neurological, respiratory, cardiovascular, and circulatory systems. A mental impairment includes any mental or psychological disorder, such as an emotional or mental illness.

Long COVID is a physiological condition affecting one or more body systems. For example, some people with long COVID experience:

- Lung damage
- Heart damage, including inflammation of the heart muscle
- Kidney damage
- Neurological damage
- Damage to the circulatory system resulting in poor blood flow
- Lingering emotional illness and other mental health conditions

Accordingly, long COVID is a physical or mental impairment under the ADA, Section 504, and Section 1557.

b. Long COVID can substantially limit one or more major life activities

"Major life activities" include a wide range of activities, such as caring for oneself, performing manual tasks, seeing, hearing, eating, sleeping, walking, standing, sitting, reaching, lifting, bending, speaking, breathing, learning, reading, concentrating, thinking, writing, communicating, interacting with others, and working. The term also includes the operation of a major bodily function, such as the functions of the immune system, cardiovascular system, neurological system, circulatory system, or the operation of an organ.

The term "substantially limits" is construed broadly under these laws and should not demand extensive analysis. The impairment does not need to prevent or significantly restrict an individual from performing a major life activity, and the limitations do not need to be severe, permanent, or long-term. Whether an individual with long COVID is substantially limited in a major bodily function or other major life activity is determined without the benefit of any medication, treatment, or other measures used by the individual to lessen or compensate for symptoms. Even if the impairment comes and goes, it is considered a disability if it would substantially limit a major life activity when the impairment is active.

Long COVID can substantially limit a major life activity. The situations in which an individual with long COVID might be substantially limited in a major life activity are diverse. Among possible examples, some include:

- A person with long COVID who has lung damage that causes shortness of breath, fatigue, and related effects is substantially limited in respiratory function, among other major life activities
- A person with long COVID who has symptoms of intestinal pain, vomiting, and nausea that have lingered for months is substantially limited in gastrointestinal function, among other major life activities
- A person with long COVID who experiences memory lapses and “brain fog” is substantially limited in brain function, concentrating, and/or thinking.

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10. Version control

Version	Amended by	Brief Description of Change	Status	Date
1.0	SJP131	Document creation	Cleared	15/07/22
2.0	AHR908	Review	Cleared	20/09/23