"Long COVID"

Living Evidence Summary

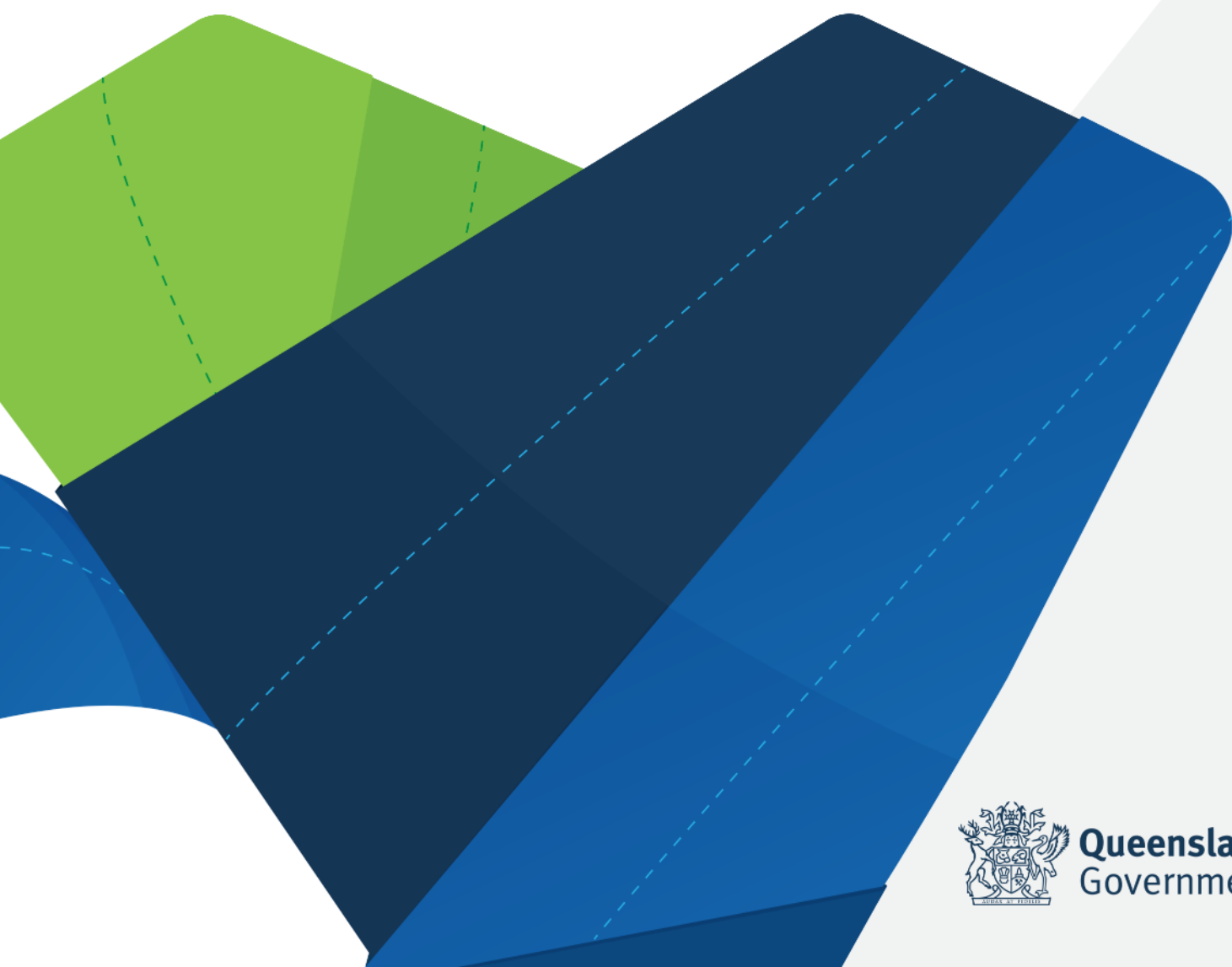Queensland Government

Living Evidence Summary

Quick Summary of Management Tools

1. Self-Management Tools:

    a. Qld Health's advice on [recovering from COVID-19 and long COVID (PDF)](#)

    b. Qld Health's [steps to recovery after COVID-19 (PDF)](#), including a link to a daily symptom diary

    c. Qld Health's guidance on [breathing exercises and physical activity (PDF)](#) to aid recovery

    d. [WHO](#): Support for rehabilitation: self-management after COVIC-19-related illness (dpf)

    e. RACGP's [Patient Resource: Managing Post-COVID-19 Symptoms (PDF)](#).

    f. The UK RCOT's [Recovering from COVID-19: Post viral-fatigue and conserving energy - RCOT](#) (online).

    g. Long COVID Physio's [online portal](#) (navigation by symptom).

    h. NHS's [Long COVID Rehabilitation Booklet (PDF)](#).

    i. NHS's "Your COVID Recovery" page with good, easily navigable self management (click links at "Your Road to Recovery" tile): [I have or may have long COVID | Your COVID Recovery](#)

2. GP first review: [Post COVID Functional Scale](#). Patients self-identify the levels of functional limitations. If PCFS was used as an online screening tool:

    a. Grade 0 – no functional limitations: No further action (ie does not have Long COVID);

    b. Grade 1 - negligible functional limitations: optional self-management (see 3);

    c. Grade 2 – slight functional limitations: encourage self-management (see 3);

    d. Grade 3 – moderate functional limitations: GP review (see 2);

    e. Grade 4 – severe functional limitations (unable to self care): urgent GP review (see 2).

3. GP review: [C19-YRS (Yorkshire Screening Tool)](#). identify specific symptom domains for either self-management (see 3), further clinical investigation, or referral for specialist support.

4. GP Management tools:

    a. NSW ACI's [model of care](#) for the management of Long COVID patients.

    b. NSW ACI's [Clinical practice guide for assessment and management of adults with post-acute sequelae of COVID-19](#) (as management tool). The ACI has also published a [model of care to guide acute care clinicians in the post-acute phase](#) which is valuable prior to the post-COVID condition phase.

    c. RACGP's [Caring for patients with post-COVID-19 conditions](#)

Contents

Nomenclature

There are a number of terms used to describe the protracted resolution of COVID-19 symptoms. They include "post acute sequelae of COVID-19" (PASC), "post COVID-19 condition" (PCC), "post-COVID-19 syndrome" (PCS) and "Long COVID". This latter term is generally used in the media and by the layperson, and it is used below.

Definition

Definitions of Long COVID vary across studies and agencies

When reviewing any Long COVID study or report, it is important to check the definition used. These variations include:

- The time period post-infection: some may consider ongoing health issues 4 weeks after COVID-19 as "long COVID", and others may use 12 weeks after diagnosis.
- The number of symptoms. Some will consider one ongoing symptom to be long COVID, others will require multiple symptoms to meet the definition.
- The functional impact. Some do not consider whether symptoms have an impact on daily function. As a result, a mild lingering occasional dry cough risks being considered of equal impact with fatigue severe enough to inhibit a return to work.
- The patient profile. Some studies will include post-intensive care patients, with a risk that these patients have a "post intensive care syndrome".

Note these varying definitions will affect estimations of prevalence.

Examples of the varying definitions to Long COVID

a) WHO, October 2021

Post COVID-19 condition occurs in individuals with a history of probable or confirmed SARS CoV-2 infection, usually 3 months from the onset of COVID-19 with symptoms, and that last for at least 2 months, and cannot be explained by an alternative diagnosis.

Common symptoms include fatigue, shortness of breath, cognitive dysfunction but also others and generally have an impact on everyday functioning. Symptoms may be new onset following initial recovery from an acute COVID-19 episode or persist from the initial illness. Symptoms may also fluctuate or relapse over time. See WHO.

b) National Institute for Health and Care Excellence (NICE) (UK)

The NICE rapid guideline definition is – after the WHO – frequently cited and uses the following clinical case definitions to identify and diagnose the long-term effects of COVID-19:

- **Acute COVID-19**

  Signs and symptoms of COVID 19 for **up to 4 weeks.**
- **Ongoing symptomatic COVID-19**

Signs and symptoms of COVID 19 from **4 weeks up to 12 weeks.**

- **Post-COVID-19 syndrome**

  Signs and symptoms that develop during or after an infection consistent with COVID 19, continue **for more than 12 weeks and are not explained by an alternative diagnosis.** It usually presents with clusters of symptoms, often overlapping, which can fluctuate and change over time and can affect any system in the body. Post COVID 19 syndrome may be considered before 12 weeks while the possibility of an alternative underlying disease is also being assessed.

- In addition to the clinical case definitions, the term 'Long COVID' is commonly used to describe signs and symptoms that continue or develop after acute COVID 19. It includes both ongoing symptomatic COVID 19 (from 4 to 12 weeks) and post COVID 19 syndrome (12 weeks or more).

c)   **Office of National Statistics (UK)**

Symptoms continuing **for more than four weeks** (emphasis added) after the first suspected coronavirus (COVID-19) infection that were not explained by something else. See ONS summary.

d)   **CDC, 5 May 2022**

Post-COVID conditions are a wide range of new, returning, or ongoing health problems that people experience after first being infected with the virus that causes COVID-19. Most people with COVID-19 get better within a few days to a few weeks after infection, **so at least four weeks after infection is the start of when post-COVID conditions could first be identified** (emphasis added). Anyone who was infected can experience post-COVID conditions. Most people with post-COVID conditions experienced symptoms days after their SARS CoV-2 infection when they knew they had COVID-19, but some people with post-COVID conditions did not notice when they first had an infection. See CDC Summary.

Definition and diagnosis: Queensland's recommendations

In Queensland Health's response to the Australian Government's parliamentary inquiry into long COVID and repeated infections, the below was recommended:

Three distinct post-COVID patient cohorts should be recognised to support appropriate identification and management by clinicians:

1. Patients who have experienced critical illness or a prolonged period of moderate to severe disease with resulting deconditioning, respiratory, cardiac and cognitive complications. For example, those with Intensive Care Unit (ICU) related complications and Post Intensive Care Syndrome (PICS).

2. Patients with pre-existing chronic medical conditions or disability that has been exacerbated by their COVID illness and may require significant intervention to regain baseline function.

3. Patients experiencing a longer recovery from COVID-19. **This is the patient cohort that should be defined as experiencing Long COVID.**

Australia should align to the WHO definition of post-COVID condition (long COVID) where symptoms must persist 12 weeks after infection, but with two exceptions:

1. Do not include "new symptoms" as a potential indicator of long COVID, and instead recommend patients test for a new COVID or other viral infection in accordance with the current health guidelines.

2. The patient's persisting symptoms must impact on their ability to perform at their pre-COVID level of everyday activities and functions.

Diagnosis

There are no definitive tests for Long COVID. It has been described as a "diagnosis of exclusion" requiring the exclusion of other potential explanations. The US Department of Health and Human Services noted in August 2022 "no laboratory test can distinguish it from other causes". To complicate diagnosis, it has been noted that "*commonly reported post-acute COVID-19 symptoms are not specific to COVID-19 and are commonly reported regardless of infection status, for a variety of reasons*". Coupled with the lack of a definitive diagnosis, this means there is a higher risk of diagnosing Long COVID where other factors may offer an equally justifiable explanation (eg poor post-pandemic mental health, deconditioning due to inactivity, temporal associations like age-related hair loss).

Why does Long COVID occur?

The mechanisms that lead to Long COVID are still poorly understood, and this is also the case for many post-viral syndromes. A good example of the challenges of post-acute infection syndromes is here.

There remains no uniform biomarker for those experiencing Long COVID. Numerous studies suggest a biological basis, but none have yet been shown to be consistent across the affected population. Many hypotheses on the cause of Long COVID have been proposed. They include:

- viral persistence
- unrepaired tissue damage
- persistent immune activation
- autoimmunity
- impaired oxygen delivery due to micro-clotting
- disruption of cellular energy metabolism
- alterations in gut microbiome
- microvascular dysregulation
- vasculo-proliferative processes initiated by prior hypoxia

This comprehensive review found Long COVID was likely to result from organ damage and potentially autonomic nervous system damage.

This [editorial in 2023](#) has suggested further work is needed to understand the psychological mechanisms involved in Long COVID.

Incidence and Prevalence

[NSW Health's submission](#) (#272) to the parliamentary inquiry into long COVID and repeated infections cited [this paper (in its supplementary material)](#) and said

> "*recent Victorian estimates for a highly vaccinated population during the Omicron wave suggested 2% of hospitalised and 0.09% of non-hospitalised adults develop long COVID*".

Ascertaining incidence and prevalence is a major challenge

There are numerous confounders that make global and local estimates unreliable. When reviewing an estimate of prevalence, it is essential to consider the below:

- The definition of Long COVID (see box under "Definitions", above);
- The presence of a control or comparator group. It is essential to have a comparison because many symptoms occur in the virus-free population as well as after other illnesses;
- The time that the study occurred, and the different variants at that time;
- The population's COVID experience or naivity (eg Italy or US with significant exposure to multiple variants versus Australia with primarily exposure to omicron).
- The population's vaccination status at that time, including the potential that the study populations were non-vaccinated, partially-vaccinated, and fully vaccinated but with waning immunity;
- The methods used in the study, including self-reporting of symptoms and confirmation of COVID status (eg PCR vs self reporting).

Given the above, very few studies describing prevalence are relevant to an Australian context. The Australian Institute of Health and Welfare has produced a thorough [literature review about long COVID in Australia](#). Another useful summary of the challenges in estimating prevalence is [here](#).

The [UK Office of National Statistics](#) (ONS) noted on 1 September 2022 that it was changing its data collection methodology for long COVID, and as a result its data release was not comparable with previous data releases. The new method involves "remote collection" via telephone or online, whereas previously data was collected face to face. The ONS acknowledges that this new methodology will result in changes to the estimates. Using the new, remote method, the ONS estimates "the unadjusted odds of self-reporting long COVID **were 32% higher for those responding remotely** (online or by telephone) than for those who responded through face-to-face interviews with study workers". With adjustment (for socio-demographic factors relating to the likelihood of responding the new method, and likelihood of experiencing long COVID symptoms), this became a slightly smaller 30%.

As a result, prevalence estimates appear linked with study rigour. This meta-analysis found higher study quality was associated with lower prevalence. Where there are controls, this 2022 Norwegian study – conducted from mid-2020 to mid-2021 – compared post-COVID complaints at 5-6 months after infection between people testing positive and negative to COVID-19, as well as vaccinated and non-vaccinated people. The differences between ongoing complaints amongst COVID-positive people at 5-6 months was small. This negligible difference is similar to a large retrospective UK study from August 2022 of **non-Hospitalised** people that found, after at least 12 weeks, 5.4% of infected people and 4.3% of controls reported at least one long COVID symptom.

In children, there are two noteworthy studies with PCR-negative control groups that suggest the burden of paediatric long COVID is low. This study found an association for long COVID with those who were in intensive care, with complex conditions or under 5 – but not otherwise. This study surveyed families of children who tested positive and negative to COVID-19 via PCR. It showed 0.8% COVID positive children experienced Long COVID symptoms, while COVID negative children reported lingering more lingering symptoms not typically associated with Long COVID (eg concentration difficulties, headaches, muscle and joint pain etc).

In June 2022, the Lancet found a reduction in the odds of developing Long COVID after Omicron infection versus the Delta variant of 0.24 to 0.5 depending on age and time since vaccination. In August 2022, this Israeli study found that individuals who had received two doses of Pfizer vaccine "reported no more of these [long COVID] symptoms than individuals never reporting infection". As noted earlier, it also said "commonly reported post-acute COVID-19 symptoms are not specific to COVID-19 and are commonly reported regardless of infection status, for a variety of reasons".

The WHO notes "current research shows that approximately 10%-20% of COVID-19 patients go on to develop prolonged symptoms that may be post COVID-19 condition". This may be an attempt at average global prevalence and unlikely to be applicable to Queensland's context. Another global analysis estimated prevalence after 3 months to be 6.2% which decreased to 0.9% after 12 months.

Risk factors

Evidence on risk factors is highly varied, and this is likely to be attributable to the generally poor quality of Long COVID research. The AIHW's literature review noted growing evidence supporting the below as risk factors:

- severity of acute disease;
- age, most common in middle-aged adults;
- female sex; and
- comorbidities, including obesity.

This is supported by a large systematic review released in March 2023, which added smoking as an additional risk factor.

The AIHW's literature review noted that

"many of the studies identified to date investigating determinants of long COVID use populations that come into contact with health services, and therefore capture more severe cases. It is also unclear whether different risk factors are associated with different sets of symptoms. For example, data from the US Department of Veterans Affairs database found sleep disorders, headache, mood disorders and smell problems were more common in young adults; chest pain arrhythmia, headache, smell problems, hair loss, skin rash were more common in females".

A review of UK health data sets suggested risk factors included increasing age, female sex, white ethnicity, poor pre-pandemic general and mental health, overweight/obesity, and asthma were associated with prolonged symptoms, but findings for other factors, such as cardio-metabolic parameters, were inconclusive. Note this involved self-reported Long COVID.

The RECoVERED Study, which tracks COVID-19 cases in Amsterdam, Netherlands, diagnosed via the local public health service and from hospitals, found that female sex and obesity were the most important determinants of speed of recovery from COVID-19 over 12 months.

A short summary of literature relating to various risk factors is below:

- Age: Several studies (BMJ, ONS, The Lancet) show the age group most greatly affected by Long COVID is approx 35-49yrs, followed by 50-69yrs.

- Gender: Women are more likely to experience Long COVID (eg ONS), with data suggesting around 60% of Long COVID cases are women (eg The Lancet, Nature Medicine, this New York Times report), with one study as high as 73% female.

- Pre-existing conditions: the presence of certain pre-existing conditions is documented in many quarters (eg CDC) as a risk factor.
  - Poor pre-COVID mental health is correlated with Long COVID. This large, prospective US study in September 2022 found a 50% higher risk for those with two or more pre-existing mental health issues. Other evidence includes this large UK study and this Japanese study. This (quite small) French study showed Long COVID complaints were associated with psychiatric disorders (including new onset) and suicide risk, and recommends screening for these at intake.
  - Note also that this news report from September 2022 shows significant mental health burdens in the US with recommendations to screen the population for anxiety.
  - Asthma has been found to be a risk factor in Nature Medicine.
  - It is perhaps most noteworthy that some studies (for example the BMJ, The Lancet) show limited or no association between many pre-existing co-morbidities and Long COVID. The former study cited a lack of evidence for pre-existing conditions like obesity, diabetes, and cardiovascular disease.

- Ethnicity: This is somewhat contested, with several studies showing a higher risk among white ethnicity. This is at odds with reports based on expectations that non-white ethnicities will have a higher burden. Several studies consider it more likely that non-white ethnicities will be adversely affected due to the social determinants of health. However, such generalised assumptions must be challenged given the high socio-economic situations for many migrant groups. For example:

- Controlled European studies found a higher risk among individuals of white ethnicity, which was also notably at odds with this group's lower morbidity generally. This similar 2022 study found the same for white ethnicity, although findings were not significantly different across groups.
  - The CDC notes health inequities may put racial or minority groups "at greater risk", but note this is an assumption.
- The number of initial COVID-19 symptoms during acute infection: This paper found the number of initial symptoms to be more closely correlated with Long COVID than the severity COVID-19 disease (study cohort was hospitalised patients).
- Severity of COVID-19 disease:
  - Pro: there is some information from the CDC and BMJ, which find that severe infections may take longer to resolve and develop into Long COVID.
  - Con: the WHO says "there does not appear to be a relationship between the initial severity of COVID-19 infection and the likelihood of developing post COVID-19 condition".
- Viral load early in the acute infection: Supported by evidence published in Cell early in 2022.
- Presence of autoantibodies: Also noted as a risk in the above paper.
- Reactivation of the Epstein Barr virus: Also noted as a risk in the above paper and here.
- According to the ACI's Living Evidence Summary for Long COVID, there are links with the social determinants of health (also here), as well as people working in social care, teaching or health care.

Aboriginal and Torres Strait Islander People

It is important that research objectively assesses whether First Nations groups (or any other ethnicity) is at greater risk. Many studies assume this fact without evidence, citing assumptions like the influence of the social determinants or perceived lack of engagement with the health system (which itself needs to be objectively tested).

Reinfection

Emerging evidence in 2023 suggests the risks of Long COVID following reinfection are significantly reduced across all symptom domains at both 28 days and 90 days after reinfection.

Notwithstanding this, it would be prudent to see further evidence on reinfection and Long COVID.

Protection and Prevention

General consensus remains that the "best way of protecting people from long COVID is to protect against COVID-19 itself". This includes adopting healthy behaviours and being up-to-date with vaccination. A summary of potential protective factors is below:

- A prospective cohort study released in February 2023 noted "pre-infection healthy lifestyle was associated with a substantially lower risk of" Long COVID in women. The study comprised solely of female healthcare workers aged 55-75yo.

- Vaccination: a prospective cohort study published in Nature in 2023 found that unvaccinated people were seven times more likely to develop long COVID than vaccinated people. This 2023 systematic review found six of eight studies showed two vaccination doses before infection reduced rates of long COVID, and three of five studies showed significant reductions in patients with long COVID where vaccination was given after infection. However, the authors noted the heterogeneity of these studies as well as many inherent biases resulted in evidence "of low certainty".

- In August 2022, this Israeli study found that individuals who had received two doses of Pfizer vaccine "*reported no more of these [long COVID] symptoms than individuals never reporting infection. Commonly reported post-acute COVID-19 symptoms are not specific to COVID-19 and are commonly reported regardless of infection status, for a variety of reason*s".

- A paper here from late 2022 identified preliminary evidence that two doses were more effective than one, and all studies in this review found that vaccines reduced the risk of developing Long COVID in those with mild/moderate COVID-19. However, this study flagged the duration since vaccination may be relevant (most studies in this review related to infection up to a month after vaccination). Also noteworthy were the mRNA vaccines (eg Pfizer, Moderna) showing greater efficacy than adenoviral vaccines.

- Two recent systematic reviews here and here supported these claims that vaccination reduced Long COVID risk, as did a scoping review here.

- Antivirals: there is some emerging evidence on the potential benefit of antivirals in reducing the impact of Long COVID. Treatment with nirmatrelvir (paxlovid) within five days of positive SARS-COV-2 test in people who had a least one risk factor for progressing to severe COVID-19 illness has been associated with reduced risk of long COVID regardless of vaccination status and history of prior infection.

- One preliminary summary here suggests antivirals may confer benefit. An article in Nature suggested antivirals may prevent Long COVID because they could address lingering SARS-CoV-2 reservoirs in the body.

Vaccination as treatment for long COVID

There is conjecture about vaccination after COVID infection to address persistent symptoms. There are a couple of points to note here:

- There is good evidence that being up-to-date with vaccinations reduces the likelihood and severity of long COVID. Obviously anyone who has Long COVID symptoms but is not

up-to-date with vaccination should ensure they update their vaccination status in accordance with ATAGI advice.

- Some suggest that vaccination reduces Long COVID symptoms because it helps clear viral reservoirs.
- Several studies have looked at "vaccination as a treatment for long COVID" – that is, the effect of vaccination after COVID infection on Long COVID symptoms.
- This systematic review found three of five studies showed significant reductions in patients with Long COVID where vaccination was given after infection.
- This systematic review found seven of eleven studies showed a benefit arising if vaccination occurred after long COVID (four of eleven found small changes or even worsening – one suggested this worsening may be due to those already experiencing an excessive immune response; another disputing this, so a potential conclusion relating to the need to consider the host immune response).
- This systematic review found vaccination after COVID-19 was not associated with symptomatic changes to Long COVID.
- This BMJ editorial provides a good summary of whether vaccines can be a potential treatment for long COVID. It notes that benefits are possible ("benefits are likely to outweigh any harms"), but more evidence is needed.

Symptoms

There are now over 200 symptoms associated with Long COVID in the literature. The most common scenario is non-specific multisystem post-viral symptoms. The RACGP's advice to GPs describes the following:

- fatigue
- dyspnoea
- joint pain
- chest pain
- cough
- change in sense of smell or taste
- cognitive disturbances
- hoarse voice

Less common symptoms include:

- insomnia,
- low-grade fevers,
- headaches,
- neurocognitive difficulties,
- myalgia and weakness,
- gastrointestinal symptoms,

- rash,
- depression.

According to the ONS, fatigue continued to be the most common symptom reported as part of individuals' experience of long COVID (51% of those with self-reported long COVID), followed by shortness of breath (33%), loss of sense of smell (26%), and difficulty concentrating (23%).

Urgent need for better research on symptoms

It has been reported that Long COVID can affect numerous bodily systems, including the immune, cardiovascular, respiratory, reproductive, gastrointestinal, and neurological/cognitive systems. A widely reported overview of Long COVID's effects on the body is provided here. However, caution should be exercised when reading this review because it cites numerous studies that do not have adequate controls and are often low quality (eg using self-reported conditions). A review of the article in the RACGP's newsletter is here.

> Further research is needed into impacts on the body, and it is essential that these studies use comparator groups like influenza and similar viral illnesses.

One study compared COVID-19's long term sequelae with other common viral respiratory illnesses together with a control group (no record of COVID or other viral illness). This study considered 47 symptoms, including many typical of Long COVID like those listed at the beginning of this section on symptoms.

When comparing COVID-19 with other viral respiratory illnesses, it found people experiencing Long COVID are at higher risk of only seven health symptoms for up to a year following the infection. They are fast-beating heart, hair loss, fatigue, chest pain, shortness of breath, joint pain and obesity.

In contrast, there was a greater risk attributable to the non-COVID cohort in long term neurological symptoms, anxiety and mood, cognitive impairment, pulmonary embolism, pneumonia, stroke, heart failure, muscle weakness, and immune system effects. A media review of the article is here.

> Neither study covered the "post-Omicron" period (ie including long COVID attributable to Omicron).

Functional Impacts

Investigations into Long COVID infrequently consider the functional impact and rarely compare pre-COVID functional levels with post-COVID levels. Evidence of functional impact should also be compared with functional impact arising from other viral illnesses.

The risk of not considering functional impact is that mild ongoing symptoms (for example, a lingering night-time dry cough) may be conflated with impacts severe enough to inhibit a return to pre-COVID levels of work / routine.

Labour Market Impact

On 5 December 2022, the UK's Office of National Statistics noted "Long COVID is unlikely to be the sole driver of increasing levels of inactivity in the UK labour market during the COVID-19 pandemic. Following a period of stable inactivity rates, the number of working-age adults who are inactive mainly because of ill-health has been rising since 2019, as reported in our article, half a million more people are out of the labour force because of long-term sickness, published 10 November 2022. This was before the arrival of COVID-19 in the UK.

Furthermore, the increasing levels of inactivity in the UK during the pandemic have not been seen in many other Organisation for Economic Co-operation and Development (OECD) countries, as shown on the OECD's labour market statistics webpage, despite long COVID having a global impact as shown in analysis published in the Journal of Infectious Diseases. Besides long COVID, indirect health effects of the pandemic and extended NHS waiting lists may be contributing to decreasing levels of labour market participation related to ill-health, but further research is required to establish this".

Australian estimates of labour market impact have been based on models from overseas (for example, this model from Deakin University), where earlier variants affected unvaccinated / partially vaccinated populations. This is also likely to explain the Commonwealth Department of Treasury's unreleased (but widely reported) modelling in August 2022 claiming 31,000 Australians were off work each day due to Long COVID.

Identification (Models of Care)

The NSW ACI Living Evidence website contains an excellent table describing time period, symptoms, assessment and management steps. The implication from this table is that GPs should consider referral to specialised multidisciplinary outpatient clinic for persistent symptoms lasting beyond 12 weeks.

There are two tools valuable in the identification of Long COVID conditions. They are:

1. The Post COVID Functional Scale (PCFS). This is a short, validated self assessment enabling people to identify the degree of impact on a short scale. The PCFS can also be used to ascertain if respondents had pre-COVID functional impacts. For those who have a moderate or greater impact, many services then direct people to a more

comprehensive self-assessment via the validated Post-Covid-19 Yorkshire Rehabilitation Screen.

2. The Post-Covid-19 Yorkshire Rehabilitation Screen (C19-YRS). This validated tool enables the identification of the different domains of impact, with the respondent rating the degree of impact on a 0-10 scale (or 0-3 in the modified C19-YRSm version).

Once the impacted domains are ascertained and rated, the user can be triaged into self-management or more comprehensive support where required.

Given the lack of a biomarker or unique identifier, there remains conjecture around treatments. A summary from 1 September 2022 of the status of treatment options is here.

Management and Rehabilitation (Models of Care)

As noted above, the Long COVID experience can involve impacts across a range of domains. For milder cases, there are a range of valuable tools to assist patients with self-management of Long COVID. They include:

- Queensland Health's advice on recovering from COVID-19 and long COVID (PDF)

- Queensland Health's steps to recovery after COVID-19 (PDF), including a link to a daily symptom diary

- Queensland Health's guidance on breathing exercises and physical activity (PDF) to aid recovery

- NSW ACI's model of care for the management of Long COVID patients.

- The NSW ACI's Clinical practice guide for assessment and management of adults with post-acute sequelae of COVID-19 (as management tool). The ACI has also published a model of care to guide acute care clinicians in the post-acute phase which is valuable prior to the post-COVID condition phase.

- The RACGP's Caring for Patients with Post-COVID-19 Conditions provides an excellent summary of management options and pathways (see p8-9, Box 3: Management of Common Symptoms).

- WHO's Support for Rehabilitation: Self Management after COVID-19-related illness. This is used in a number of Australian Long COVID clinics (eg Nepean Hospital, RPA, Tasmania). It is a pdf where consumers take themselves to the relevant sections within the document for rehab programs.

- RACGP's Patient Resource: Managing Post-COVID-19 Symptoms. Its format is also a pdf requiring consumers to find the correct section of a pdf for their rehabilitation.

- The UK RCOT's Recovering from COVID-19: Post viral-fatigue and conserving energy - RCOT. This is specific to fatigue management, and may be increasingly relevant to management of post exertional malaise.

- Long COVID Physio's online portal, with a host of resources across various Long COVID impacts. The portal has tiles that are organised according to rehabilitation domain (eg

breathing, fatigue, post exertional symptom exacerbation, etc). It is a good template for "navigation by symptom". However, while very thorough and comprehensive, the format within each tile is less user friendly.

- NHS's Long COVID Rehabilitation Booklet, used widely in the UK. Like the WHO's guide it is a pdf where consumers self navigate to the relevant sections within the document for rehab programs.
- NHS's "Your COVID Recovery" page with good, easily navigable self management (click links at "Your Road to Recovery" tile): I think I have long COVID | Your COVID Recovery

Management of higher needs patients most frequently involves management by a multidisciplinary team across medicine and allied health. Currently the evidence suggests addressing symptoms in primary care, and if unresolved, onward referral to relevant services based on symptoms.

Recovery from Long COVID

Nearly all patients with Long COVID will fully recover. At the population level, it is very rare for symptoms not to resolve.

However, the duration for recovery remains uncertain in the literature because of the paucity of studies examining the impact of the Omicron variant in vaccinated populations. An Israeli study released in January 2023 covered the period from 1 March 2020 to 1 October 2021 (therefore pre-Omicron and including unvaccinated, partially vaccinated and multiple vaccinated cohorts) and considered non-hospitalised cases of COVID-19. It found that

"most health outcomes arising after a mild disease course remained for several months and returned to normal within the first year.... the disease does not lead to serious or chronic long term morbidity in the vast majority of patients and adds a small continuous burden on healthcare providers".

Further reading

- Queensland Health's website on Long COVID for the public
- Queensland Health's website on Long COVID for clinicians
- NSW ACI's Long COVID Model of Care
- NSW Health Patient Information
- NSW ACI "In Brief": Post-acute sequelae of COVID-19 (long COVID): Post acute sequelae of COVID-19 (long COVID) (nsw.gov.au)
- NSW ACI Living Evidence Summary (PASC/Long COVID): https://aci.health.nsw.gov.au/covid-19/critical-intelligence-unit/post-acute-sequelae
- NHS's "Your COVID Recovery" page with good, easily navigable self management (click links at "Your Road to Recovery" tile): I think I have long COVID | Your COVID Recovery

- NSW ACI's [Clinical practice guide for assessment and management of adults with post-acute sequelae of COVID-19](as management tool)
- Australia's National COVID-19 Clinical Evidence Taskforce's [FAQs for Long COVID](...)
- [Why the hypothesis of psychological mechanisms in long COVID is worth considering (nih.gov)](...) (January 2023)
- [Clinical Trials: Top Priority for Long COVID (medscape.com)](...) (May 2023)
- [Helen Salisbury: Unexplained symptoms aren't always long covid | The BMJ](...) (March 2023)
- [Healthy Lifestyle Linked to Lower Risk of Long COVID (medscape.com)](...) (February 2023)
- [Add This to the List of Long COVID Symptoms: Stigma (medscape.com)](...) (January 2023)
- [Lots of long COVID treatment leads, but few are proven (pnas.org)](...) (September 2022)
- ['Nocebo effect': two-thirds of Covid jab reactions not caused by vaccine, study suggests | Medical research | The Guardian](...) (January 2022)
- [Why Long COVID Worries Me (medscape.com)](...) (April 2021)