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Department of Health and Aged Care

Inquiry into Long COVID and Repeated COVID Infections

Submission from the Department of Health and Aged Care

to the

Standing Committee on Health, Aged Care and Sport

November 2022

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List of acronyms

ABS	Australian Bureau of Statistics
ACCHS	Aboriginal Community Controlled Health Service
AIHW	Australian Institute of Health and Welfare
CALD	Culturally and linguistically diverse
CDM	Chronic disease management
CDNA	Communicable Diseases Network Australia
CET	National COVID-19 Clinical Evidence Taskforce
COVID-19	Coronavirus disease 2019
Department	Australian Government Department of Health and Aged Care
GP	General practitioner
GPRC	General practice respiratory clinic
IHACPA	Independent Hospital and Aged Care Pricing Authority
IVD	In vitro diagnostic
MADIP	Multi-Agency Data Integration Project
MBS	Medicare benefits schedule
MRFF	Medical Research Future Fund
MSAC	Medical Services Advisory Committee
NACCHO	National Aboriginal Community Controlled Health Organisation
NATSIHP Sub-committee	National Aboriginal and Torres Strait Islander Health Protection Sub-committee
NHMRC	National Health and Medical Research Council
NHRA	National Health Reform Agreement
NICE	National Institute of Health and Care Excellence
PBAC	Pharmaceutical Benefits Advisory Committee
PBS	Pharmaceutical Benefits Scheme
PHN	Primary health network
POTS	Postural orthostatic tachycardia syndrome
RACGP	Royal Australian College of General Practitioners
TGA	Therapeutic Goods Administration
TOR	Terms of Reference
VOC	Variant of concern
UK	United Kingdom
US	United States
WHO	World Health Organization

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Executive Summary

The Australian Government Department of Health and Aged Care (Department) welcomes the opportunity to provide a submission to the *House Standing Committee on Health, Aged Care and Sport Inquiry into Long COVID and Repeated COVID Infections.*

The Department recognises that some people experience prolonged symptoms after infection with SARS-CoV-2, the virus that causes coronavirus disease 2019 (COVID-19). This is sometimes referred to as long COVID. The Department acknowledges the uncertainty faced by people experiencing symptoms of long COVID and the importance of access to appropriate services and support.

While there is now a vast body of literature on acute COVID-19, there is still much to learn about long COVID. The Department is taking a wide view and seeking to better understand the effects of long COVID on the health of individuals and the impact on the health care system more broadly. Building a better understanding of long COVID and developing evidence-based treatments is complicated as it encompasses a wide spectrum of sequelae, with more than 200 symptoms attributed to long COVID, and there is no consistently applied definition.

It is also important that the wider indirect effects of the pandemic and its response on individuals and the health care system continue to be considered and managed. These include impacts such as delayed health screening, disrupted chronic disease management, prolonged elective surgery waiting times, and adverse mental health effects.

There are some uncertainties regarding the specific causes of long COVID and its impact in Australia, particularly in the context of relatively high vaccination rates, exposure to lower severity variants (when compared to the experience of most other countries) and the impact of antiviral medication for those at highest risk of severe illness.

The Australian Government's research agenda, together with the Department's work to obtain greater insights through data linkage projects will be pivotal in building our understanding of the impacts of long COVID on individuals and their communities and informing appropriate responses.

The Department recognises that different types and levels of health care may be required for people with long COVID, depending on their specific symptoms and circumstances. It is expected that many people will be managed through primary care, including general practitioner (GP) and allied health services funded via the Medicare Benefits Scheme (MBS).

The Department is leading the development of a national response to long COVID from a measurement and management perspective and will work closely with states and territories on its development.

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The response will:

- describe the current situation and understanding of long COVID in Australia
- identify gaps in understanding and health service arrangements to support people with long COVID
- guide how long COVID will be managed, measured, and monitored.

As evidence relating to long COVID is rapidly emerging and evolving, the national response will be revisited regularly to ensure it remains relevant and informed by the best available evidence and advice.

Whilst much work is currently underway to improve understanding of long COVID in Australia, this submission provides information on what we know now, recognising that our knowledge will continue to grow as more information becomes available.

A submission from the Australian Institute of Health and Welfare is also provided at Attachment A.

Part 1: Understanding long COVID[1]

Defining long COVID

Long COVID is a term that has been commonly used to describe signs and symptoms that continue or develop in the weeks and months following infection with SARS-CoV-2, the virus that causes COVID-19. However, nomenclature to describe the long-term effects of COVID-19 varies and there is currently no widely accepted, consistent definition.

The World Health Organization (WHO) has defined 'post COVID-19 condition' (long COVID) as occurring in individuals with a history of probable or confirmed SARS-CoV-2 infection, usually 3 months from the onset of COVID-19 with symptoms that last for at least 2 months and cannot be explained by an alternative diagnosis. Common symptoms include fatigue, shortness of breath and cognitive dysfunction, as well as others that 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.(1)

The National Institute of Health and Care Excellence (NICE) in the United Kingdom provides case definitions to identify and diagnose the long-term effects of COVID-19 according to the length of time after initial infection.(2)

- 'Acute COVID-19' is defined as signs and symptoms of COVID-19 for up to 4 weeks.
- 'Ongoing symptomatic COVID-19' is defined as signs and symptoms of COVID-19 from 4 weeks up to 12 weeks.
- 'Post COVID-19 syndrome' is defined as 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

[1] Part 1 addresses TOR 3 (Research into the potential and known effects, causes, risk factors, prevalence, management, and treatment of long COVID and/or repeated COVID infections in Australia)

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.

The NICE further states that 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).(2)

In Australia, the National COVID-19 Clinical Evidence Taskforce has adopted the NICE definition of post COVID-19 syndrome.(3)

Clinical features of long COVID

Long COVID can present differently in different people and symptoms can range from mild to severe. More than 200 symptoms have been described in the medical literature, in both adults and children.(4) The most common symptoms are fatigue, shortness of breath and cognitive dysfunction ('brain fog').(5, 6)
The following symptom groups have been reported commonly by people with long COVID:(3)

- respiratory symptoms: breathlessness, cough
- cardiovascular symptoms: chest tightness, chest pain, palpitations
- generalised symptoms: fatigue, fever, pain, reduced activity and functional level, reduced nutritional status and weight loss
- neurological symptoms: cognitive impairment ('brain fog', loss of concentration or memory issues), headache, sleep disturbance, autonomic dysfunction, peripheral neuropathy symptoms, dizziness, delirium (in older adults), mobility impairment, visual disturbance
- gastrointestinal symptoms: abdominal pain, nausea and vomiting, diarrhoea, weight loss and reduced appetite
- musculoskeletal symptoms: joint pain, muscle pain
- ear, nose and throat symptoms: tinnitus, earache, sore throat, dizziness, loss of taste and/or smell, nasal congestion
- dermatological symptoms: skin rashes, hair loss
- psychological symptoms: low mood, anxiety, intrusive memories, other psychological symptoms.

Individuals who required care for COVID-19 in an intensive care unit (ICU) may also experience symptoms of post-intensive care syndrome.(7) Post-intensive care syndrome refers to one or more of the following symptoms that people experience following care in ICU:

- anxiety, depression
- cognitive impairment, memory loss
- muscle weakness, dysphagia, reduced quality of life.

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Pathophysiology of long COVID

The pathophysiology of long COVID is poorly understood. A number of pathophysiological mechanisms underpinning long COVID have been hypothesised across a range of sequelae. These include organ damage due to excessive immune response during the initial infection, persistent inflammation affecting various end organs and tissues, delayed autoimmune response, viral persistence beyond the acute phase of the infection and complications associated with severe COVID-19.(8-12) Potential pathogenic mechanisms during acute infection that have been suggested to cause organ damage include coagulopathies (bleeding disorders) associated with ischaemic injury (injury to cells from inadequate blood supply), endothelial dysfunction (blood vessel disorder) and direct viral invasion.(13, 14) It has been postulated that for some, the initial infection may trigger persistent inflammation or an immune-mediated response that can lead to symptoms following the acute infection.(8, 15) Thromboembolic events (blood clots) occurring after resolution of acute infection have been suggested to be immune-mediated rather than true thromboembolic events.(15)

Risk factors for long COVID

Risk factors for long COVID include:(16-22)

- female sex
- pre-existing health conditions (e.g., high blood pressure, asthma, diabetes, obesity)
- psychological distress and pre-existing mental health conditions
- increased severity of initial infection (such as requiring hospitalisation)
- socioeconomic deprivation.

There are mixed findings in the medical literature on whether increasing or decreasing age is associated with the risk of developing long COVID.(23)

Vaccination against COVID-19 prior to SARS-CoV-2 infection has been associated with a reduced risk of developing symptoms of long COVID as well as a reduction in the severity of symptoms of long COVID compared with individuals who are unvaccinated.(23-25) In addition, there is evidence to suggest that individuals vaccinated after developing symptoms of long COVID experience an improvement in the number and severity of their symptoms.(26, 27)

There is some evidence that infection with the Omicron variant confers a reduced risk of long COVID when compared with the Delta variant. In a case-control study from the United Kingdom (UK) using self-reported data, individuals infected with Omicron were less likely than individuals infected with Delta to experience long COVID.(28)

There is currently little evidence as to whether COVID-19 treatments reduce the risk of long COVID, although there is some indication that they may have a protective effect.(29, 30) Research is currently being undertaken to further investigate this potential protective effect.(31)

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Prevalence of long COVID

There has been significant variation in the medical literature regarding the prevalence of long COVID. More recent estimates from larger and more rigorous studies have estimated that prevalence of persisting symptoms range from around 3.6% to 20% at least 12 weeks after initial infection.(5, 32)

The prevalence of long COVID in children and adolescents estimated in the medical literature is lower than that for adults, with the estimated prevalence at 8 to 12 weeks after initial infection ranging from 1.6% to around 13%.(33-36)

Difficulty in estimating prevalence of long COVID in Australia

Long COVID is an emerging health issue both in Australia and internationally, however, there remains significant uncertainty about its prevalence in Australia.

Australia's experience of COVID-19 differs from other countries who experienced larger outbreaks of the Alpha and Delta variants as well as outbreaks prior to COVID-19 vaccine availability. Australia has relatively high rates of vaccination, which is associated with reduced risk and severity of long COVID.(23) Serological surveys amongst Australian blood donors indicate that around two thirds (65%) of adults in Australia were estimated to have had SARS-CoV-2 by the end of August 2022, compared to 17% in early March 2022 and 46% in early June 2022.(37) Consequently, most people in Australia who have had COVID-19 have been infected with the Omicron variant, which has been the dominant variant in Australia since December 2021. Infection with Omicron has been associated with a lower risk for long COVID than infection with the Delta variant.(28) Therefore, caution should be taken in applying extrapolations based on the experience of other countries to Australia.

There are currently few published Australian studies on long COVID prevalence. A study of self-reported symptoms of almost 3,000 people from New South Wales who were infected early in the COVID-19 pandemic (1 January to 29 May 2020) estimated that 7% of participants had persisting symptoms 12 weeks after their initial infection.(38) A more recent Australian study, also using self-reported symptoms from 3,510 participants, found that 9.7% of participants who had COVID-19 continued to experience symptoms 12 weeks after their initial infection.(39)

Prevalence and impact of re-infections in Australia

Reinfection is possible following recent and/or prior recovery from COVID-19. Variants that demonstrate increased immune evasion, such as the currently circulating Omicron BA.5 subvariant, have a greater likelihood of causing reinfections. The extent of protection provided by natural infection is dependent on the variants circulating in the community.

National COVID-19 reinfection data is not currently available in Australia. Some jurisdictions (e.g. Western Australia and Tasmania) have publicly reported reinfection data,(40, 41) however, reinfection rates may vary in accuracy due to reporting differences across jurisdictional surveillance systems. Based on available general practice respiratory clinic

(GPRC) data, as at 5 October 2022, 736 reinfections were detected in GPRCs nationally since March 2020. The proportion of positive cases that were reinfections was highest in July 2022 with 6.1% of cases estimated to be reinfections. Figures reported are likely an underestimate of true reinfections due to factors including observed decline in testing rates, underreporting, unrecorded asymptomatic cases and jurisdictional ability to match case records of previous infections.

It is important to note that Australia's surveillance definition of COVID-19 reinfection has changed over time due to changes in available evidence. As such, available reinfection data may vary. Between 2 March 2022 and 8 July 2022, COVID-19 reinfections were defined as a positive COVID-19 test that occurred more than 12 weeks after an initial infection. Between 9 July 2022 and 14 October 2022, COVID-19 reinfections were defined as a positive COVID-19 test occurring at least 28 days after release from isolation. Since 14 October 2022, COVID-19 reinfections have been defined as a positive COVID-19 test occurring at least 35 days after a previous positive test.

Monitoring reinfection data can assist with identifying how soon reinfections occur after a previous infection, the clinical severity of reinfections compared with previous infections and whether any subpopulation groups are at a higher risk of reinfection. The Department will continue working with leading experts, including members of the Communicable Diseases Network Australia (CDNA), to consider future opportunities to monitor COVID-19 reinfections.

Part 2: Australian Government investment into measuring and understanding long COVID[2]

Measuring long COVID in Australia

MBS analysis

The Department has commenced preliminary work to identify the impacts of long COVID by analysing changes in health services accessed by individuals before and after COVID-19 infection. The analysis compares MBS items claimed pre- and post-COVID-19 for each individual, evaluating statistically significant changes in health services accessed in the period after active COVID-19 infection. These include diagnostic items that may indicate persisting effects of COVID such as increased GP visits, chest X-Ray services, blood tests or use of pulmonary rehabilitation services. The overall numbers, however, are relatively small.

As identifiable COVID-19 cases are not available in Commonwealth-held data, analysis is preliminary and uses two separate types of proxy events to indicate change in utilisation of MBS items. One proxy uses the claiming of COVID-19-related MBS services (COVID-19 Management Service, CMS). The other proxy is the COVID-19-specific antivirals molnupiravir

[2] Part 2 addresses TOR 3 (Research into the potential and known effects, causes, risk factors, prevalence, management, and treatment of long COVID and/or repeated COVID infections in Australia)

(Lagevrio®) and nirmatrelvir and ritonavir (Paxlovid®). Each have their own limitation, with CMS items inconsistently used by GPs, and noting antiviral usage at the time was limited to specific older population with underlying health conditions.

Preliminary analysis is demonstrating higher healthcare utilisation (GP presentations, chest X-rays and CT scan services) in a period between 31 days and 60 days for COVID-19 positive patients presenting face-to-face with a medical practitioner and those who received COVID-19 antiviral treatment.

States and territories data linkage work

The Department has commenced work with states and territories to link COVID-19 case data. This work will support more comprehensive COVID-19 case cohort identification and enable the study of long-term health effects associated with COVID-19. It is anticipated linked datasets will enable a better understanding of the impacts of COVID-19 in population groups including Indigenous Australians, people with disability, older Australians and people with a culturally and linguistically diverse background. This may include potential indicators of long COVID.

The Department has also been working with the Victorian Department of Health to integrate identified Victorian COVID-19 notifiable diseases and hospital data into the Australian Bureau of Statistics (ABS) linked data resource, Multi-Agency Data Integration Project (MADIP).

This work will support collaborative policy and epidemiological analyses for Victorians and higher-risk population groups. It will enable analyses of deaths following COVID-19 and provide insight into longer-term health effects through changes in health service usage and treatments accessed after COVID-19. It will also demonstrate proof-of-concept for data integration at the national level, which can be leveraged for other jurisdictions.

Investment in long COVID research

The Department recognises that health and medical research has an important role in Australia's ongoing response to COVID-19 and will consider the need for further research investment as the epidemiology of COVID-19 evolves.

The Government provides direct support for health and medical research through the complementary Medical Research Future Fund (MRFF) and the National Health and Medical Research Council (NHMRC). The MRFF funds priority driven research with a focus on research translation.

To date, there has been an overall investment of $130 million through the MRFF in COVID-19 research. Research topics include diagnostics, vaccine development, antiviral development, clinical trials, digital health research infrastructure, studying the human immune response to COVID-19 infection, community information needs and behavioural responses during outbreaks. As part of this, the MRFF has invested in COVID-19 research specifically related to long COVID.

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In 2021, two research projects were provided funding to study people who have tested positive for COVID-19 to improve understanding of the long-term health impacts of COVID-19:

- $3.4 million to Murdoch University to further its research into improving the understanding of long-term impacts of COVID-19 and develop new models to predict disease progression and tailor treatment
- $1.8 million to University of Melbourne to investigate the effect that SARS-CoV-2 variants of concern may have on the brain.

In addition, in 2022, the Australian Institute of Health and Welfare (AIHW) received $3 million to establish a national linked data platform that integrates COVID-19 case information with a range of relevant existing health data sets. This platform, which will be available to Australian researchers, will contribute to understanding the longer-term impacts of COVID-19 on patients. See Attachment A AIHW Submission for further detail.

Research outcomes from other projects funded through the MRFF will also increase understanding of the longer-term health impacts of COVID-19, including clinical trials to study the longer-term effect of COVID-19 on the brain or the heart, research into human immune responses to COVID-19 infection, and COVID-19 mental health research. This includes the following two clinical trials:

- $2.4 million to University of New South Wales to investigate statin treatment to prevent brain complications as a result of COVID-19
- $2.6 million to University of Melbourne to investigate the use of cardioprotective therapy to manage persistent cardiovascular effects of COVID-19.

A full list of MRFF funded projects, including COVID-19 research projects, is available on the MRFF website.(42)

The NHMRC has funded two projects on long COVID, to commence from 2022:

- $717,305 to University of Queensland, Qld: COVID-19-induced vascular complications: mechanisms and potential therapies
- $904,308 to University of Queensland, Qld: Targeting neuropilin in SARS-CoV-2 neuronal uptake and transport.

The AIHW has provided funding to the ANU Centre for Social Research and Methods COVID-19 Impact Monitoring series, with a particular focus on experiences of long COVID. The survey data is available through the Australian Data Archive.(43) See Attachment A - AIHW Submission for further detail.

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Part 3: Potential impacts of long COVID and repeated infections[3]

Impact of COVID-19 on risk of cardiovascular, neurological, immunological and other conditions

There is evidence that SARS-CoV-2 infection is associated with increased risk of adverse sequelae affecting multiple organ systems.(44-46)

Adverse cardiovascular outcomes associated with COVID-19 include myocarditis, ischaemic heart disease, cardiac arrhythmias, thromboembolic disease and heart failure.(47) The risk of these conditions is increased in individuals who had more severe acute infection as well as individuals with pre-existing risk factors such as hypertension, diabetes mellitus and obesity.(48) However, younger, low-risk individuals are also at risk of cardiovascular complications, including myopericarditis, thromboembolism and cardiac arrhythmia.(49-51)

There is evidence in the medical literature that COVID-19 may be associated with adverse metabolic outcomes, such as type 2 diabetes mellitus.(52-55) However, it is currently unclear whether COVID-19 increases the risk of developing diabetes mellitus, whether it precipitates development in individuals who were already predisposed to develop the condition or if heightened awareness of adverse outcomes and increased access to health services has resulted in early diagnosis.(52)

COVID-19 is also associated with neurological and mental health manifestations, including cerebrovascular disorders, neurocognitive impairment, autonomic dysfunction, peripheral nerve disorders, sensory disorders (e.g., loss of smell), anxiety and depression, with the risk of these outcomes being higher in individuals who experienced more severe acute infection with SARS-CoV-2.(56-60) Some patients have developed autonomic dysfunction following COVID-19, which can manifest with signs including high heart rate, postural hypotension (low blood pressure), high blood pressure and low grade fever. This has been compared with postural orthostatic tachycardia syndrome (POTS).(13, 61, 62) There is emerging evidence of potential changes in the structure of certain areas of the brain on imaging, such as the areas related to the sense of smell, following SARS-CoV-2 infection.(63)

There remains uncertainty regarding whether SARS-CoV-2 reinfections lead to a cumulative risk of long COVID. A pre-print study from the US of older veterans examining the outcomes of reinfection inferred additional risk of adverse outcomes with each subsequent infection compared with people who had never been infected.(64) However, as shown in Figure 1, the additional risk of adverse outcomes following reinfection, which was compared with not being reinfected, was lower than the risk from the initial infection.(65)

[3] Part 3 addresses TOR 4 (The health, social, educational and economic impacts in Australia on individuals who develop long COVID and/or have repeated COVID infections, their families, and the broader community, including for groups that face a greater risk of serious illness due to factors such as age, existing health conditions, disability and background) and TOR 5 (The impact of long COVID and/or repeated COVID infections on Australia's overall health system, particularly in relation to deferred treatment, reduced health screening, postponed elective surgery, and increased risk of various conditions including cardiovascular, neurological and immunological conditions in the general population)

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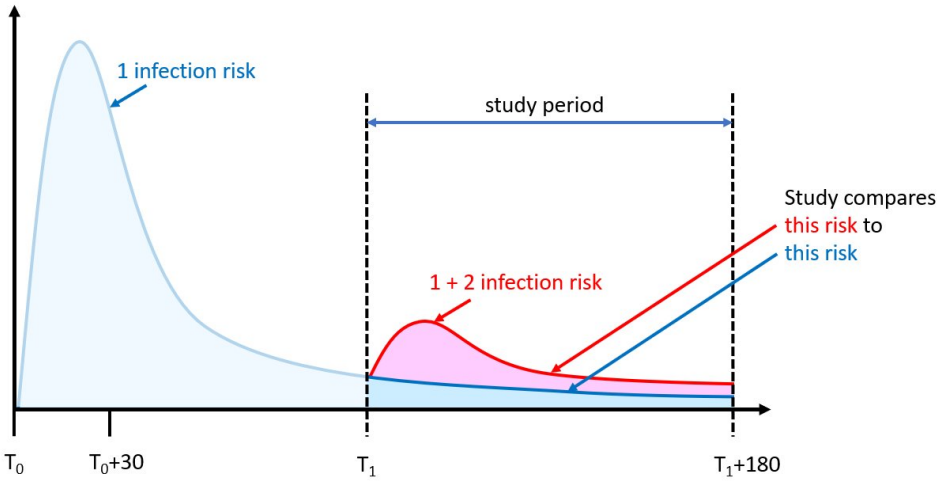

Figure 1: Pictorial representation of additional risk conferred by reinfections as suggested in the pre-print study by Al-Aly et al(64) (Source: Prof. Michael S Fuhrer, Twitter (65))

There have been several other studies indicating that immunity conferred by past infections leads to a lower risk of severe illness with SARS-CoV-2 reinfection.(66-70) This suggests that the risk of long COVID following reinfection is likely lower than the risk from the initial infection.

Impact on health screening in Australia

It is difficult, and likely too early, to identify the impact of long COVID and repeated COVID infections on health screening and preventative health services in Australia. There are indications that the COVID-19 pandemic has had some negative impact on cancer screening services in Australia. The most recent BreastScreen Australia monitoring report, published by the AIHW, indicates that the COVID-19 pandemic has adversely impacted utilisation of BreastScreen Australia services in early 2020, with participation rates falling from 2018-19 to 2019-20.(71) While this early data illustrates the impact of the closures of BreastScreen clinics over the March-April 2020 period and then subsequent lower capacity to screen due to restrictions, it is unknown whether long COVID and repeated infections will affect screening rates.

Conversely, the AIHW's report *Cancer screening and COVID-19 in Australia*, released in October 2020, showed no clear effect of COVID-19 restrictions on bowel screening activity, which relies on home test kits. The impact on cervical screening is more difficult to interpret due to the National Cervical Screening Program changing from 2-yearly to 5-yearly screening.(72)

An analysis of MBS health assessment items has shown no clear trend in the utilisation of these preventative health items. It is likely too early to determine what impact long COVID and repeated COVID-19 infections may have on access to preventative health assessments. The Department will continue to monitor and analyse utilisation of these MBS items.

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Long COVID and the National Disability Insurance Scheme (NDIS)

Long COVID can reduce people's ability to perform day-to-day activities, exercise or work. This has led to calls for long COVID to be recognised as a disability for the purposes of the NDIS. To meet the disability requirements for NDIS funding a person's disability must be caused by an impairment which is likely to be permanent. As the evidence on long COVID is still emerging it is too soon to determine the long term outlook for people experiencing prolonged symptoms following COVID-19.

All governments are continuing to work to resolve how the NDIS and other services (such as health services) should work together, so that people with disability receive the right services and achieve the best possible outcomes. The NDIS is not intended or designed to replace other essential services on which people with disability and the wider population rely, including health services. Rather, all governments, including state and territory governments, have an important role in ensuring publicly funded and provided services are inclusive and accessible for all Australians.

Long COVID and mental health

The mental health and wellbeing of all Australians remains one of the Australian Government's highest priorities. The Department acknowledges the challenges that COVID-19 has placed on people's mental health and is committed to ensuring all Australians have access to the right services and support wherever they are around the country.

There is increasing evidence that long COVID may pose a challenge to the health of Australians and will likely result in increased demand on primary care and mental health services. Evidence is still emerging. However, as is reported with many long-term illnesses, individuals with long COVID are at risk of adverse mental health outcomes, such as a first experience of psychological symptoms or an exacerbation of existing mental health concerns.

Many symptoms have been linked to long COVID, including fatigue, which studies suggest is among the most common and debilitating symptoms. It is known that fatigue can worsen symptoms of depression and anxiety and, in turn, depression and anxiety can worsen fatigue. Further, there is some evidence that people with pre-existing mental distress, including depression, anxiety, worry, perceived stress and loneliness, may be at increased risk of both developing long COVID and experiencing impairment in activities of daily living due to long COVID.(73)

We do know that the pandemic has impacted on the mental health of Australians and the impacts are ongoing. The use of MBS mental health service item numbers and calls to Lifeline have decreased from their respective peaks in August and September 2021 but remain higher than pre-pandemic levels.

There continue to be several mental health supports available to encourage more people to seek support for their mental health, including those who have been adversely impacted by COVID-19. These include additional Medicare subsidised psychological services through the

MBS Better Access initiative (available to 31 December 2022), access to telehealth arrangements, and a range of online and digital supports.

Long COVID and specific population groups

As we enhance our understanding of long COVID in Australia, the Department recognises the importance of investigating its prevalence and impact in specific populations, including First Nations people, people from culturally and linguistically diverse (CALD) backgrounds, older Australians and people with a disability. These groups are a priority for surveillance and response, which includes producing targeted and translated online resources, as they may be at higher risk of long COVID given what is known about the risk factors.

It is anticipated that the linked datasets currently in development will enable an improved understanding of the potential impacts of long COVID in these population groups. This will be important to inform the specific services and supports required for these populations.

The National Aboriginal and Torres Strait Islander Health Protection Sub-committee (NATSIHP Sub-committee), which is co-chaired by the Department and the National Aboriginal Community Controlled Health Organisation (NACCHO), is planning to explore what members are hearing about long COVID in First Nations communities, and the plans jurisdictions and Aboriginal Community Controlled Health Services have in place to deal with long COVID.

The Aged Care Advisory Committee (ACAG) has discussed the potential effects of long COVID on older Australians and residents of residential aged care homes. ACAG discussed the extra challenges for older Australians experiencing long COVID due to pre-existing health issues and the importance of vaccination to help reduce the risk of long COVID. ACAG also discussed the potential difficulties in identifying long COVID symptoms in older people due to other co-morbidities, medications for existing conditions masking symptom presentation and symptoms perceived to be due to ageing more generally rather than attributed to long COVID.

The issue of long COVID has been raised at the Advisory Committee on the Health Emergency Response to Coronavirus (COVID-19) for People with Disability. This Committee reports to the Chief Medical Officer for the Australian Government and is the forum to discuss the issue of long COVID as it relates to people with disability.

The Culturally and Linguistically Diverse Communities COVID-19 Health Advisory Group (Advisory Group) works in partnership with the Department, providing advice and recommendations to improve health outcomes and ensure the design and implementation of the National COVID-19 Vaccine Program is culturally safe and accessible for everyone. The Advisory Group is currently reviewing its future work plan and looking to explore member concerns around long COVID in CALD communities.

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Part 4: Responding to long COVID[4]

Preliminary categorisation of long COVID outcomes

The Department considers that there are broadly 3 categories through which long COVID outcomes and treatment can be understood, each requiring different levels and types of health care, as shown in Figure 2. These are:

1. post-viral syndrome
2. disease-specific conditions
3. medically unexplained physical symptoms.

Symptoms of post-viral syndrome generally self-resolve within three to six months. People with post-viral syndrome may require management in primary care, including support and reassurance from their GP. Some people will experience medical conditions following COVID-19 which will require access to specific specialist care, such as specialist cardiologist management of cardiac conditions.

A small proportion of people will experience medically unexplained sequelae that persist beyond three to six months and for which they require specific multidisciplinary care.

Individuals who required care for COVID-19 in an ICU may also experience symptoms of post-intensive care syndrome. Management of this syndrome includes post-ICU rehabilitation.

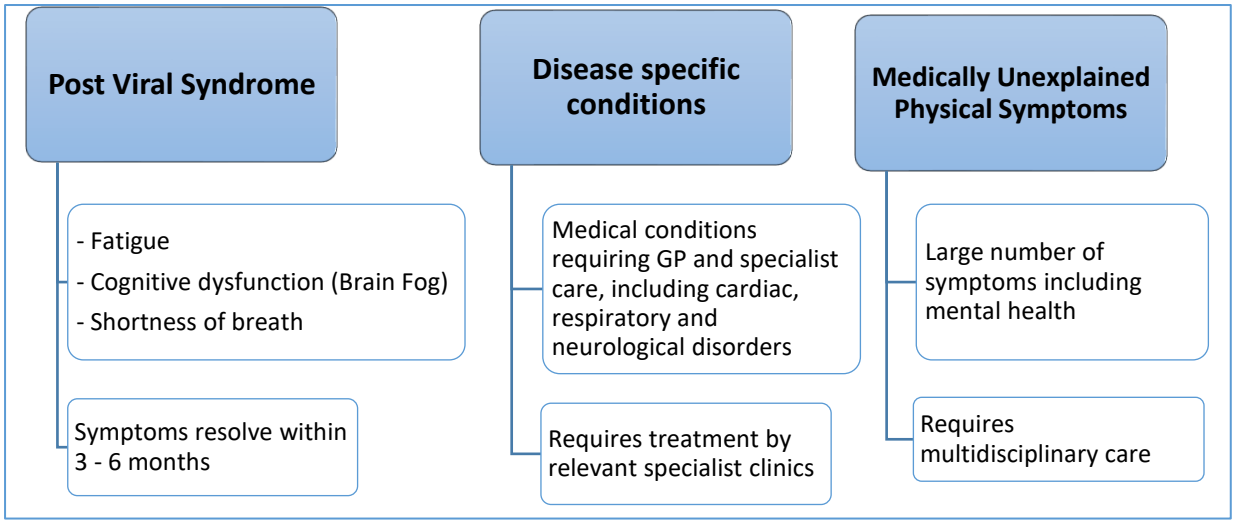

Figure 2: Preliminary categorisation of long COVID outcomes and management

A national response to long COVID

The Department is preparing a national response to long COVID to guide how long COVID will be managed, measured, and monitored. It will outline what is known about long COVID,

[4] Part 4 addresses TOR 6 (Best practice responses regarding the prevention, diagnosis and treatment of long COVID and/or repeated COVID infections, both in Australia and internationally)

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and what remains unknown, as well as the complexity of measuring long COVID and understanding its impact. The response will also provide details on the activities underway to better measure and understand long COVID, as well as detail the health services and supports that are available.

Importantly, the response will identify gaps in:

- health service arrangements to support people with long COVID
- resources to help people with long COVID to better understand and manage their symptoms
- resources for health professionals to treat and manage patients experiencing long COVID.

As evidence regarding long COVID continues to emerge, the response will be revisited regularly to ensure it remains relevant.

Resources for consumers

The Department has developed long COVID factsheets for consumers and providers. The factsheets detail the different symptoms people may experience if they have long COVID, the benefits of vaccination to reduce the risk of COVID-19 infection and long COVID, and where to seek support.(74, 75)

The Australian Government funds *healthdirect* to provide information to consumers about long COVID and repeated COVID infections through the National Coronavirus Helpline, the Living with COVID Helpline, and online resources.(76)

To help people self-manage fatigue and other long COVID symptoms, the Royal Australian College of General Practitioners (RACGP) has produced a resource that draws from information provided in the 'living' guidelines produced by the National COVID-19 Clinical Evidence Taskforce.(77)

Resources for GPs

Primary Health Networks (PHNs) provide support and resources to support GPs to enable them to better manage and care for patients presenting with long COVID. Some PHNs have established community pathways of care for people with long COVID, and some are undertaking research into long COVID service needs in their region. Many PHNs have been hosting webinars and other information services for GPs to learn more about how to better manage long COVID.

To support GPs in caring for people with long COVID, the Department contracted the RACGP to update the RACGP guidelines *Caring for patients with post-COVID-19 conditions.*(78) The National COVID-19 Clinical Evidence Taskforce has produced a *Care of after COVID-19* guidance that complements the RACGP long COVID guidance.(3)

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Primary care services

People with persisting symptoms after COVID-19 are encouraged to seek medical advice from their GP. It is likely that many symptoms can be managed through primary care services, including GPs and allied health professionals such as physiotherapists, occupational therapists, dietitians, speech pathologists, psychologists, social workers and exercise physiologists.

The Department supports access to multidisciplinary primary care services through the MBS and through private health insurance rebates for general treatment policies which cover the costs of many allied health services. As with the majority of health conditions, there are no specific MBS items for the treatment and care of people with long COVID. Individuals with long COVID can access existing MBS items for the treatment of their condition, including time tiered GP general attendance items. If clinically appropriate, GPs can also refer patients to relevant specialists for treatment. Specialist doctors also have access to a range of general consultation items.

Individuals with long COVID may be eligible for MBS chronic disease management (CDM) items and GP mental health treatment items. To be eligible for CDM items a person must have at least one medical condition that has been present (or is likely to be present) for at least six months or is terminal. The CDM items enable GPs to plan and coordinate the health care of patients with chronic or terminal medical conditions. GPs may refer patients for up to five MBS subsidised allied health services per calendar year under a GP Management Plan and Team Care Arrangement. There is no list of eligible conditions. Whether an individual meets the eligibility requirement of having a chronic or terminal condition is a clinical judgement for their GP. GP mental health treatment items cover early intervention, assessment and management of patients with mental health disorders and include referral pathways for up to 10 MBS subsidised clinical psychologist services in a calendar year (this was temporarily increased to 20 until 31 December 2022).

Private health insurers can pay benefits for various goods and services under general treatment cover. This includes cover for clinically appropriate alternatives to hospitalisation, disease management and prevention programs, physiotherapy and a range of other allied health services. It is up to each health insurer to determine which services they cover.

Meeting the needs of older Australians

Older Australians living in residential aged care homes need to see their GPs more than those not living in residential aged care homes. An enhanced Aged Care Access Incentive has been introduced to increase face-to-face care from GPs for those living in residential aged care homes. Under the new incentive, GPs will be encouraged to continue providing quality care, increase their capacity to visit residential aged care homes, and improve residents' health and wellbeing.

Residents can see their GPs more often and spend more time with them to get an individualised care plan, including the prevention, diagnosis and treatment of long COVID

and repeated COVID infections. This allows these issues to be identified and managed earlier.

The Department has also provided funding to PHNs to better support the delivery of virtual access to primary care, including the development of telehealth infrastructure. The majority of medical care for residents, including those who experience long COVID and/or repeated COVID infections, can be provided via telehealth, including routine check-ups, prescription of medicine, and mental health consultation and counselling.

Improved telehealth infrastructure allows for better patient-centred care as it reduces waiting times, disruptions to the routine of residents, and the need for transport and hospital transfers. In addition, PHNs and HealthPathways remain available to residential aged care homes and general practices to provide advice on long COVID management, including clinical guidance and localised referral options to manage those experiencing physical and mental health issues that may result from COVID-19.

Public hospitals and community clinics

Most of the international approaches to the management of long COVID identified at Attachment C involve a multidisciplinary team providing care through community health clinics, general practice, rehabilitation programs, or COVID-19 clinics. This multidisciplinary team may include GPs, specialist doctors, and allied health professionals. People presenting with severe symptoms will require emergency assessment and referral to appropriate specialist management.

State and territory governments are responsible for the public health system, including public hospitals and community clinics. They continue to have a role supporting people who have long COVID by providing access to outpatient services, including multidisciplinary long COVID clinics. Some private hospitals have also established long COVID clinics.

The Government is working with state and territory governments to better understand the services provided by multidisciplinary long COVID clinics, including whether demand is being met and any additional demand for primary health care services arising from long COVID.

Under the National Health Reform Agreement (NHRA), the state and territory governments have committed to providing eligible patients with the choice to receive public hospital services free-of-charge, on the basis of clinical need and within a clinically appropriate period. Decisions regarding access to public hospital services and determining the appropriate treatment of individual patients rest with states and territories, individual hospitals and the doctors involved.

Public hospital services provided for the treatment of long COVID, including in an outpatient setting, attract a funding contribution from the Commonwealth under the NHRA.

There are indications that management strategies and resources required for long COVID patients may be different from managing patients during the acute phase and an additional code has been added by the Independent Hospital and Aged Care Pricing Authority (IHACPA) into the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (Twelfth Edition). The IHACPA is currently working with the Commonwealth and all states and territories to determine whether a specific Tier 2 class is required to recognise specialised treatment provided for long COVID, or whether it can be treated through existing Tier 2 classifications.

Whether or not a specific classification is required for the treatment of long COVID, the Commonwealth provides funding through the NHRA to the states and territories for the treatment of respiratory illness and COVID-19 in both inpatients and outpatients.

Diagnostic tools and treatments

Diagnostic tests

A challenge with diagnosing long COVID is the lack of consensus regarding classifications and diagnostic criteria. In addition, there are currently no long COVID-specific diagnostic tests approved in Australia. However, in September 2022, a proprietary test that claims to identify a biomarker profile unique to long COVID received European CE marking, which means it is able to market the test in those countries accepting the designation.(79)

If such diagnostic tests were to enter the Australian market, they would require evaluation under the Therapeutic Goods Administration's (TGA) in vitro diagnostic (IVD) regulatory framework.(80) If approved by the TGA and the sponsor of the test applied for reimbursement through the publicly subsidised patient rebates for private diagnostic tests, the test would require appraisal by the Medical Services Advisory Committee (MSAC). The MSAC provides advice to Government on whether a new diagnostic test should be publicly funded via Medicare (and if so, its circumstances) following an assessment of its comparative safety, clinical effectiveness, cost-effectiveness, and total cost, using the best available evidence.

Therapeutics

Although there may be medicines available to treat symptoms which may be related to long COVID, there are no medicines currently listed on the Pharmaceutical Benefits Scheme (PBS) specifically for the treatment of long COVID.

The Government has invested in a diverse range of treatment options for acute COVID-19 including the two oral antiviral COVID-19 treatments, molnupiravir (Lagevrio®) and nirmatrelvir and ritonavir (Paxlovid®). These treatments can be accessed under the Pharmaceutical Benefits Scheme (PBS) through an authorised prescriber such as a GP, physician, or nurse practitioner. At this time, there is no evidence that these treatments prevent Long Covid nor are they licenced for the treatment of Long COVID. However, studies are continuing and will be closely monitored by the Department.

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Conclusion

Responding to long COVID is a key priority for the Department. This includes efforts to enhance our understanding of the prevalence and impact of long COVID, and ensure adequate supports are in place. The Department recognises the uncertainty faced by people experiencing long COVID symptoms and the difficulties faced by health professionals in diagnosing, treating and supporting patients with a new condition for which evidence is continually emerging.

Importantly, the Department's response to COVID-19 includes efforts to continue to minimise COVID-19 transmission, thereby reducing repeated infections and the potential for long COVID, within the context of a COVID-19 response that looks towards recovery.

The Department will continue to review the epidemiology and consider how we can transition COVID-19 responses into more sustainable arrangements in line with the public health advice and the following key principles:

- minimising severe illness and death by using measures that are effective, proportionate and targeted to protect those most vulnerable to COVID-19
- ensuring our health, economic and social systems can respond to future waves
- managing "pandemic fatigue" and encouraging individual resilience and action
- promoting vaccination, including booster doses, to improve health outcomes
- supporting the economic and social well-being of all living in Australia
- returning funding and policy settings to a more sustainable and balanced footing.

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Attachment A – AIHW Submission: Inquiry into Long COVID and Repeated COVID-19 infections

About the AIHW

AIHW's existing role in monitoring chronic conditions

The Australian Institute of Health and Welfare (AIHW) is a leader in health and welfare data. The National Centre for Monitoring Chronic Conditions (NCMCC) is led by AIHW, funded by the Commonwealth Department of Health and Aged Care. The NCMCC provides evidence-based information to inform policy on chronic disease, including estimates of the prevalence of a range of chronic diseases including diabetes, chronic lung disease and cardiovascular disease. AIHW has a long history of working with a range of data sources and stakeholders to provide the most robust estimates of the impact of chronic disease on Australians. With the emergence of long COVID, the NCMCC is now exploring evidence on this as a chronic disease. The first piece of this work is a literature review, which is further detailed below.

Data linkage at the AIHW

AIHW is also a Commonwealth Accredited Integrating Authority (AIA) and whose independent status is acknowledged and trusted by all jurisdictions. As an AIA, we link sensitive information for researchers to generate a person level source of information across multiple data sources. Our experience in ethics, governance and data linkage is trusted by health and welfare researchers. Given this, AIHW has been funded by the Medical Research Future Fund to establish a National COVID-19 linked data set. More details about this project are discussed below.

Collaboration with stakeholders internationally and in academia

Finally, AIHW works with a range of stakeholders across government, non-government and academia. Internationally, AIHW provides delegates and input to OECD and WHO meetings and has connections with international researchers. AIHW has been involved in ongoing discussions about the long-term impact of COVID-19 on health systems and health outcomes globally since the start of the pandemic. AIHW is also designated as the World Health Organization Collaborating Centre for the Family of International Classifications (WHO-FIC) in Australia and has been involved in the classification of long COVID, more detail on this is described in the pages below. Closer to home, AIHW has recently collaborated with the Australian National University (ANU) Centre for Social Research and Methods during the pandemic on their COVID-19 Impact Monitoring Survey Series. In the August 2022 data collection, AIHW funded ANU to add an additional module on long COVID in Australia. This project is also detailed further below.

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Specific AIHW programs of work

Long COVID literature review

Background on project

This project has been funded under the NCMCC to explore the current available evidence on long COVID with a specific focus on understanding the impact of long COVID in Australia. There is a need to investigate which population groups are most at risk of developing long COVID, and whether vaccines may prevent long COVID and reduce patients' ongoing health system usage. The report will use 'long COVID' as a general term to refer to ongoing symptomatic COVID-19 and post-COVID syndrome. See Attachment B for a summary of this report.

What the report includes

The broad objective of the project is to provide information on:

- Current estimates on the incidence and prevalence of long COVID in Australia.
- How SARS-CoV-2 variants and vaccination modify the risk of developing long COVID.
- Current evidence on demographic, clinical and social determinants of long COVID (including modifiable risk and protective factors).
- Summarise evidence on outcomes and impact of long COVID on patients, such as mortality, health service use, quality of life and patient experience.
- Data deficiencies and research gaps around long COVID.

What the report does not include

Studies focused on therapy and treatment of long COVID, and models of clinical care are out of scope for this project. Studies specifically examining long COVID in adolescents and children particularly the post-COVID condition multi-inflammatory syndrome in children (MIS-C) are also not included (however, studies comparing age groups that include children are within scope).

Identifying cohorts of interest

The study aims to identify population groups experiencing the greatest burden of long COVID. The study will also explore its relationship with pre-existing and new onset chronic conditions, such as diabetes, and other conditions with similar etiology including chronic fatigue syndrome.

Information on background rates of disease

The project will summarise the incidence and prevalence of long COVID from available studies on the Australian population and compare with international evidence.

Timeframes

The literature review aims to be published in December 2022.

Future developments

This project will provide the foundational work for future monitoring of long COVID and will be used to inform possible research on the long-term impacts of COVID-19 as well as future monitoring under the AIHW's national COVID-19 linked data set.

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COVID-19 linked data set

Background on project

The AIHW has been funded by the Medical Research Future Fund to develop a COVID-19 linked data set that will link COVID-19 cases collected in state and territory notification systems to existing health data sets, including deaths, hospitals, aged care, immunisation, MBS and PBS data.

What the data can be used for

This data will provide an asset for use in COVID-19 research into the medium and longer-term health effects of COVID-19, including effects on health system use.

The linked data set will also facilitate research to inform the impact of COVID vaccines and treatments, reinfections, risk factors for disease, health service planning, monitoring and evaluation, and health policy development at the national and state and territory level.

Other broad areas of research include:

- epidemiological and statistical research
- service and medication dispensing and patient journeys
- identifying groups or cohorts of interest
- monitoring, evaluation and data quality improvement.

Given that the data is at a person-level, the linked data set could identify people who have had multiple infections over time, and their interactions with the health care system during that period. Changes in an individual's service usage and health outcomes can be used to estimate the long-term effect of COVID-19.

What the data cannot be used for

- Currently, there is no detailed information included on an individual's education or level of income, to assess these individual social determinants of health association with COVID-19, however, the project has been built to ensure interoperability with other national data that do include this information, such as the Census. In the next stage of this project, AIHW will be looking to add this information to the linked data. Currently, data could be presented by Socio-Economic Indexes for Areas (SEIFA) which is a product developed by the ABS that ranks areas in Australia according to relative socio-economic advantage and disadvantage.
- The current scope of the linked data is limited to administrative health data sets, and not any survey information. At present, the data will not be able to capture patient reported outcome measures or precisely identify individuals with long COVID who do not have a clinically coded diagnosis. However, the project has been set up in a way that other data could be linked in the future following relevant ethical and governance approvals.
- COVID-19 cases are being identified in this study by the notification data provided by states and territories and through the certified death records. If an individual does not have their positive result registered with the state/territory health departments, it may be that an individual will not be flagged as having COVID-19 in our dataset. This will be a limitation of the data as cases become less severe and the motivation for testing decreases over time.

- The project is being linked iteratively when data becomes available. Data linkage and collation at a national level takes time to ensure a high-quality product, and some data are only collated annually. Real-time surveillance is not in scope in the current project.

Identifying cohorts of interest

The COVID-19 linked data set includes demographic variables that will be able to identify Aboriginal and Torres Strait Islander individuals, culturally and linguistically diverse populations, older Australians, rural and remote Australians and in the next linkage update, those with a disability. AIHW is still assessing the quality of these fields and looking into other sources of information that may enhance this information, such as the Census.

Ability to look at health system and background rates of disease

The COVID-19 linked data set includes information on health system usage five years prior to an individual's COVID-19 diagnosis. This includes information on hospital admissions and emergency department presentations, Medicare Benefits Schedule and Pharmaceutical Benefits Scheme usage and age care presentations from 1 January 2015 to the most recent available. This 5-year 'look back' period will be able to provide some information on an individual's prior health service usage and how it changes over time.

Timeframes

AIHW aims to have a de-identified research dataset available to approved Government researchers by December 2022. A technical summary report on the linkage and methods will also be release in December 2022 and non-Government researchers will be provided access to the data in the second half of 2023.

Future developments

To ensure value for money and improve efficiencies, the AIHW research team are keeping abreast of progress in the data linkage space and seek to align with, and make use of, cloud-based national platforms for data sharing, linking and access as they develop. The linked data platform has been built to ensure interoperability with existing national data sets (such as MADIP) that have been used during the pandemic.

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ANU survey 'The experience of COVID-19 in Australia – including long-COVID'

Background on project

The ANU Centre for Social Research and Methods COVID-19 Impact Monitoring series has received funding from the Australian Institute of Health and Welfare, with a particular focus of the August 2022 data collection on experiences of 'Long-COVID'. The survey data is available for download through the Australian Data Archive.

What the report includes

The survey asked participants questions on

- Demographic, socioeconomic and geographic factors
- Experiences with testing and isolating for COVID-19
- If an individual had a confirmed or suspected COVID-19 infection and when this occurred. The survey also asked about reinfections.
- Symptoms of their COVID-19 infection
- If the individual considered themselves having had long COVID (defined at two different time thresholds of 4-12 weeks and more than 12 weeks), and how this impacted their day-to-day activities
- Symptoms of long COVID
- Individuals' feelings on future lockdowns and infection
- Whether or not the individual had received a vaccine to prevent COVID-19
- Mental health and wellbeing.

What the survey does not include

- The survey does not include any clinical diagnosis codes nor does the survey confirm an individual COVID-19 positive result with a PCR or RAT test.
- The survey does not ask individuals about the severity of their infection e.g. whether they were admitted to hospital.
- The survey does not collect any information on health service usage prior to an infection or background rates of disease.

Identifying cohorts of interest

The survey includes demographic variables that can identify Aboriginal and Torres Strait Islander individuals, culturally and linguistically diverse populations, older Australians, rural and remote Australians. It also collected information on an individual's level of education, household income and area of socioeconomic status.

Information on background rates of disease

The survey estimates that 4.7% of adult Australians have had or currently have post-COVID-19 syndrome (symptoms that lasted 3 months or more).

Regarding reinfections, the survey found that *'The vast majority of Australians (83.4%) who have had COVID-19 have only had it one time. However, 11.2% of those who have had COVID-19 reported that they had it twice, and a further 5.4% three times or more.'*

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Timeframes

Data were collected from the 12th wave of the COVID-19 Impact Monitoring series, with a total of 3,510 responses collected between the 8th and 22nd of August using the Life in Australia™, online probability-based panel. The ANU report was published on the 12th October 2022.

Future developments

This survey has the potential to provide a baseline for future waves, depending on research priorities.

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International Classification of Diseases Revision

The Australian Institute of Health and Welfare is designated as the World Health Organization Collaborating Centre for the Family of International Classifications (WHO-FIC) in Australia. The Australian Collaborating Centre (ACC) assists the WHO with their efforts to support national and international health information systems, statistics and evidence. The ACC is part of a Network of collaborating centres that contribute to the development, dissemination, maintenance and use of products that help categorise concepts in health and the health system.

Long COVID can be collected in standardised health information systems for example hospital and mortality national data collections.

The International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Australian Modification (ICD–10–AM) is used to assign codes for hospitalisations in Australia. The Australian Modification, in its eleventh and twelfth editions added codes to identify *'History of COVID-19 with residual conditions'* and *'Post coronavirus disease 2019 [COVID-19] condition'* which is assigned for documented long COVID.

With reference to mortality data i.e., coded data using the ICD-10 Version:2019 (who.int) *'Post COVID-19 condition, unspecified'* can be used to identify Long Covid.

The WHO International Classification of Diseases (ICD) Eleventh Revision (ICD-11) has now been adopted by the World Health Assembly, but is not currently implemented in Australia. ICD-11 allows coding of *'Post COVID-19 condition'*. For further information see ICD-11 for Mortality and Morbidity Statistics (who.int).

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Attachment B – Long COVID in Australia – a review of the literature, AIHW

A literature review of the scale and impact of long COVID has been prepared by the AIHW. The full report will be publicly released on 16 December 2022. The following is the draft summary of the findings of the report.

Summary

Long COVID is a complex, multi-system illness with the potential for a substantial impact on society, from increased health care costs to economic and productivity losses. Symptoms may persist for weeks or months following acute SARS-CoV-2 infection, come and go over time, or manifest as new onset chronic conditions, such as heart disease, diabetes, kidney disease and neurological conditions.

Long COVID is an umbrella term used to describe both ongoing symptoms in the medium-term (4-12 weeks) and longer-term sequelae beyond 12 weeks known as *post-COVID syndrome* (National Institute of Health and Care Excellence) or *post-COVID condition* (World Health Organization).

This review analyses the available Australian and international literature to understand the impact and scale of long COVID, including:

- incidence and prevalence of long COVID in Australia and internationally
- whether SARS-CoV-2 variants and vaccination modify the risk of developing long COVID
- demographic, clinical and social determinants of long COVID
- outcomes and impact of long COVID on patients, such as burden of disease, health service use, quality of life and patient experience
- data deficiencies and research gaps around long COVID.

Many studies from earlier phases of the pandemic were conducted before clear definitions were developed and produced wide variation in results. In addition, there has been no consensus on a core set of health outcomes to be measured and reported for long COVID which has also translated into inconsistent findings.

Prevalence of long COVID

As most cases of COVID-19 have occurred in Australia during 2022 studies of the occurrence of long COVID have only recently gathered momentum. From the limited data available, current prevalence estimates of long COVID (defined as >12 weeks) in Australia range from 5 to 10% of COVID-19 cases.

Wide variation in estimates has been reported from international data, ranging from 9-81% in a global systematic review. Sources of heterogeneity include methodological differences between studies including definitions of long COVID and follow-up time, geographic region, demographic and clinical profile of study participants and acute COVID-19 disease severity.

Studies using stricter case definitions for long COVID have produced more modest estimates. The prevalence of post-COVID condition (>12 weeks) ranged from 8-17% in studies from the UK. The global prevalence of post-COVID condition was estimated to be 3.7% of all COVID-19 infections and 6.2% of symptomatic infections when only symptoms of fatigue, cognitive problems or shortness of breath were counted.

Many studies lack non-COVID comparison groups that are needed to establish whether the prevalence can be attributed to COVID-19, which is particularly important for studies that rely on self-report of a diverse range of signs and symptoms that are not unique to long COVID.

Regardless of the precise definition of long COVID used by individual studies, most studies find a relationship with severity of acute COVID-19. Prevalence is highest in patients who were admitted to an intensive care unit (ICU) for COVID-19, followed by hospitalised patients, and lowest in non-hospitalised patients.

There is growing evidence that the risk of long COVID has been lower during the Omicron wave compared with earlier SARS-CoV-2 variants. However, because many people were vaccinated when the Omicron variant emerged, observed differences in risk of long COVID in relation to different SARS-CoV-2 variants could be due to vaccination. A meta-analysis of 18 studies found that the risk of long COVID was 32% (RR 0.68, 95% CI 0.53-0.87) lower based on studies using a >4-week definition and 25% lower for other definitions combined (RR 0.75, 95% CI 0.64-0.88) for people double vaccinated against SARS-Cov-2 compared to unvaccinated people.

Determinants of long COVID

There is growing evidence that severity of acute disease, age, female sex and comorbidities are the most common risk factors for the development of long COVID:

- severity of illness during the acute COVID-19 infection has been identified by numerous studies as an important predictor of long COVID. This includes the number of symptoms, length of hospital stay and ICU admission
- long COVID has an inverted U-shaped relationship with age and is most common in middle-aged adults
- studies have consistently shown that females experience a higher prevalence of self-reported long COVID than males, a finding that is independent of demographic and clinical characteristics
- poorer underlying health is also related to an increased risk of long COVID. Pre-existing chronic conditions and their associated risk factors, such as obesity and smoking, increase the risk of developing long COVID.

People from lower socioeconomic groups, certain occupations and ethnic backgrounds may also be at a higher risk of developing long COVID. However, there is a lack of robust research focusing on social determinants and long COVID. Understanding the burden of long COVID in specific population groups is important for targeted prevention and developing treatment and care programs.

Very few protective factors other than SARS-CoV-2 vaccination have been identified. There is emerging but preliminary evidence that management of acute COVID-19 infection with anti-viral medication and physical activity may reduce the risk of long COVID.

Long COVID and chronic conditions

Some people develop a range of multi-organ symptoms as a direct complication during the acute COVID-19 illness or that develop over the longer term leading to new-onset chronic conditions.

Studies of large, health databases predominantly from the USA have identified an increased risk of a range of chronic outcomes, including cardiovascular disease, metabolic disorders, and mental and neurological complaints up to 12 months following infection. Imaging and laboratory studies have demonstrated persistent structural damage to the heart which may result in increased hospitalisation for cardiovascular events such as heart attacks.

One of the most common neurological complaints is 'brain fog' characterised as difficulties with cognitive function, attention and memory. Some symptoms of long COVID, particularly persistent fatigue and post exertional malaise, overlap with Myalgic Encephalomyelitis (ME), also called Chronic Fatigue Syndrome (CFS). ME/CFS has also been associated with previous viral infections and the underlying pathophysiology between these sets of symptoms may be similar for the two conditions. Continued research into long COVID may provide further understanding of ME/CFS. Likewise, established research on ME/CFS may point to clues worth investigating in long COVID.

Impact of long COVID

The review examines four dimensions of the impact of long COVID. The population health impact through the burden of disease and mortality, impacts on the health system, quality of life and social impacts, and the patient experience with long COVID.

- In Australia, since the start of the pandemic and up to 30 September 2022, there had been 10,279 deaths due to COVID-19 reported by the Australian Bureau of Statistics of which 123 (1.2%) were classified as being due to post-COVID condition. Long COVID contributed to 10.2% of the total burden of disease from COVID-19 in Australia in the first few months of 2022.
- Several studies have reported increased post-acute COVID-19 health care utilisation and costs, including rehospitalisation, emergency department visits, outpatient visits and primary care attendances.
- A significant proportion of people with long COVID report limitations on their daily activities and a reduced quality of life. In the COVID-19 Impact Monitoring Survey, 21.6% of respondents with symptoms lasting for 3 months or more reported their ability to carry out day-to-day activities had reduced substantially compared to before COVID-19. The impact of persisting symptoms can impact workforce participation, including delays in return to work, and ongoing residual difficulties that impact the ability to perform the same duties or limit working hours.
- The term 'long COVID' emerged as a social terminology to describe patient's experiences of the long-term health effects of SARS-CoV-2 infection. The use of online support groups and

social media has been a key tool for patient advocacy, demonstrating the evolution of social attitudes and experiences of long COVID. In the early phase of the pandemic, long COVID sufferers expressed a lack of belief and recognition of their illness by health care professionals and struggled to access medical care. Over time, the sentiments have become more positive reflecting increased knowledge, acceptance and awareness of long COVID and health system responses to the condition.

Data deficiencies and future research

One of the main limitations of long COVID research is the inconsistency in the definitions of long COVID used. Specially, there is difficulty in effectively defining the condition's symptoms and time course for research and clinical purposes. Two definitions have been developed by NICE and WHO that define parameters around the timing and duration of symptoms, but both remain broad in relation to symptoms. An international consensus study has produced a Core Outcome Set for adults with post-COVID-19 condition consisting of 12 outcomes across clinical, life impact and survival domains to improve harmonisation and comparability across studies.

In September 2020 the World Health Organization activated an ICD-10 code for post COVID-19 condition. Analysis of the use of the code in US health care records has shown that the uptake varies widely and currently underestimates the frequency of long COVID. As use of the code becomes more consistent, health care records will provide large and rich sources of data to understand the impact of long COVID, such as patterns of health service use among long COVID patients. However, health records may be impacted by behavioural differences in seeking care, the need for care depending on the severity of long COVID symptoms, disparities in the availability of care, obtaining a diagnosis of long COVID and having that diagnosis recorded in the patient record. These issues may lead to lack of representation in health records of some population groups.

Most of the evidence presented in this review has been from research conducted overseas. Some opportunities for research to monitor the impact of long COVID in Australia include:

- The national COVID-19 linked dataset is a project being conducted by the AIHW to link COVID-19 infection notifications from states and territories to national administrative health datasets including deaths, hospitals, aged care, immunisation, MBS and PBS data. This data asset will allow investigation of health outcomes post-COVID-19 infection, including the occurrence, risk factors and impact of long COVID. This information will be valuable for understanding health service demands arising from long COVID and could be useful in designing targeted long COVID models of care.
- Long COVID clinics have been established across Australia to provide specialised care to people having long term symptoms after COVID-19 infection. These clinics provide an opportunity to collect data on long COVID progression in affected individuals.
- Large-scale national surveys, like those established in the UK and USA, provide rapid and relevant long COVID information including tracking of prevalence over time. This information is important for planning for prevention and health care demand.

- Several Australian longitudinal studies have included questions on COVID that will allow for analysis of post-COVID outcomes. This includes the 45 and Up Study conducted by the Sax Institute.

Long COVID is a new condition and therefore the evidence so far is limited by a relatively short follow up time since infection, particularly in Australia where most of the acute burden of COVID-19 has occurred in 2022 to date. Research and monitoring of long COVID is urgently required to understand its impact in the Australian population and to corroborate findings with the evidence from other countries.

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Attachment C – Australian and International long COVID guidelines and resources

Australia

- Australian guidelines for the clinical care of people with COVID-19
- National COVID-19 Clinical Evidence Taskforce 'Care of People after COVID-19' flow chart
- Royal Australian College of General Practitioners 'caring for patients with post-COVID-19 conditions' clinical resources

USA

- American Academy of Physical Medicine and Rehabilitation (AAPM&R) assessment and treatment of postacute sequelae of SARS-CoV-2 infection in children and adolescents
- AAPM&R Multi-Disciplinary Collaborative Consensus Guidance Statement on the Assessment and Treatment of Autonomic Dysfunction in Patients with Post-Acute Sequelae of SARS-CoV-2 Infection (PASC) - Blitshteyn - PM&R - Wiley Online Library
- Centers for Disease Control and Prevention Post-COVID Conditions: Information for Healthcare Providers

Canada

- Government of Canada 'COVID-19 for health professionals: Post-COVID-19 condition (long COVID)'
- Ontario Health Post COVID-19 Condition: Guidance for Primary Care

United Kingdom

- Long covid—an update for primary care | The BMJ

New Zealand

- Clinical Rehabilitation Guideline for People with Long COVID in Aotearoa New Zealand | Ministry of Health NZ

Other

- WHO Long COVID Rehab Guidelines — Long COVID Physio

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