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Long COVID Working Group Update

Sally Galbraith, Darren Stevens, Linda Kemp
On behalf of the Long COVID WG

Acknowledgement of Country

I would like to acknowledge the Traditional Owners and Custodians of the Country on which we meet today – in Sydney, the Gadigal People of the Eora Nation – and their continuing connection to land, sea, and community. I pay my respects to their Elders, past present and emerging.

I would like to extend that acknowledgement and respect to any Aboriginal and Torres Strait Islander peoples here today.

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Speakers and Working Group Members

DARREN STEVENS
is an Australian Actuary who has been working across Life Insurance, Superannuation, Wealth and Fintech for the last 38 years. He has spent time working in the UK, Asia, South Africa and New Zealand. Darren was a Council Member of the Actuaries Institute 2019-2022 and relevant to this working group suffered from Long COVID for 18 months during 2022 and 2023.

LINDA KEMP
is an Actuary and consultant in Private Health Insurance at Finity Consulting. She specialises in clinical analytics and data science with a focus on health outcomes.

SALLY GALBRAITH
is an Actuary and Director in the Outcomes team at the National Disability Insurance Agency (NDIA). She also has extensive prior experience as an actuarial consultant in the general insurance area, and as a university academic.

Long COVID Working Group Members:

Chris Scheuber	Daniel Langford	Darren Stevens	Han Li	Kelly Yong	Linda Kemp
Maggie Lee	Nicholas Stolk	Rui Zhou	Sally Galbraith	Shelley Agrawal	Xu Shi
Zhan Wang (Chair)					

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Cautions and Disclaimers

Beware the data sets and conclusions

This presentation will include findings from various research items across different countries. These may have been conducted with different definitions, sample size, methodology, and etc. It is important to note that there is no “universal” approach and to be mindful when drawing conclusions from these research findings.

Disclaimers

This Long COVID presentation is intended for discussion purposes only and does not constitute consulting advice on which to base decisions. We are not medical professionals, public health specialists or epidemiologists.

The presentation will be conducted in accordance with Institute’s Code of Conduct and attended by members in their professional capacity. It is acknowledged that professional members in their employed capacity, may be active market participants in their respective industries who may compete with each other as defined by competition law. Participants are, therefore, reminded that in accordance with their competition law compliance obligations they should not:

- discuss any matter that may be perceived as being cooperation by competitors in a market to influence that market;
- discuss any matters that could be regarded as fixing, maintaining or controlling prices, allocation of customers or territories, coordinating bids and/or restricting output or acquisitions in any circumstances;
- share commercially sensitive information relating to their employer; or
- share information for an anti-competitive purpose.

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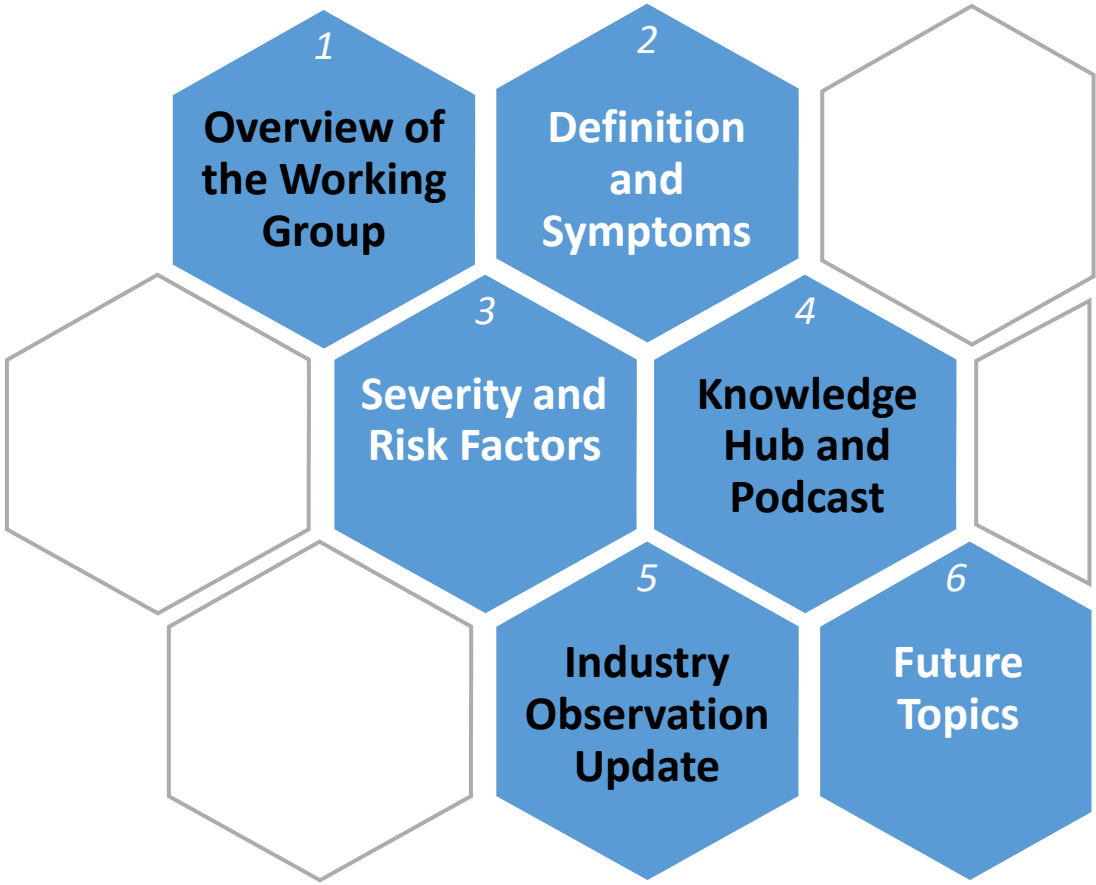
Long COVID WG Update | Agenda



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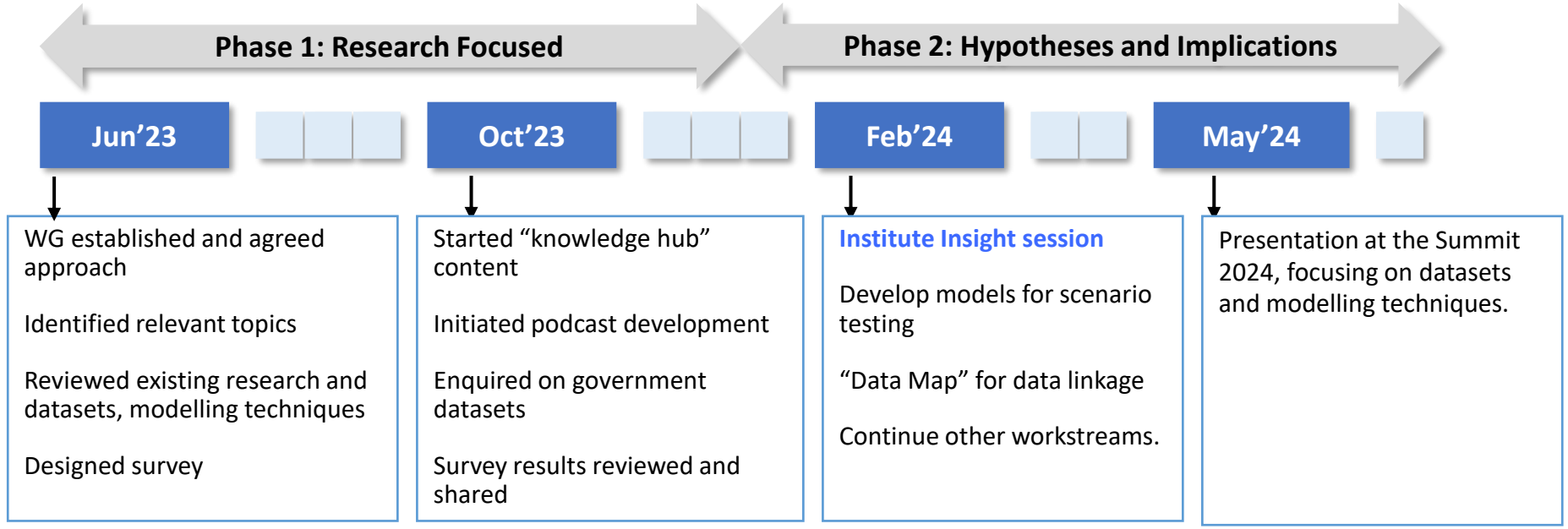
1 | Overview of Working Group

The Long COVID Working Group ("WG") was established in June 2023 with 13 members. The WG's **primary objective** is to provide relevant insights to actuaries working in various areas of specialisations re the potential impact of Long COVID. **Secondary objective** is to look at broader interest to society on this topic, such as impacts on the Public Health system, other government agencies, and organisations outside of the financial services industry.

The WG's timeframe is set to 12 months at this stage. The diagram below summarises key activities.



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2 | Definition of Long COVID

Or should we call is Post-Acute sequelae of SARS-CoV-2 (PASC)?

Generally accepted

- Ongoing symptoms lasting more than 4 weeks
- Post COVID-19 symptoms after 12 weeks not explained by an alternative diagnosis

World Health Organisation

- The continuation or development of new symptoms 3 months after the initial infection
- Symptoms lasting for at least 2 months with no other explanation

It is believed that Italian archeologist Elisa Perego first coined the term "Long COVID" in a tweet in late May 2020.

The term "long hauler" emerged from the trucker cap that American preschool teacher Amy Watson was wearing on her Facebook support group page.

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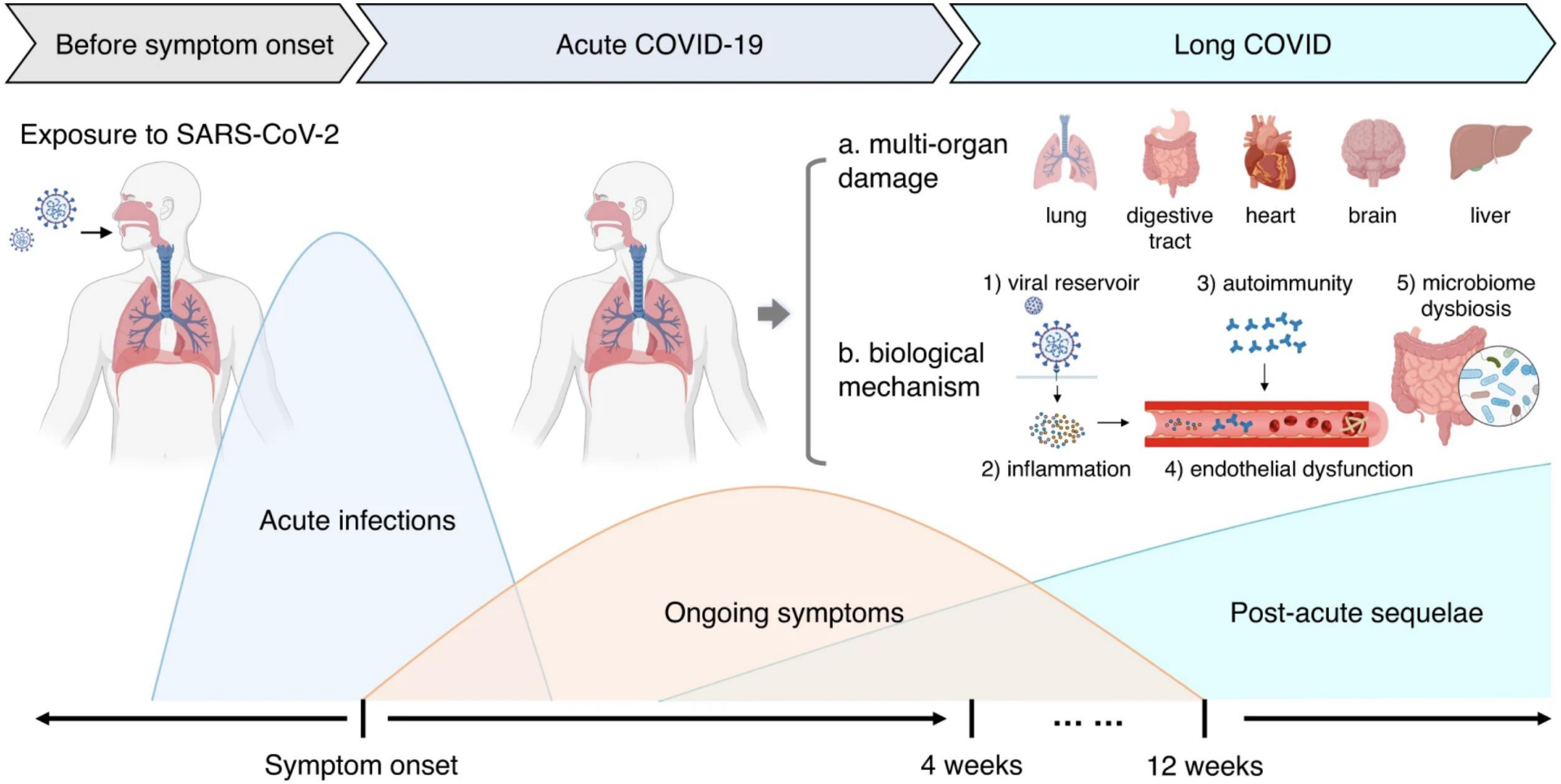
2 | It emerges over time



Li, J., Zhou, Y., Ma, J. *et al.* The long-term health outcomes, pathophysiological mechanisms and multidisciplinary management of Long COVID.

2 | Symptoms of Long Covid

200+ different symptoms have been reported, most common ones are:

- Fatigue and post exertional malaise
- Cognitive dysfunction (a.k.a. brain fog)
- Breathlessness, Chest pains or heart palpitations
- Headaches, Insomnia, Dizziness
- Depression and anxiety
- Joint pains, tingling and numbness, nerve pain
- Tinnitus, earaches and hearing issues
- Nausea, diarrhea and stomach aches
- Skin problems (peeling, rashes, itching)
- Continued loss of taste and smell, hair loss
- Menstrual changes, erectile dysfunction, urinary incontinence
- Blurred vision and hallucinations

Detectable organ or tissue damage

New chronic illness after COVID infection

Mysterious new symptoms

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2 | Multi-system impacts

Three main phenotypes (groupings of symptoms emerging)

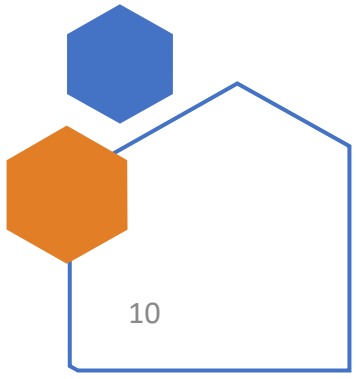
1. Fatigue, post exertional Malaise, cognitive exhaustion and brain fog
2. Allergies, headaches, food intolerance, skin issues and gut issues
3. Heart issues, nausea, dizziness, insomnia, anxiety, chest pain, vision problems and temperature dysregulation

Not uncommon for "long haulers" to suffer from all three phenotypes with one being dominant or different phenotypes becoming dominant over the course of the illness.

Post viral symptoms

Fatigue & fog

Neurological inflammatory



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2 | Testing for Long Covid

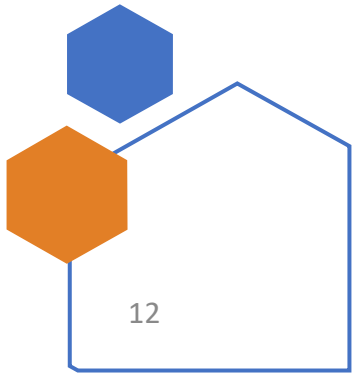
Early days and no accepted test

Blood tests could be available in a year or two (based on Cortisol / T-cell activity)

Continued virus shedding may indicate Long COVID – possibility of fecal tests

Different physiological responses e.g. by sex

How do Insurers and Health professionals confirm if someone has Long Covid and what are the implications?



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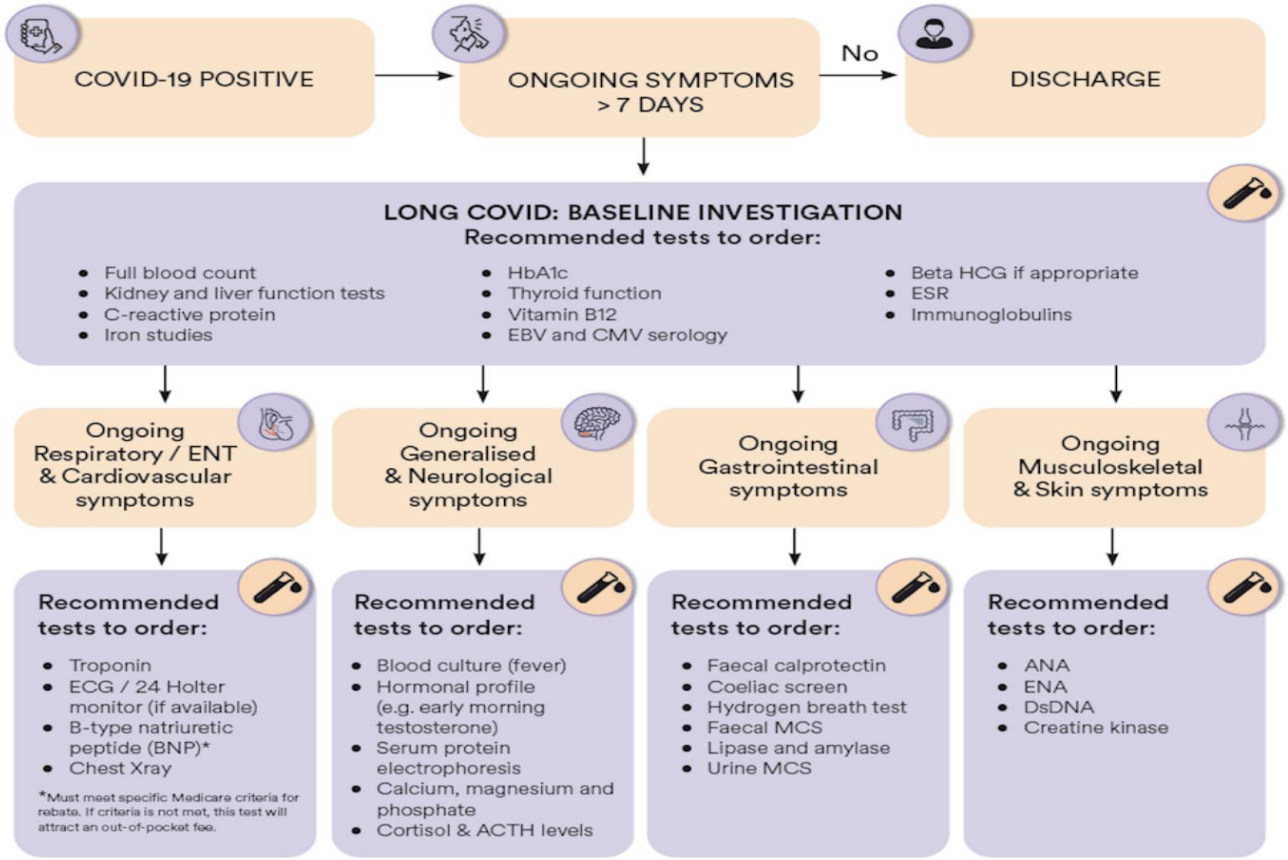
2 | Example of recommended testing program

Australian Clinicalabs – Summary of Long COVID investigative recommendations



- *Expensive*
- *Frustrating*
- *Stressful*
- *Time consuming*
- *Inconclusive*

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3 | What proportion of people are getting Long COVID?

We don't know how many people are getting Covid so cannot accurately know the proportions developing Long Covid

Australia

- Early research in Australia estimates that 20% of people with COVID-19 still experience symptoms after one month, and 5%+ after three months.

Estimates vary by Country, definition and data set

- Australia 5-10%, UK 8-17%, US 14%+, Netherlands 13%+
- CDC estimates 35% of adults who had Covid 19 suffered from long COVID
- Some estimate 50%-70% of hospitalised cases suffered from long COVID

UK and US numbers

- Rough estimates are over currently over 2m sufferers in UK and up to 23m people in the US have developed Long COVID.

US CDC Estimates:

15% of population had long COVID

6% currently have Long COVID

Up to 2% population still significantly impacted by Long COVID

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3 | Severity of symptoms

Variable and undefined

- Globally over 20% of Long COVID sufferers are significantly impacted
  - But no uniform definition of “impact”, mostly self-reported
- The four Countries have similar experience around severity of symptoms

Impact on activities of daily living

	UK	US	Canada	Australia
Not at all	32%	19%		24%
A little	48%	61%		64%
A lot	21%	20%	21%	22%

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3 | Duration of symptoms

Even more variable results and lack solid data

- Almost all Anecdotal and tends to vary by severity of symptoms
- Also varies by impact on activities of daily living
  - No real impact = suffer from 3-6 months
  - Some impact = suffer from 6-12 month
  - Significant impact = suffer for 12+ month "long haulers"
- No consistency in data, analysis or underlying cohorts of patients

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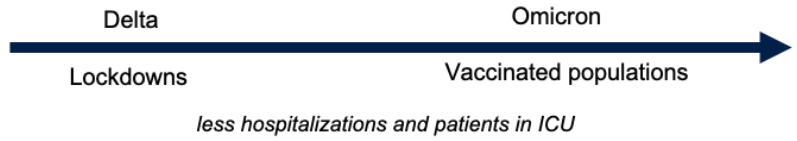
3 | What proportion of people are getting Long COVID?



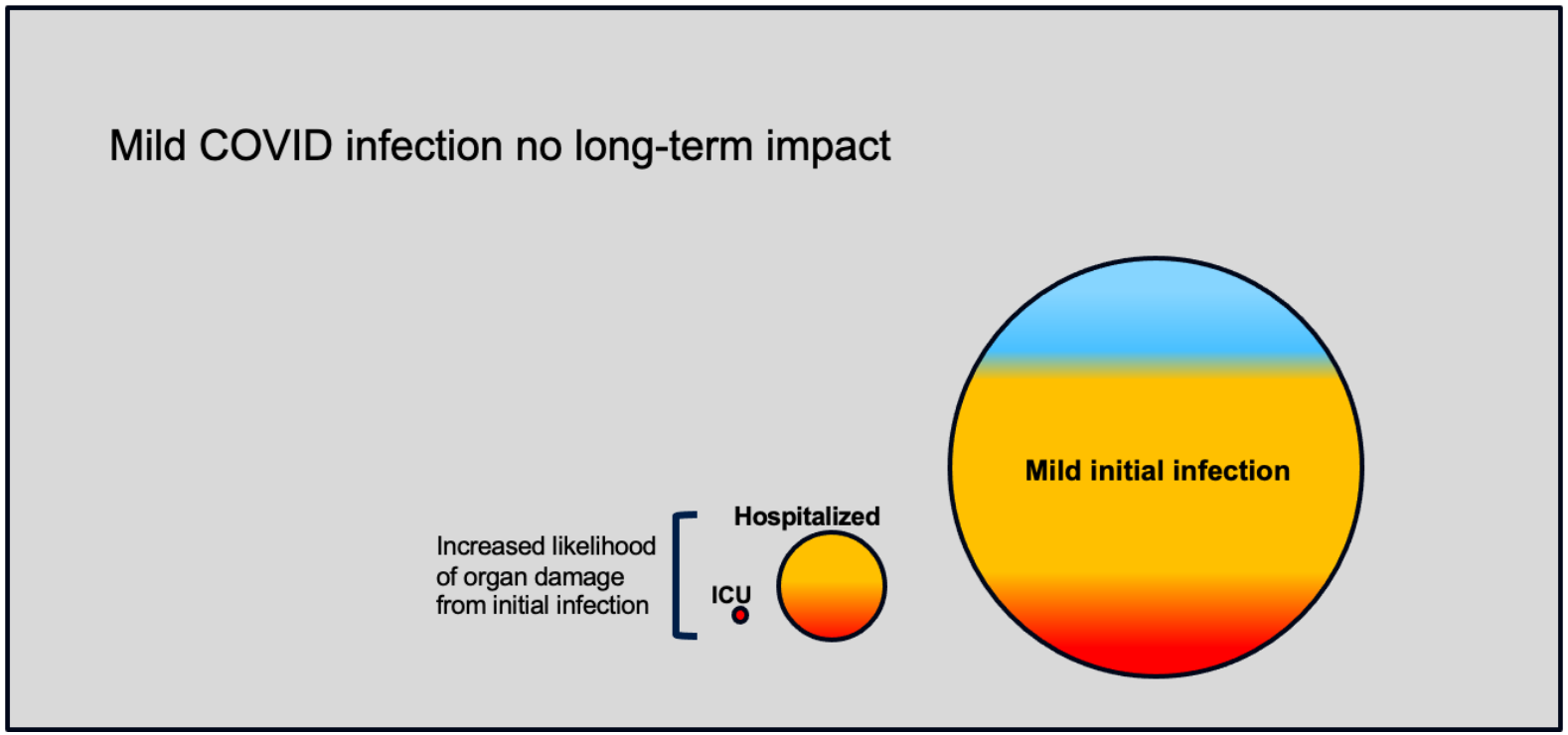
Number people contracting COVID in Period

Severity of Long-COVID

No real impact on daily living

Some impact on daily living

Significant impact on daily living



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3 | Risk factors

Hospitalised with Covid-19

- People who experienced severe Covid-19 and were hospitalised tended to develop more severe Long COVID
- Many had also suffered organ damage through Covid infection.

Underlying conditions

- People with underlying health conditions prior to Covid-19 – particularly immunocompromised and poor mental health

Unvaccinated

- People who did not get a Covid-19 vaccine have a higher risk of getting Long COVID after initial infection
- Some evidence of persons developing Long COVID from vaccine

Age and sex

- Older patients, women have higher risk
- Could correlate to severity of initial Covid infection
- Women 40-60 are greatest risk according to some studies.

Other areas of research have looked at

- Variant of Covid with some research showing Delta as worse than Omicron – later contradicted by other research
- History of illness such as Glandular Fever/Epstein-Barr Virus
- Multiple early symptoms and heavy viral load from Covid infection
- Autoantibodies and poor Gut health

3 | Beware the data sets and conclusions

Need to consider "exposed to risk" when looking at risk factors

- Studies on hospital patients – consider characteristics of patients
  - E.g. elderly, unvaccinated, severity of COVID infection
- Different variants emerge over time, with different symptoms and Long COVID impacts
- Studies focused on healthcare workers may be skewed to female
  - Some evidence emerging that female immunology fight COVID in a different way to males.

Consider the data for each study reviewed

- Is the sample random or is there a bias in the data?
- Were they hospitalized? What was the vaccination status and which vaccine?
- How severe was their illness? Did they have pre-existing conditions?
- What strain of COVID did they contract? How many times have they had COVID?
- Sex, Age, Immunology.....

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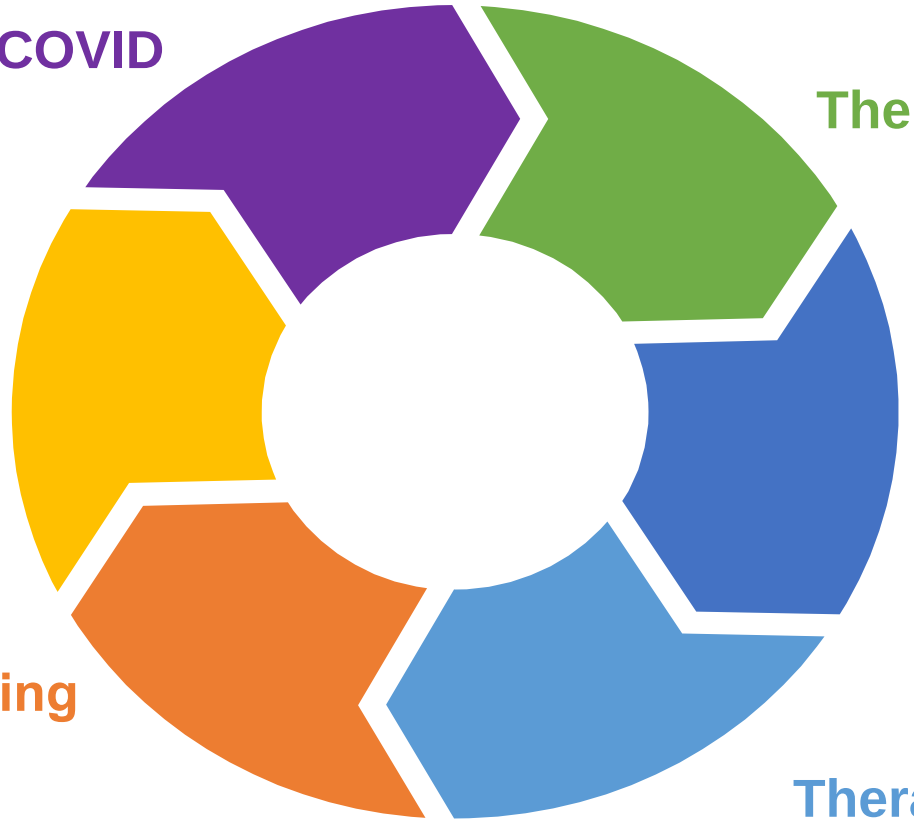
3 | Australian response

Government has allocated $50 million in funding, the panel agreed we need to know more about:



What causes Long COVID

The best models of care

Factors affecting prognosis

The needs of vulnerable communities

People's experience of living with Long COVID

Therapeutic interventions

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3 | International experience: US, UK

	US (WHO 2023, CDC studies)	UK (NIHR and NHS)
People with Long COVID	8.8m (3.4%)	1.8m (3%)
Impact of gender	Twice as many women as men (4.4% vs 2.3%)	Women 50% more likely to report Long COVID
Other risk factors noted	Age – ages 35-49 highest rate Higher chance with repeat infections Earlier virus strains lead to more Long COVID	Poor health, asthma, overweight all increase risk Non-white ethnic groups have 70% lower rate of reporting Long COVID
Funding for research	$1.15bn NIH spend so far – “underwhelming trials fail to test meaningful Long COVID treatments”	£50m Gov funding

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3 | International experience: Asia

The Chinese University of Hong Kong found that more than 2 million Hongkongers may have experienced symptoms of Long COVID, according to an ongoing study, with 70 per cent of interviewees reporting conditions such as depression, poor memory and hair loss. (Hong Kong population ~7.4m)

Some estimate that ~10% of infections result in Long COVID in Singapore and Malaysia (no tracking)

Singapore NTU study found unvaccinated people more likely to develop heart problems a year later.

Some likening it to Black Lung from 1970's

There is little information available from China about Long COVID

HK Studies found that increased Long COVID in Asian populations could be due to a lack of certain "good bacteria" in gut microbiota.

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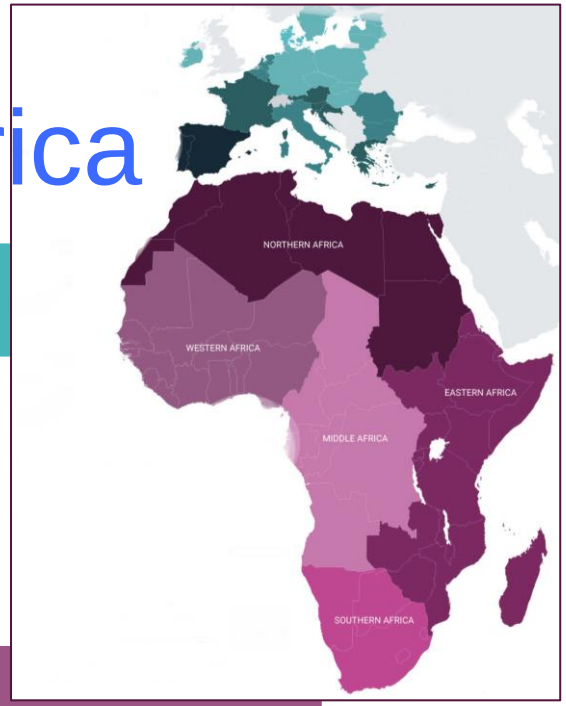
3 | International experience: Europe, Africa

European Region (53 countries) WHO estimates

- By mid 2023 COVID is still responsible for over 1,000++ deaths per week
- ~1 in 30 Europeans may have developed Long COVID in first 3 years of pandemic
- Since 2020 nearly 36m Europeans contracted long lasting health problems post COVID-19



African experience

- Comparable to global prevalence
- Comorbidities associated with Long COVID may lead to additional complications in African populations due to hypercoagulation and thrombosis
- Risk factors include advanced age, being female, >3 COVID symptoms in the acute phase, initial fatigue and dyspnea, COVID-19 severity, pre-existing conditions including obesity, hypertension, diabetes mellitus, and other chronic illness

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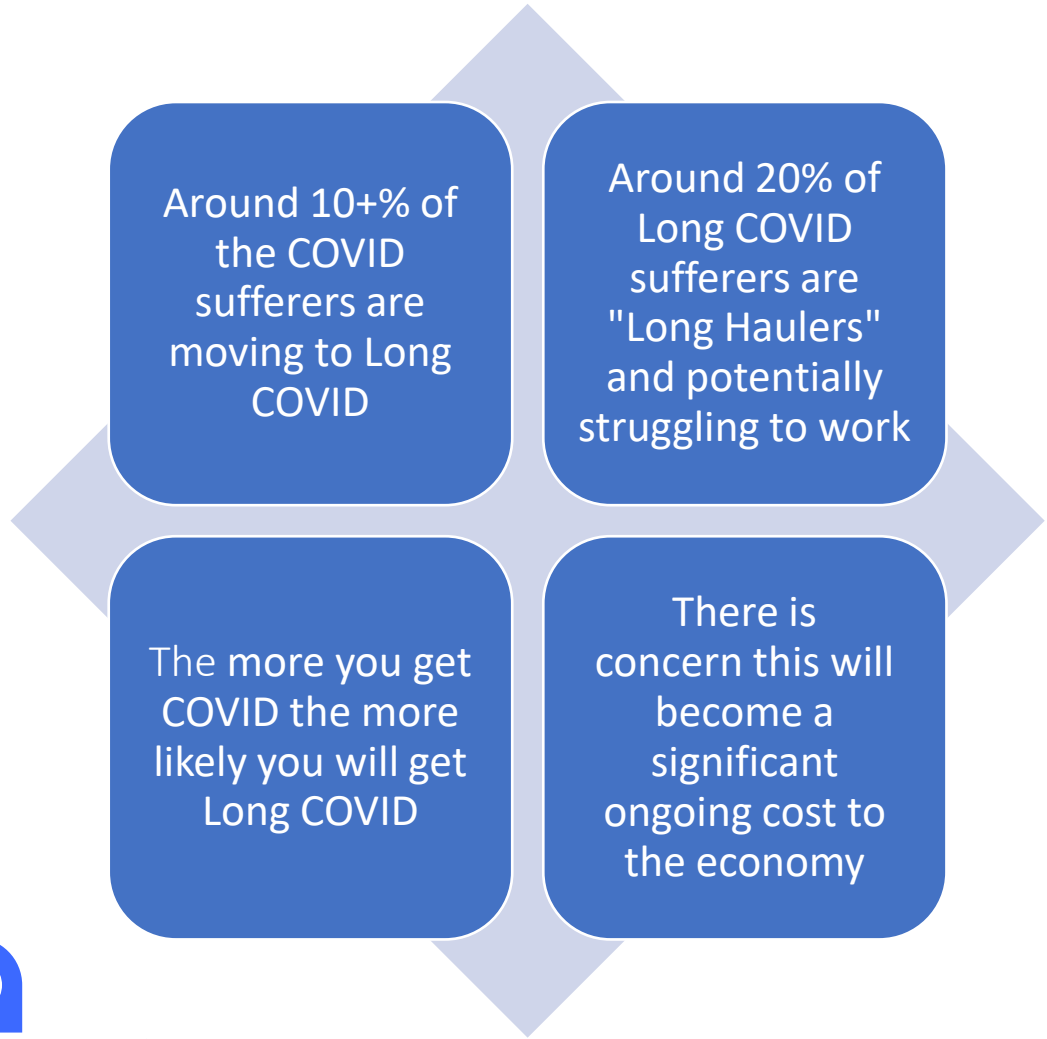
3 | In summary



Some perspectives

If we had same proportions as US CDC estimates:

- 4m Australians would have had Long COVID
- 1.6m Australians would currently have Long COVID
- 325k Australian Long COVID sufferers would have significant impact on activities of daily living

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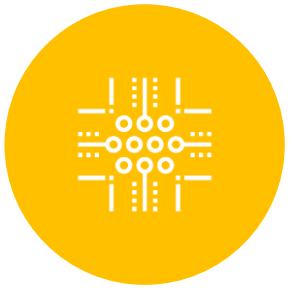
3 | Some interesting questions

When will there be a test for Long COVID?

What is the higher risk with repeat COVID infections?

What data should we be recording on Long COVID?



Should we be recording more COVID data?

How do we separate Long COVID from other conditions?

How does our approach to Long Covid impact our approach of ME/CFS suffers regarding health/life insurance?

Who covers the costs of Long COVID – Health, Insurance, Medicare, WorkCover....?

How do we stay up to date on our approach to Long COVID?

4 | Knowledge Hub and Podcast

These materials are currently being developed

A knowledge hub will be available on the Institute website, providing links to useful resources and summaries of important articles

Podcasts will also be released covering the purpose of the WG, definitions, symptoms and severity, data collection and modelling

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5 | Industry Observations

Surveyed members of the Actuaries Institute:

- Their view on the impacts of Long Covid
- Their organisation's approach to Long Covid including data collection processes and allowance in pricing/reserving.

Low response rate: 22 actuaries mostly working in life insurance (59%) and health insurance (27%).
23% of respondents noted they or a family member have personally experienced Long Covid.

The low response rate may indicate a low level of industry interest in Long Covid. Nonetheless, we shared the survey findings with the LIPC and HIPC to supplement understanding of industry practice.

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5 | Industry observations : Survey results

Data collection

- No insurers collect data on Long COVID at policy inception

Claims management

- Data collected at claim not related to key risk factors for LC (variant, vaccination etc)

Projections

- No allowance for LC in standard forecasts
- 12% use it as a scenario

Feedback from HPC, LIPC

- Unsurprised
- Noted that we should not just think about insurance, but all Australians

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6 | Future Topics – datasets

Australia

- COVID-19 register and linked dataset (AIHW)
- PLIDA
- NIHSI
- NCIMS
- ANU poll on Covid-19 attitudes and behaviours (longitudinal panel data)

Most promising:

- COVID-19 register and linked dataset (AIHW): comprehensive linked dataset including MBS, PBS, deaths, immunisation, some hospital data,...
- ANU poll on Covid-19 attitudes and behaviours (longitudinal panel data)

Other countries

UK Office of National Statistics: estimates of the prevalence of self-reported Long COVID

US Centres for Disease Control and Prevention: questions in Household Pulse Survey, National Health Interview Survey

Drawbacks: eligibility requirements, timeframe and costs associated with accessing data

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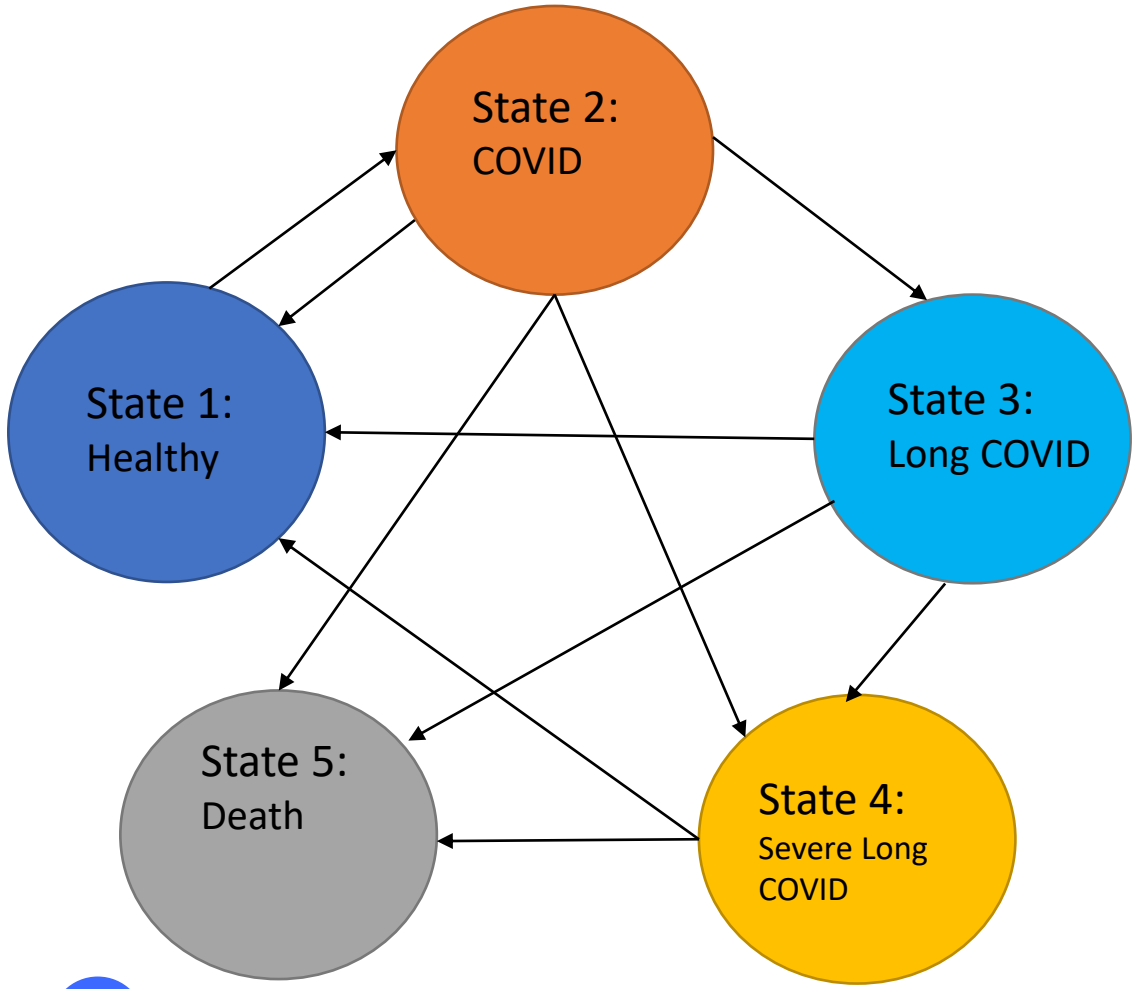
6 | Future Topics – modelling



Proposed model structure:

- A multi-state transition model consisting of 5 states.
- Transition intensities could depend on individual characteristics such as age, gender, etc.
- This model can be simplified or extended based on data availability.

Model calibration:

- Option 1: Based on data from the COVID-19 Register and linked datasets by AIHW.
- Option 2: Based on findings from existing research on Australian and international data.

Simulation study:

- Simulate the trajectories of health and mortality experience for a cohort of individuals.
- The simulation results can be used to assess the impact of Long COVID on insurance industry and society at large.

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Thank you

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