

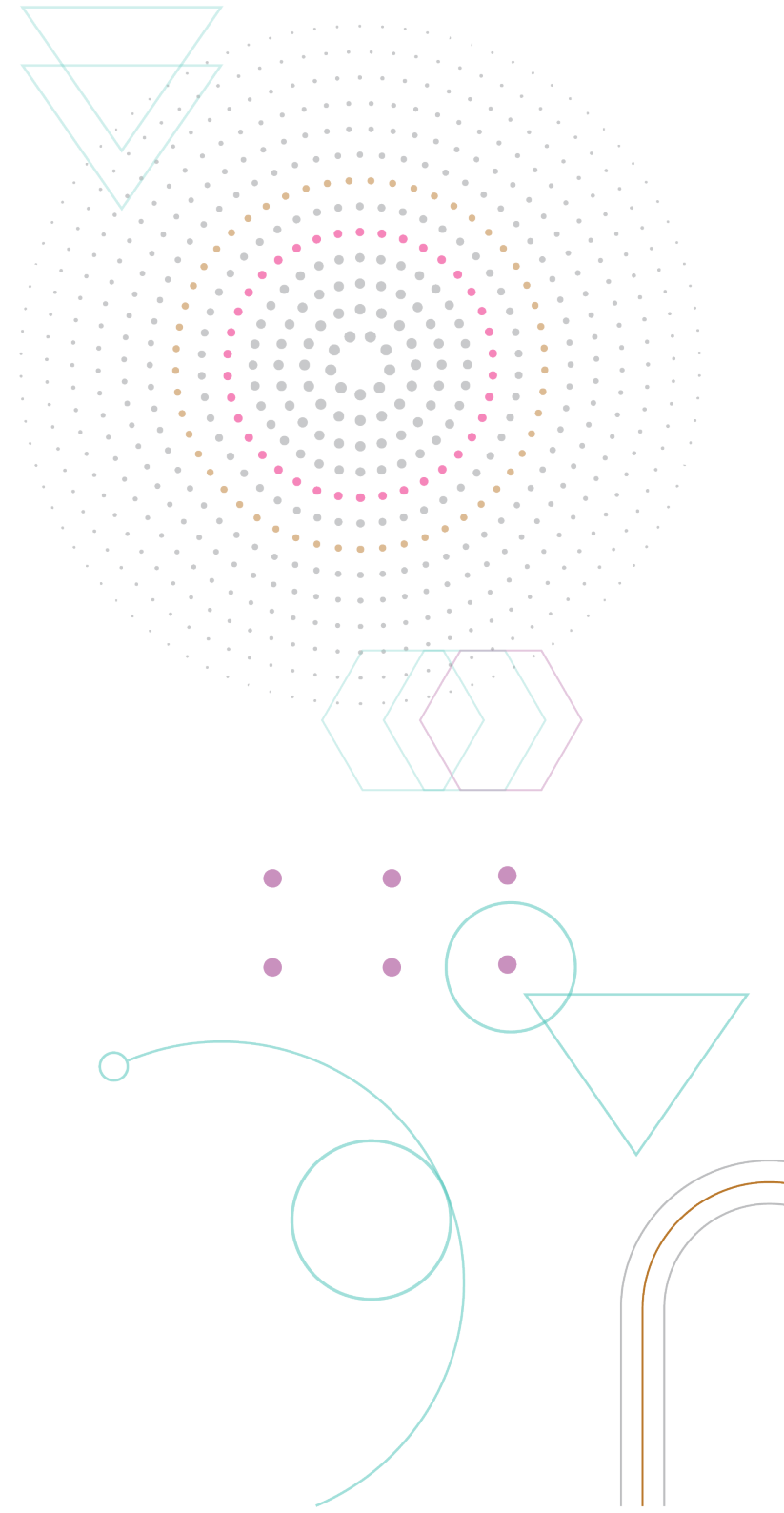


Australian Government
Department of the
Prime Minister and Cabinet

Doherty Institute COVID-19 modelling

Key findings and implications –
including sensitivity analysis

17 September 2021



Sensitivity analysis overview

The Doherty Institute has run sensitivity analysis to test the effect on its earlier modelling of higher case numbers when moving to Phases B and C of the National Plan to transition Australia's National COVID-19 Response (National Plan).



Doherty's sensitivity analysis found that the Delta variant can be managed at vaccination rates of 70% and 80% when combined with *optimal test, trace, isolate and quarantine (TTIQ) practices* and *appropriate public health and social measures (PHSMs)* to control transmission and manage capacity of the health system.



Doherty's sensitivity analysis showed that, even if an outbreak starts with hundreds or thousands of cases, its **original conclusions** for transitioning to Phases B and C of the National Plan at 70% and 80% vaccination rates respectively **remain robust**.



The sensitivity analysis confirms that, when daily case numbers are in the tens or hundreds, movement to Phase B can be achieved with vaccination rates of 70% when combined with *low-level* PHSMs and *partial* TTIQ or alternatively *baseline* PHSMs and *optimal* TTIQ.



When daily case numbers are in the thousands, applying *medium* PHSMs in the locations of concern would be prudent and improve outcomes as Australia moves to Phase B at 70% vaccination rates, before shifting to *low* PHSMs from 80%.



Doherty is now undertaking further work that focuses on synergies between vaccination, TTIQ and PHSMs at a **small area level** – reflecting that COVID-19 outbreaks will continue to occur like a number of localised 'spot fires' – and for **high-risk groups and settings**, including Indigenous Australians and schools.



The Doherty Institute view the **importation of COVID-19 into all jurisdictions as inevitable**, therefore **clear population messaging** is as critical to dealing with COVID-19 outbreaks as ensuring the health sector is ready.



The impact of COVID-19 on children is already incorporated in the Doherty modelling and the setting of targets. The **best way to protect children is for the adult population**, including their parents, **to get vaccinated**, as they are more likely to transmit COVID-19 and children experience less severe health outcomes from COVID-19.



The Doherty modelling confirms that with high vaccination and appropriate TTIQ and PHSMs to constrain outbreaks, overall cases and deaths are expected to be of a **similar order of magnitude to annual influenza** - on average in Australia around 178,600 confirmed cases of influenza annually and 642 deaths attributed to influenza (2016 -2019), with 313,466 cases and 958 deaths in 2019. COVID-19 projected deaths are expected to be significantly lower than from other major causes, such as cancer, dementia, diabetes and road accidents.

With low or medium case numbers when entering Phase B, outbreaks can be constrained through optimal test, trace, isolate and quarantine (TTIQ) capacity or low public health and social measures (PHSMs)

The table below shows the cumulative clinical outcomes over the first **180 days** of an outbreak starting with **low case numbers** (10s) at **70% vaccination coverage** with different combinations of PHSMs and TTIQ effectiveness.

	Baseline PHSMs and Optimal TTIQ	Low PHSMs and Partial TTIQ
Symptomatic infections	21,791	8,013
Ward admissions	706	271
ICU admissions	132	58
Deaths	106	42



The scenarios modelled above are based on the simplifying assumption of a single national epidemic. Both PHSM and TTIQ settings are **fixed** for the entire duration of these modelled scenarios.

'Real world' clinical outcomes are expected to be more positive with jurisdictions adjusting PHSMs to constrain outbreaks as necessary, consistent with the National Plan, 12-15 year olds vaccinated and effective treatments.



The case, hospitalisation and death rates between the **low** (10s) and **medium** (100s) case outbreak scenarios are **very similar** when taking into account the full period of the epidemic. The low scenario does not complete its full course in 180 days.

For example, there is approximately a **5% difference** between estimated symptomatic infections and deaths under the low cases scenario for its full epidemic curve compared to the medium scenario (which has largely completed its course in the first 180 days), at 70% vaccination coverage and with baseline PHSMs and partial TTIQ.

The findings highlight the **importance of maintaining effective contact tracing and proportionate public health measures** to control transmission in outbreak areas.

With higher case numbers when entering Phase B, outbreaks can be constrained through medium PHSMs between 70 and 80% coverage in outbreak areas

The table below shows the cumulative clinical outcomes over the first **180 days** of an outbreak starting with **high case numbers** (1000s) with partial TTIQ and the application of **medium PHSMs between 70% and 80%** vaccination coverage (~2 weeks) followed by low PHSMs.

	Medium/low PHSM and Partial TTIQ
Symptomatic infections	156,799
Ward admissions	5,630
ICU admissions	1,216
Deaths	948

'Real world' clinical outcomes are expected to be more positive with jurisdictions adjusting PHSMs to constrain outbreaks as necessary, consistent with the National Plan, 12-15 year olds vaccinated and effective treatments.



Given the importance of constraining transmission early with high case numbers at 70%, application of medium PHSMs at the time of transition to Phase B is recommended in **outbreak areas** until 80% coverage (~2 weeks), followed by low PHSMs. At 80% coverage, outbreaks are expected to be markedly easier to manage.



In comparison ...

Influenza impact in Australia in 2019				
Age	0 - 19	20 - 64	65+	Total
Cases	122,764	142,455	48,217	313,466
Deaths	18	99	841	958

Other causes of death in 2019

- 47,698 Cancer
- 14,591 Dementia
- 4,513 Diabetes
- 13,995 Heart diseases
- 1,186 road accidents

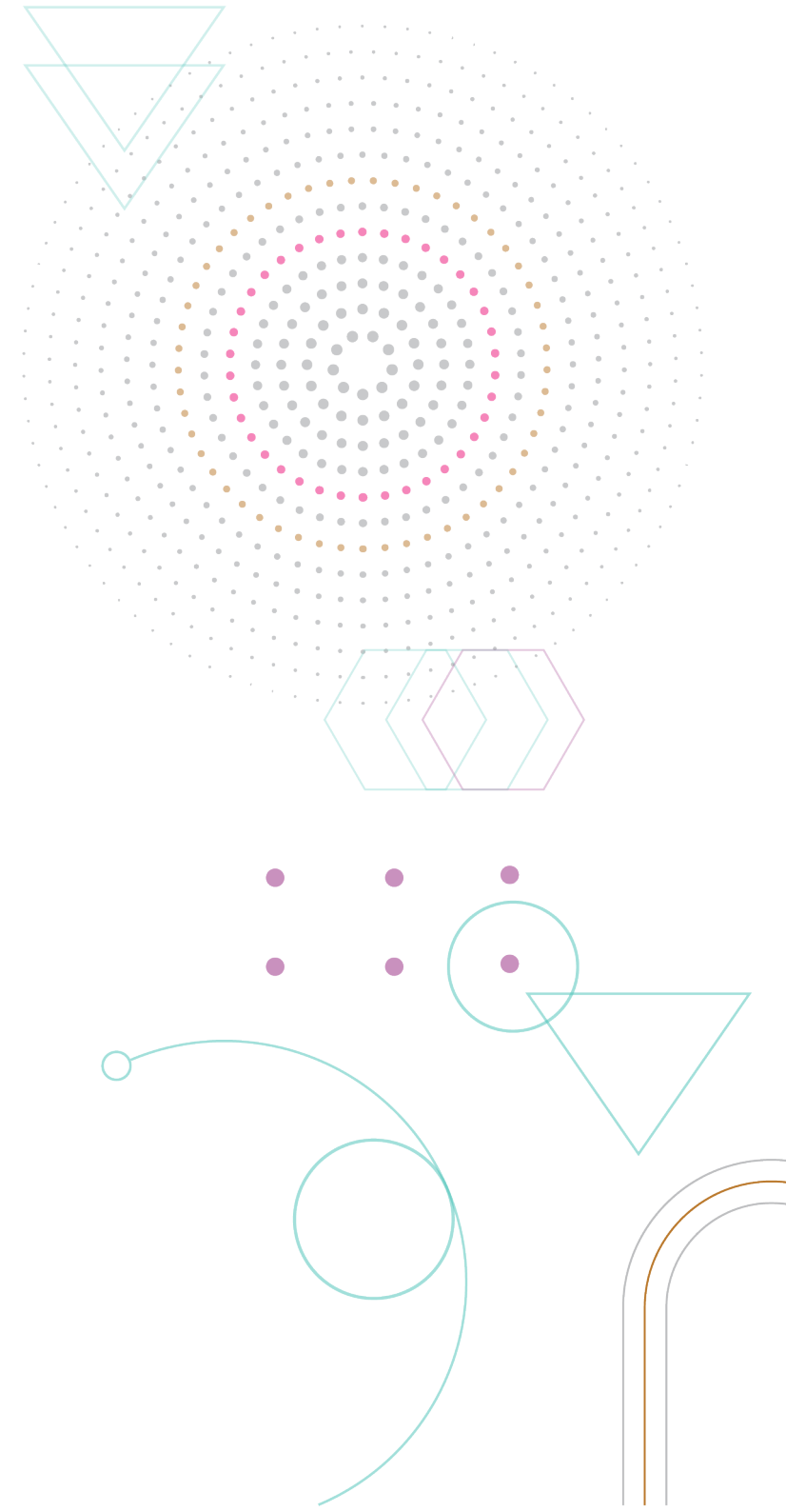


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Key findings and implications

3 August 2021



Vaccinating around 70% of the population aged 16+ will allow Australia to transition to Phase B of the National Plan

Vaccination coverage is a continuum, with every increase reducing transmission and negative health outcomes.

Younger adults are peak transmitters of COVID-19, while older adults experience the most severe health impacts.

As supply allows, extending eligibility to all adults (16+) offers the greatest potential to slow down transmission.

The Doherty modelling indicates that once around 70% of the population aged 16 and over is vaccinated, Australia will be able to move to Phase B of the National Plan without exceeding health system capacity, so long as this is **combined with optimal TTIQ and low-levels of ongoing restrictions and public health measures**, with jurisdictions adjusting in response to outbreaks as necessary, including:



Maintaining effective track and trace, isolation and quarantine



Social distancing and capacity limits in commercial settings and workplaces



2sqm social distancing (or density restrictions)



Record keeping and COVID-safe plans

In Phase B, **lockdowns are unlikely** with low levels of ongoing restrictions.

At 70% vaccination coverage, the number of strict lockdowns would be significantly reduced

Rapid epidemic growth and high caseloads are expected at **50%** and **60%** coverage of the population, with more substantial transmission reduction at **70%** and **80%**.

Therefore, until we have high vaccination coverage:



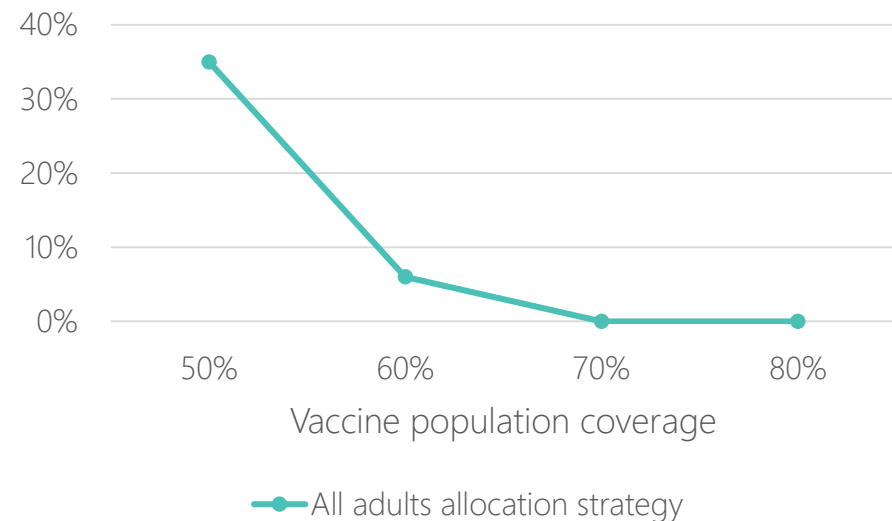
Any outbreaks are likely to have rapid and uncontrolled growth, with significant morbidity and mortality and requiring regular and extended lockdowns.



The optimal strategy is likely to be to continue with the suppression approach and lock down early and hard when there is an outbreak to limit the duration and costs of lockdowns.

The Federal Government has **aligned its economic support and assistance to support faster and stronger lockdowns** in Commonwealth-declared COVID-19 hotspots while we are in the suppression phase.

Percentage of time needed to stay in strict lockdowns with optimal test, trace, isolate and quarantine measures and low-level restriction measures



With vaccine coverage **around 70%**, strict lockdowns will be unlikely. **Low case numbers** can be **maintained with low restrictions** which ensures test, trace, isolate, quarantine measures are most effective.

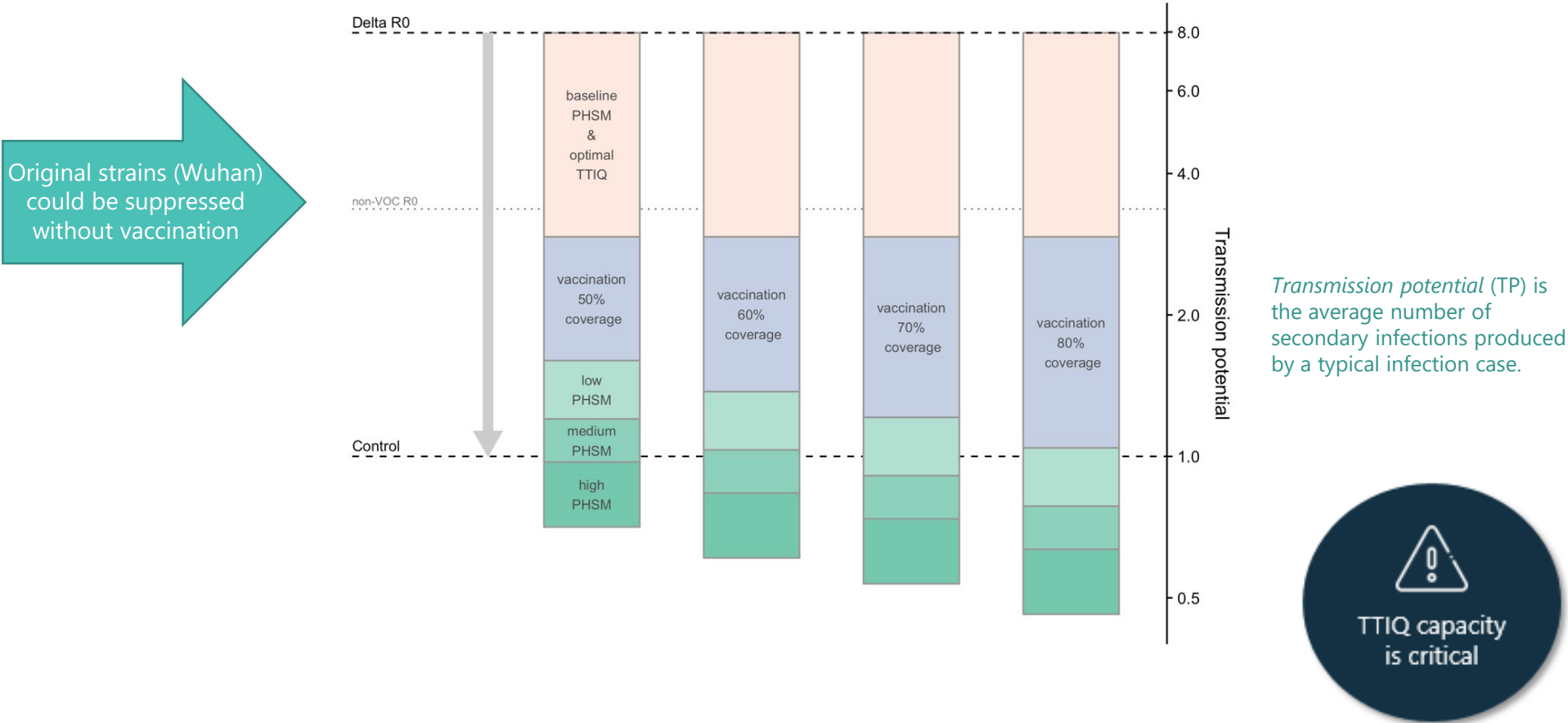
It is not possible to constrain an outbreak in Phase B using light restrictions when vaccine coverage is only 50% or 60%.

Differential vaccine rates by age group will be necessary to minimise severe health outcomes and transmission.

The vaccination rates of those over 60 is expected to be around **90%** by the time there is movement to Phase C.

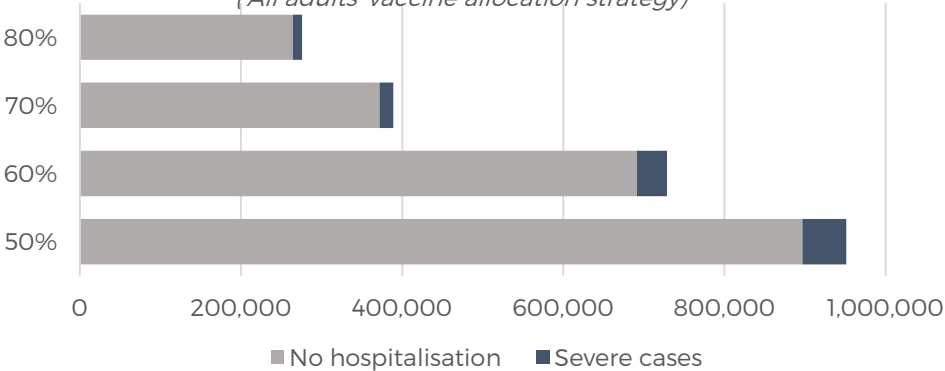
As vaccine coverage increases, less stringent public health and social measures will be required to bring transmission potential below 1

The chart below shows the combined effects of vaccination and public health and social measure scenarios on COVID-19 transmission potential under the 'All adults' vaccination scenario assuming **optimal TTIQ effectiveness**, due to high caseloads. Standard age (60+) and dosing interval (12 weeks) recommendations are assumed for AstraZeneca.




At 70% and 80% vaccination coverage, the rates of severe infections are greatly reduced in an uncontrolled outbreak scenario

Cumulative symptomatic infections over the first 180 days of an outbreak with partial TTIQ and baseline PHSMs
(All adults' vaccine allocation strategy)



The chart on the left is likely to overstate the numbers of infections and deaths. The numbers would be significantly lower with low level restrictions and optimal TTIQ.



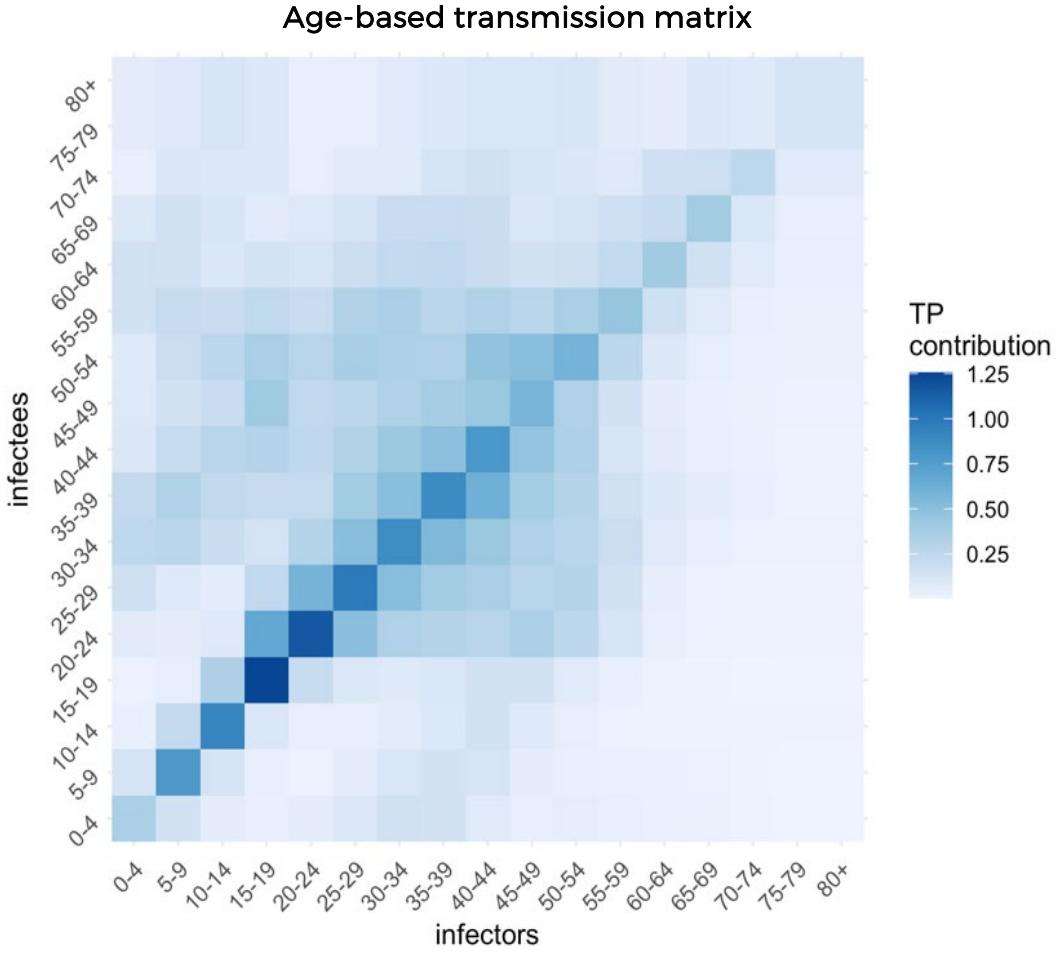
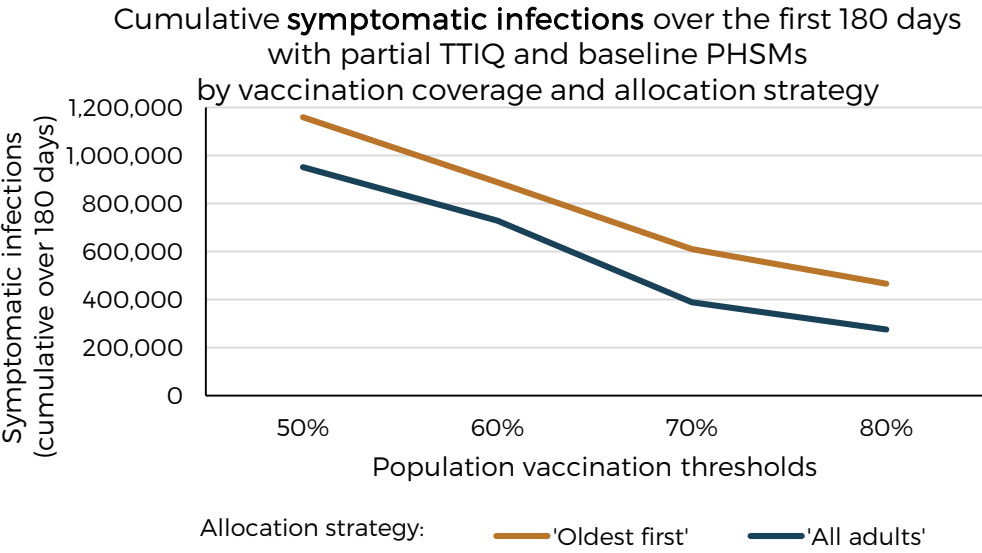
The modelled scenario is premised on the seeding of infections by 30 individuals. The scenario is unlikely as it assumes baseline restrictions (minimal density and capacity restrictions).

The modelling assumes vaccine coverage is uniform across Australia. However, **outbreaks could quickly spread through sub-groups with lower rates of vaccination.**

Even coverage is critical and could be assisted by monitoring and heat maps to **identify local government areas** that need **greater support** to raise their vaccine uptake.

As supply allows, extending vaccinations for adults under 40 years offers the greatest potential to reduce transmission now that a high proportion of vulnerable Australians are vaccinated

Vaccine uptake by young adults (age 16 and over) will **strongly influence** the impact of vaccination on overall transmission



We need to increase the uptake of AstraZeneca to combat the challenge the aggressive Delta strain presents to Australia



The Delta strain has intensified the need for increased vaccination uptake globally.

Full AstraZeneca vaccine coverage is comparable to full Pfizer coverage in reducing death and hospitalisation, and health advice recommends adults **under the age of 60 should consider getting AstraZeneca.**

Given current supply, there are **positive outcomes** from an increased uptake of the AstraZeneca vaccine among people **aged 40 and over.**

More than 750 million AstraZeneca vaccines have been supplied globally in the past 12 months. In the United Kingdom, **24.7 million first doses** and **22.8 million second doses** have been administered as of 14 July 2021.

The health advice states that adults under the age of 60 should consider getting the AstraZeneca vaccine in the context of a COVID-19 outbreak.

Vaccine effectiveness estimates (% reduction)				
	Pfizer BNT		AstraZeneca	
	1 dose	2 doses	1 dose	2 doses
Symptomatic infection	33%	83%	33%	61%
Hospitalisation	71%	87%	69%	86%
ICU admission	71%	87%	69%	86%
Mortality	71%	92%	69%	90%

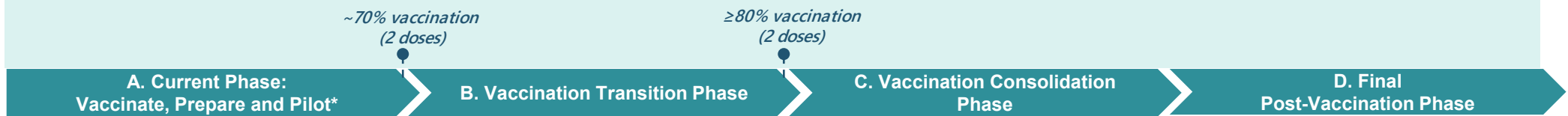
The table above shows two doses of the AstraZeneca vaccine are comparable to two doses of Pfizer for reducing hospitalisation, ICU admission and death.



National Plan to transition Australia’s National COVID-19 Response

National Cabinet agreed to a national plan to transition Australia’s National COVID-19 Response from its current pre vaccination settings, focussing on continued suppression of community transmission, to post vaccination settings focussed on prevention of serious illness, hospitalisation and fatality, and the public health management of other infectious diseases

Phases triggered in a jurisdiction when the average vaccination rates across the nation have reached the threshold and that rate is achieved in a jurisdiction expressed as a percentage of the eligible population (16+), based on the scientific modelling conducted for the COVID-19 Risk Analysis and Response Task Force



A. Current Phase: Vaccinate, Prepare and Pilot*
Continue to strongly suppress the virus for the purpose of minimising community transmission

Measures may include:

- Accelerate vaccination rates;
- Close international borders to keep COVID-19 out;
- Early, stringent and short lockdowns if outbreaks occur;
- Minimise cases in the community through effective test, trace and isolate capabilities;
- Implement the national vaccination plan to offer every Australian an opportunity to be vaccinated with the necessary doses of the relevant vaccine as soon as possible;
- Inbound passenger caps temporarily reduced;
- Domestic travel restrictions directly proportionate to lockdown requirements;
- Commonwealth to facilitate increased commercial flights to increase international repatriations to Darwin for quarantine at the Centre for National Resilience in Howard Springs;
- International Freight Assistance Mechanism extended;
- Trial and pilot the introduction of alternative quarantine options, including home quarantine for returning vaccinated travellers;
- Expand commercial trials for limited entry of student and economic visa holders;
- Recognise and adopt the existing digital Medicare Vaccination Certificate (automatically generated for every vaccination registered on AIR);
- Establish digital vaccination authentication at international borders;
- Prepare vaccine booster programme; and
- Undertake a further review of the national hotel quarantine network.

B. Vaccination Transition Phase
Seek to minimise serious illness, hospitalisation and fatality as a result of COVID-19 with low level restrictions

Measures may include:

- Maintain high vaccination rates, encouraging uptake through incentives and other measures;
- Minimise cases in the community through ongoing low-level restrictions and effective track and trace;
- Lockdowns less likely but possible;
- International border caps and low-level international arrivals, with safe and proportionate quarantine to minimise the risk of COVID entering;
- Ease restrictions on vaccinated residents (TBD);
- Restore inbound passenger caps at previous levels for unvaccinated returning travellers and larger caps for vaccinated returning travellers;
- Allow capped entry of student and economic visa holders subject to quarantine arrangements and availability;
- Introduce new reduced quarantine arrangements for vaccinated residents; and
- Prepare/implement vaccine booster programme (depending on timing).

C. Vaccination Consolidation Phase

Seek to minimise serious illness, hospitalisations and fatalities as a result of COVID-19 with baseline restrictions

Measures may include:

- Maximise vaccination coverage;
- Minimum ongoing baseline restrictions, adjusted to minimise cases without lockdowns;
- Highly targeted lockdowns only;
- Continue vaccine booster programme;
- Exempt vaccinated residents from all domestic restrictions;
- Abolish caps on returning vaccinated Australians;
- Allow increased capped entry of student, economic, and humanitarian visa holders;
- Lift all restrictions on outbound travel for vaccinated Australians;
- Extend travel bubble for unrestricted travel to new candidate countries (Singapore, Pacific);
- Gradual reopening of inward and outward international travel, with safe countries and proportionate quarantine and reduced requirements for fully vaccinated inbound travellers.

D. Final Post-Vaccination Phase

Manage COVID-19 consistent with public health management of other infectious diseases

Measures may include:

- Open international borders;
- Quarantine for high-risk inbound travel;
- Minimise cases in the community without ongoing restrictions or lockdowns;
- Live with COVID-19: management consistent with influenza or other infectious diseases;
- Boosters as necessary;
- Allow uncapped inbound arrivals for all vaccinated persons, without quarantine; and
- Allow uncapped arrivals of non-vaccinated travellers subject to pre-flight and on arrival testing.

** No jurisdiction required to increase restrictions beyond current settings
The Plan is based on the current situation and is subject to change if required
The COVID-19 Risk Analysis and Response Taskforce’s report is available at: pmc.gov.au.*