



# WA Department of Health Omicron COVID-19 modelling

**Update: February 2022**

The WA Department of Health has undertaken modelling to reflect the recent emergence of the Omicron strain of COVID-19 in our community and how this new variant affects WA's planning to transition to living with COVID-19, including the ability to maintain a highly responsive WA Health System.

Important considerations which have impacted the modelling include:

- The very different nature of Omicron which evidence has shown to be substantially less severe than the Delta strain, albeit far more transmissible.
- The levels of immunity within the Western Australian population as a result of high levels of vaccination and the significant booster uptake.
- The trajectory of the current outbreak and how it impacts the risk assessment of opening our borders.

## Background to Omicron modelling

Modelling conducted by the Department of Health has analysed a number of pandemic scenarios for WA. The modelling considers a range of variables, including transmissibility of the virus, protection conferred against infection and serious disease by two or three doses of the vaccine, benefits of the booster doses at various population coverage, waning of vaccine protection against infection and serious disease, and the severity of the disease in both vaccinated and unvaccinated populations leading to hospitalisations, intensive care unit (ICU) admissions and deaths.

The model projects the number of symptomatic cases, hospitalisations, ICU admissions, deaths, days where the health system has over 200 and 300 beds occupied by COVID-19 patients, and the effect of applying different levels of public health and social measures (PHSMs) at differing caseloads.

The model does confirm the importance of vaccination (including boosters), PHSMs and Test, Trace, Isolate and Quarantine (TTIQ) measures.

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The model has considered two important changes (as opposed to Delta modelling) outlined below.

## 1. Increased transmissibility

Two factors contribute to Omicron’s increased transmissibility compared to the Delta variant:

### Base reproduction rate

While it has been suggested that Omicron’s higher transmissibility may be entirely attributable to increased immune escape, studies of household secondary attack rates suggest that the intrinsic transmissibility of the virus has increased. As such, a higher reproduction rate was applied in the model.

### Immune escape capability

Multiple studies show waning in the effectiveness of vaccines in preventing both infection and onward transmission, although maintaining effectiveness against severe disease and hospitalisations, including ICU. Therefore, the susceptibility of the WA population varies significantly depending on the timing of second and third dose vaccinations. Estimates of both waning immunity and actual immunisation data have been used to model the projected vaccine-induced immunity of the Western Australian population over time.

The WA population has had very little previous exposure to, and thus natural immunity to, COVID-19. The waning effectiveness of natural immunity against reinfection is still being studied across the world and will be considered in future iterations of the model.

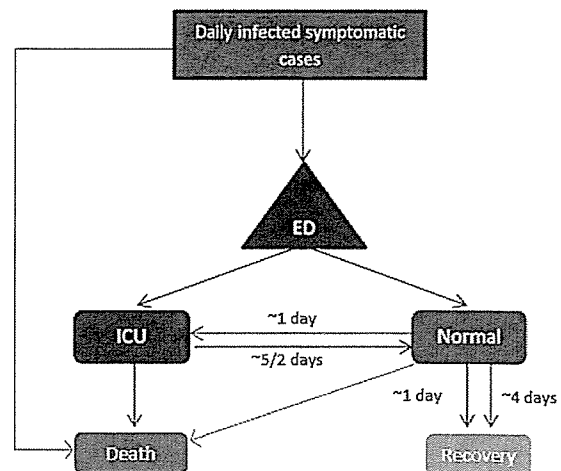
## 2. Reduced severity

Experiences both internationally and more recently interstate, have confirmed a substantial reduction in the severity of the Omicron disease resulting in decreased rates of hospitalisation. Statistical analyses conducted by universities and research institutes estimate a reduction in hospitalisation rates of approximately 70%, when compared to the Delta variant. This varies with the vaccination status of the individual, with the unvaccinated person far more likely to be hospitalised at the same age or gender. The average length-of-stay for patients requiring hospitalisation has also significantly reduced and is estimated to be 3-4 days, down from 8 days previously.

Table 1: Hospitalisation parameters and length of stay

Parameter	Days (sd)
Symptom onset to hospital admission	6 (+/-1 day)
General ward bed stay	4 (+/-1.71)
ICU bed stay (ventilated)	5 (+/- 2)
ICU bed stay (non-ventilated)	2 (+/- 0.7)
Average general ward bed stay prior to ICU admission	1
Average general ward bed stay after step-down from ICU	1

Figure 1: Clinical care pathway and length of stay



## Modelling results

The following projections assume a full re-opening of interstate and international borders to high numbers of visitors and returning residents, at the same time as the presence of high numbers of the Omicron strain in the local community. Certain border control measures such as testing on arrival and vaccination requirements will be applied to reduce the transmission rate from interstate travellers into the community.

As demonstrated in other jurisdictions, with a high anticipated caseload it is unlikely that a high or medium level of contact tracing can be maintained throughout the outbreak. Accordingly, the WA Department of Health model projections assume a deterioration in contact tracing efficacy and compliance as the number of cases rises, consistent with other jurisdictions (low TTIQ).

### 1. Cases, hospitalisations, general beds, ICU beds

The following figure and table illustrate symptomatic cases, general beds, ICU beds and deaths, as well as the numbers of days where there are more than 200 and 300 beds occupied with COVID patients. Ranges are given.

Furthermore, it is anticipated that these are conservative estimates and, as result of the WA population being significantly more vaccinated than other Australian jurisdictions and other nations when the outbreak commenced, the actual effect may be lower cases and bed requirements.

Figure 2: Symptomatic cases and bed occupancy

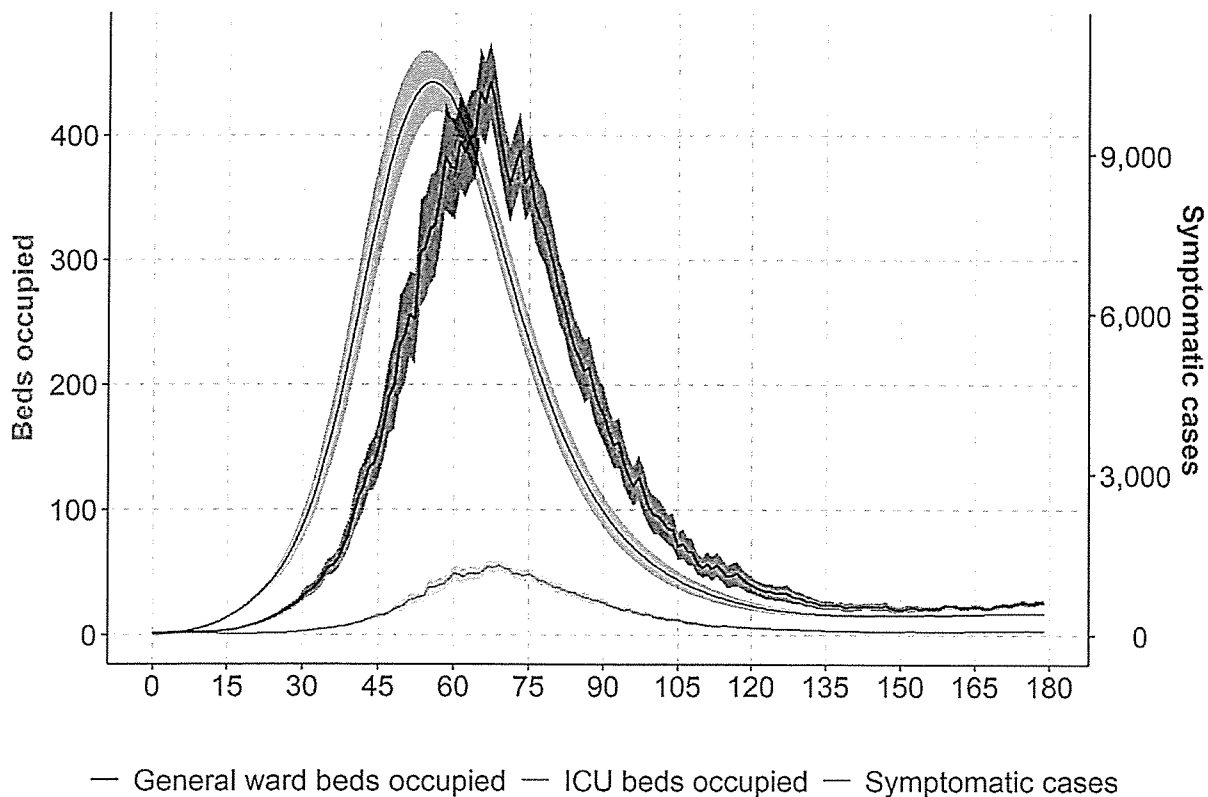


Table 2: Symptomatic cases and bed occupancy

Health system and case impact	At peak	Cumulative to 180 days	Days over 200/300 beds used
Symptomatic cases	10,363 [9,770-10,956]	463,932 [421,964-505,899]	n/a
General ward beds	443 [411-475] beds occupied	5,685 [4,545-6,826] admissions	40 [35-43]/27 [21-28]
ICU beds	56 [51-61] beds occupied	715 [547-883] Admissions	n/a
Deaths	3 [3-4]	129 [89-171]	n/a

## 2. Impact of booster uptake

Modelling of current vaccine rates suggests that booster dose coverage will be greater than 65% for the 16 years and over group, over 79% for the 50 years and over group, and over 90% for the 70 years and over group by 2 March 2022. WA's booster coverage is anticipated to continue increasing during the period of epidemic growth, reaching 80% coverage around the time of the peak. Modelling also found that peak vaccine immunity will be reached in March 2022.

The following illustrates booster uptake projections over time across different population groups, showing that uptake is currently high in the more vulnerable groups, with minimal expected increases over time.

Table 3: Booster uptake projections over time

Population	20-Jan-22	15-Feb-22	02-Mar-22	16-Mar-22
16 y.o. +	27%	53%	65%**	71%
50 y.o. +	44%	73%	79%	84%
70 y.o. +	55%	83%	86%	90%

\*\* This rate is expected to be nearing 70% due to increased booster update prior to the border opening.

## 3. Impact of reopening the borders

Opening the borders at 12:01am on 3 March 2022 will have little or no effect on the trajectory of the current outbreak. With testing all arrivals, and all eligible domestic arrivals being triple vaccinated (if eligible), international arrivals being double vaccinated and all unvaccinated international arrivals (capped at 70/week) required to do 7 days hotel quarantine, there will be minimal escape of positive cases, and numbers of cases seeded into the community from arrivals will be very low in comparison to the local outbreak. As outlined below, the modelling suggests that only 13 additional cases would be added to the local community caseload with the new testing arrangements.

Table 4: Estimated daily number of positive cases leaking into the community despite RAT testing on arrival

	Interstate	International	Total
Symptomatic	1	6	7
Asymptomatic	1	5	6
Total	2	11	13

### Additional key observations

- In a living with COVID approach, further border restrictions will have limited or no efficacy in suppressing cases, as epidemic growth is overwhelmingly driven by community transmission.
- With reducing positivity rates interstate and around the world and the systematic testing of all arrivals, it is expected that very small numbers of positive cases will leak into the community.
- Based on current high vaccination rates, high and increasing booster uptake rates and the expected waning in vaccine efficacy, the Western Australian population's immunity is projected to be at its highest in March 2022, which coincides with the expected uptrend in the epidemic curve.
- Implementing Level 1 and Level 2 Public Health and Social Measures (PHSMs) at the correct times in the outbreak will reduce the number of overall symptomatic cases at peak and keep caseloads at levels that will prevent a significant overload on the WA health system. Prematurely releasing PHSMs will increase the risk of a resurgence in epidemic growth.
- Due to the hard work of all Western Australians, the State is in a unique position and as such there are few (if no) real-world examples from which we can accurately forecast what will occur.
- The WA Health modelling is a highly complex and useful guide to what may happen, taking into account the current outbreak and easing borders on 3 March 2022; however, it is important to note the model is based on a simulation of epidemic growth using a set of scenarios.

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