

COVID-19 variants and vaccine options in 2025

Where are we now?

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Five years after SARS-CoV-2 emerged, COVID-19 continues to challenge global health with evolving variants. In Australia, the Omicron variant NB.1.8.1 is predominant. Advances in diagnostics, therapeutics and mRNA vaccines have strengthened control efforts, with vaccination remaining key to preventing severe disease, especially in high-risk groups.

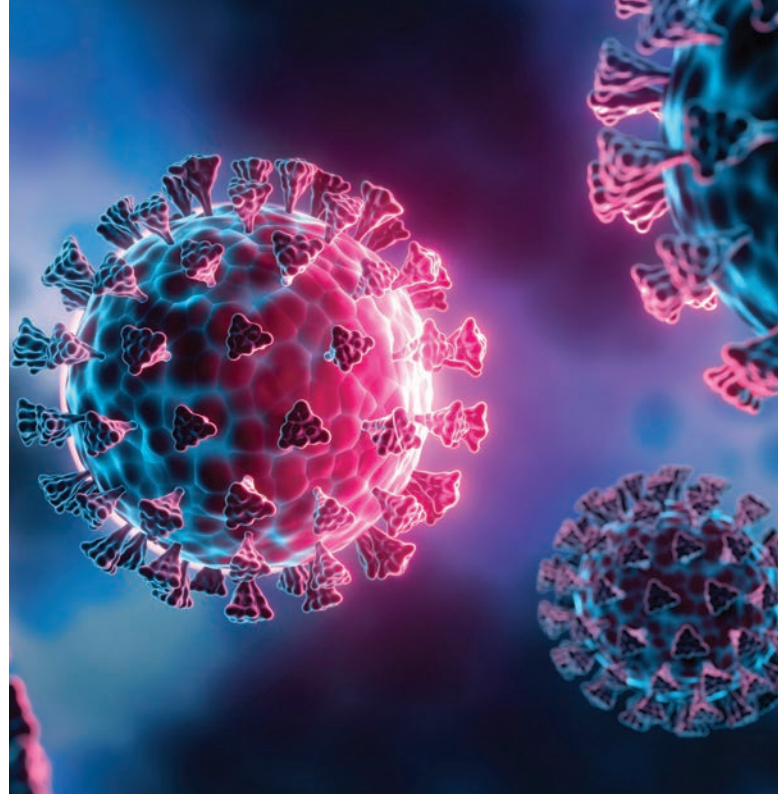
The WHO declared the end of the coronavirus disease 2019 (COVID-19) pandemic in May 2023. In October 2023, Australia commenced de-escalation of the national COVID-19 emergency response.¹ Since then, the causative virus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has continued to circulate, with new variants shaping transmission and disease burden. In 2025, COVID-19 persists as a significant cause of respiratory illness, particularly affecting older adults, residents of aged care and nursing homes and people with medical risk factors.² It was responsible for 516 deaths in the first quarter of this year in Australia and remains the leading cause of death due to acute respiratory infections in Australia across 2023 to 2025.³ This article reviews the global COVID-19 landscape in 2025, summarises the performance of updated vaccines and discusses Australia's epidemiological context and vaccination strategies.

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Key points

- Coronavirus disease 2019 (COVID-19) continues to cause significant morbidity and mortality, particularly in older adults, residents of aged care facilities and people with medical risk factors, including severe immunocompromise.
- Newer variants of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), including recombinant Omicron variant NB.1.8.1 – now the predominant strain in Australia – as well as other JN.1 sublineages, do not appear to cause more severe disease than earlier circulating variants.
- The COVID-19 mRNA vaccines available in Australia are safe and effective in protecting against severe illness and death, with generally mild and short-lived side effects. Protection wanes with time since the last dose; therefore, ongoing booster doses are important for those at highest risk.
- A COVID-19 vaccine booster dose is recommended every six to 12 months for adults aged 65 years and older and for all adults with severe immunocompromise.
- When not actively recommended, a COVID-19 vaccine booster dose is still available for some who wish to have it, based on their preference or risk–benefit assessment.
- GPs play a key role in improving vaccine uptake through active recommendation and establishing vaccine confidence.
- COVID-19 vaccines are free for recommended and eligible groups, including those without Medicare.

SARS-CoV-2 variants and epidemiology

The Omicron variant of SARS-CoV-2 emerged from South Africa in late 2021, and its descendant lineages continue to dominate transmission patterns.⁴ NB.1.8.1 is a recent descendant of Omicron, derived from the recombinant variant XDV.1.5.1. It was first recorded on 22 January 2025 and designated a 'variant under monitoring' by the

WHO.⁵ NB.1.8.1 is growing rapidly and accounts for 10.7% of globally available sequenced strains. It has been the predominant strain in Australia since May 2025, making up 72% of sequences according to the most recent AusTrakka data.⁶ Smaller numbers of other variants under monitoring, including XFG, LP.8.1, KP.3.1.1 and XEC continue to be observed in Australia.⁵ State-based genomic testing in New South Wales and wastewater surveillance in Perth, Western Australia, also indicate a much larger proportion of circulating NB.1.8.1.^{7,8}

Many countries have ceased universal reporting of COVID-19 cases, making the true incidence harder to ascertain. Hospitalisations and deaths remain key indicators monitored by the WHO, and by policy makers.⁹ COVID-19 surveillance has shifted towards integration with influenza and respiratory syncytial virus monitoring systems, using sentinel site reporting, hospital data and wastewater surveillance.¹⁰ Despite under-reporting of mild cases, local data indicate ongoing transmission, with two peaks of COVID-19-associated mortality: one from November to January and the other from May to August.³ This year to date, the number of COVID-19 cases in Australia reached a peak in late June but is overall 31.6% lower than during the same period last year.⁶ COVID-19 notification rates remain highest among people aged 70 years and over, and second highest among children aged zero to four years.⁶ Australian sentinel hospital surveillance data from January to August 2025 showed that more adults aged 65 years and over were admitted with COVID-19 than with influenza or respiratory syncytial virus, whereas more children, including those aged under 4 years, were admitted with respiratory syncytial virus or influenza than with COVID-19.

Clinical presentations of the predominant circulating variants, including NB.1.8.1, resemble those observed with earlier Omicron variants.^{10,11} They typically involve fever and upper respiratory tract symptoms such as rhinorrhoea, cough and sore throat. Newer variants carry mutations that improve immune escape; however, data do not suggest increased severity compared with earlier Omicron variants.⁹ Older adults and people with severe immunocompromise or other medical risk factors remain at higher risk of severe outcomes, including death, from COVID-19.^{12,13}

COVID-19 vaccines and their effectiveness

With the ongoing evolution of SARS-CoV-2 variants, vaccine manufacturers continue to update COVID-19 vaccines to better match circulating strains. In May 2025, the WHO Technical Advisory Group on COVID-19 Vaccine Composition advised that monovalent JN.1 or KP.2 vaccines remain appropriate vaccine antigens, alongside the updated vaccine antigen LP.8.1.¹⁴ Current COVID-19 vaccines available in Australia are the XBB.1.5 and JN.1 mRNA vaccines. XBB.1.5 was the predominant variant from late 2023 to early 2024, and XBB.1.5 vaccines have been available in Australia since 2024. JN.1-adapted vaccines are expected to provide adequate protection against severe disease from the currently predominant NB.1.8.1 variant.^{10,14} The most recently updated LP.8.1 vaccines have already

received regulatory approval in Europe, Canada and the USA; however, they are not yet available in Australia. This reflects the inherent time lag associated with sponsor submission, the local regulatory process and vaccine procurement pathways, which may result in delayed access compared with some other high-income countries.

Recent clinical trial data from early 2025 show that mRNA vaccines targeting the JN.1 variant continue to be safe, with infrequent adverse events.¹⁵ One month after vaccination, individuals who received the JN.1-adapted vaccine developed higher neutralising antibody levels against JN.1, as well as other circulating variants KP.2 and KP.3, compared with those who received the earlier XBB.1.5-adapted version.¹⁵ Although limited efficacy data exist on JN.1-containing vaccines, interim results from the US Centers for Disease Control and Prevention showed that the 2024-2025 COVID-19 vaccines (targeting JN.1 and KP.2 lineages) had estimated vaccine effectiveness against hospitalisation ranging from 40 to 46% among adults aged 65 years and over for up to four months postvaccination, compared with those not receiving the updated vaccine dose. Primary circulating SARS-CoV-2 lineages during the study period were descendants of the Omicron JN.1 lineage, including KP.2, KP.3 and XEC.¹⁶

Earlier findings also suggest that vaccines better matched to circulating variants offer improved protection (Table 1).¹⁶⁻²¹ The effectiveness of XBB.1.5-adapted vaccines against hospitalisation caused by JN.1 lineage viruses has been shown to drop to between 23 and 54%.^{12,17-19,21,22} Furthermore, hybrid immunity – conferred by a combination of vaccination and prior infection – continues to provide the most durable and broad protection, with protective effectiveness against severe disease estimated at above 90%.²³

COVID-19 vaccine recommendations and coverage in Australia

Australia follows an age- and risk-based COVID-19 vaccination strategy, closely aligned with international approaches. After initially offering COVID-19 vaccines universally, the focus has shifted toward protecting those at highest risk of severe disease, such as older adults, people with medical risk conditions and immunocompromised individuals. This approach mirrors strategies in the USA, the UK and Canada, reflecting a global consensus on prioritising high-risk groups.²⁴⁻²⁷

The Australian Technical Advisory Group on Immunisation recommends a COVID-19 vaccine booster every six months for adults aged 75 years and over and every 12 months for adults aged 65 years and over and for all adults with severe immunocompromise (Table 2).²⁸ Healthy adults aged 18 to 64 years are advised to receive a primary COVID-19 vaccine dose and may choose to receive an additional annual booster, based on individual preference and a risk-benefit assessment.

Pregnant women, children and other special groups

Unvaccinated pregnant women are recommended to receive a COVID-19 vaccine at any time during pregnancy. Booster doses

Table 1. Effectiveness of recent COVID-19 vaccines against hospitalisation¹⁶⁻²¹

COVID-19 vaccine	Author (year)	Study population	Study period	Vaccine effectiveness against hospitalisation
2024–2025 COVID-19 vaccine (targets Omicron JN.1 and the JN.1-derived sublineage KP.2)	Link-Gelles et al. (2025) ¹⁶	<ul style="list-style-type: none"> Adults aged ≥18 years USA 	September 2024 to January 2025	<ul style="list-style-type: none"> Immunocompetent adults aged ≥65 years: 46% (95% CI 26–60) Immunocompromised adults aged ≥65 years: 40% (95% CI 21–54)
XBB.1.5 COVID-19 vaccines	Nguyen et al. (2025) ¹⁷	<ul style="list-style-type: none"> Adults aged ≥18 years UK 	October 2023 to April 2024	<ul style="list-style-type: none"> During JN.1 period: 52.2% (95% CI 41–61)
XBB.1.5 COVID-19 vaccines	Antunes et al. (2025) ¹⁸	<ul style="list-style-type: none"> Adults aged ≥65 years UK 	November 2023 to May 2024	<ul style="list-style-type: none"> 45% (95% CI 29–58)
XBB.1.5 COVID-19 vaccines	Carazo et al. (2025) ¹⁹	<ul style="list-style-type: none"> Adults aged ≥60 years Canada 	October 2023 to August 2024	<ul style="list-style-type: none"> During XBB period: 54% (95% CI 46–62) During JN.1 period: 23% (95% CI 13–32)
XBB.1.5 COVID-19 vaccines	Nham et al. (2025) ²⁰	<ul style="list-style-type: none"> Adults aged ≥19 years Korea 	July 2024 to August 2024	<ul style="list-style-type: none"> 26.1% (95% CI 4.7–42.8)
XBB.1.5 COVID-19 vaccines	Lee et al. (2025) ²¹	<ul style="list-style-type: none"> Adults aged ≥50 years Canada 	September 2023 to January 2024	<ul style="list-style-type: none"> During XBB period: 64% (95% CI 57–69) During JN.1 period: 57% (95% CI 48–64)

Abbreviations: CI = confidence interval; COVID-19 = coronavirus disease 2019.

Table 2. ATAGI recommendations on timing of further COVID-19 vaccine doses²⁸

Age group	With severe immunocompromise	Without severe immunocompromise
≥75 years	Recommended every 6 months	
65–74 years	<ul style="list-style-type: none"> Recommended every 12 months Eligible for a dose every 6 months 	
18–64 years	<ul style="list-style-type: none"> Recommended every 12 months Eligible for a dose every 6 months 	Eligible for a dose every 12 months
5–17 years	Eligible for a dose every 12 months	Not recommended
<5 years	Not recommended	

Abbreviation: ATAGI = Australian Technical Advisory Group on Immunisation. Adapted from Australian Government, Department of Health and Aged Care – Statement on COVID-19 vaccine administration in 2025.²⁸

are not routinely recommended for healthy, previously vaccinated pregnant women, as their risk of severe maternal or infant outcomes from infection with the Omicron variant is very low.^{29,30} However, they may choose to receive an additional vaccine dose based on personal preference and circumstances.³¹

A large observational study from South Africa found infants under 12 months had the highest weekly COVID-19-associated hospitalisation rate among individuals aged 18 years and under during the Omicron wave.³² However, disease severity in all age groups – defined as needing oxygen or respiratory support, intensive care admission, developing acute respiratory distress syndrome or death – was lower during the Omicron period than in previous

waves.³² Fever is the most common symptom in hospitalised infants, and the median length of stay is typically short, about one to two days.^{33,34} Maternal vaccination has been shown to result in the transfer of SARS-CoV-2 antibodies to the fetus, providing passive immunity to newborns.^{35,36} However, given the overall low severity of COVID-19 in infants, the benefit of an additional vaccine dose during pregnancy appears limited in most cases.

Other adults with higher exposure risk – such as healthcare workers, people in detention settings or international travellers – may also choose to receive a booster dose, even when it is not routinely recommended.

Vaccine uptake and equity

Although vaccines remain available and funded for those most at risk, maintaining equitable uptake continues to be a challenge, particularly among Aboriginal and Torres Strait Islander communities, people living in rural and remote areas and those with disabilities or complex medical needs.^{37,38} As of mid-2025, the national COVID-19 vaccine coverage remains suboptimal and has declined across all age groups in the past year compared with the preceding 12 months. The steepest decline was observed in adults aged 65 to 74 years, with coverage dropping from 35.4 to 25.6%. Only 32.3% of adults aged 75 years and over received a recommended dose in the past six months, compared with 38.2% in the previous year.³⁸

Coverage among Aboriginal and Torres Strait Islander adults aged 75 years and over is also lower, at 20% in the past six months.⁶ In contrast, vaccine uptake is higher among aged care residents, with 72% having received a booster dose in the past 12 months.³⁸

GPs play a central role in improving COVID-19 vaccine uptake, particularly among high-risk and underserved populations. Through routine care, practice software audits and trusted patient relationships, GPs can identify eligible individuals, address vaccine hesitancy and provide tailored recommendations. Their ability to deliver clear advice, culturally appropriate communication and flexible access – such as extended clinic hours – supports equitable and timely vaccination. Sustained efforts in primary care are essential for maintaining trust and protecting those most at risk as the virus continues to evolve.

Conclusion

In 2025, COVID-19 remains a dynamic and evolving public health concern. Although the pandemic phase has subsided, the virus continues to undergo mutations, necessitating ongoing refinement of vaccine strategies and public health interventions. Circulating subvariants of Omicron such as NB.1.8.1, KP.3.1.1 and XFG highlight the virus's adaptability. Timely vaccination remains central to protecting individuals in Australia at highest risk of severe disease,

including older adults and those with medical risk factors. Updated vaccines that better align with circulating variants are expected to provide improved protection.

Research and development are advancing towards next-generation COVID-19 vaccines that aim to deliver broader and more durable immunity. These include self-amplifying mRNA platforms and pan-coronavirus vaccines that target conserved viral regions.^{39,40} Australia is contributing to these innovations, including through clinical trials of microneedle patch delivery systems designed to enhance accessibility and acceptability.

Addressing declining vaccination rates requires tailored communication, culturally safe outreach services and strong local partnerships. GPs play a key role in engaging priority populations, offering trusted advice and facilitating access through routine care and community-based support. Ensuring equitable access and uptake – particularly among priority populations – remains a cornerstone of Australia's COVID-19 vaccination strategy in 2025. **RMT**

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A list of references is included in the online version of this article (www.respiratorymedicinetoday.com.au).

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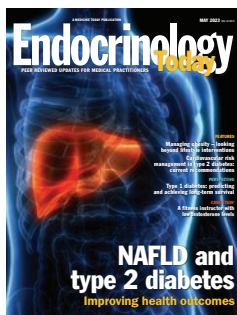
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