

# Influenza disease and vaccination in children in Australia

Influenza vaccine uptake in children has grown in response to increased awareness and progressive expansion of funding

Over the past decade, multiple initiatives have been implemented to strengthen influenza vaccination programs in Australia, with an increasing focus on children. In this article, we review these changes, the events that prompted them, and how they have influenced influenza vaccine uptake in Australia.

## Burden of influenza

Before the coronavirus disease 2019 (COVID-19) pandemic, influenza was responsible for a higher disease burden and overall health impact than any other vaccine-preventable disease in Australia.<sup>1</sup>

Historically, Australian influenza notification rates have been highest in children, particularly in those aged less than 2 years.<sup>2</sup> The highest annual hospitalisation rates for influenza overall have been recorded in children aged less than 6 months (192 per 100 000 per year), followed by children aged 6–23 months (109 per 100 000 per year).<sup>2</sup> Although paediatric hospitalisation rates are high, annual rates of influenza-associated deaths in children are low compared with adults: 0.20–0.39 per 100 000 children aged under 5 years compared with 0.65 per 100 000 in people aged 65–74 years and 3.66 per 100 000 in people aged 75 years or more.<sup>2</sup>

While it appears that influenza may have become more burdensome for children in recent years due to an increase in disease notifications (Box 1), the notification rates also reflect an increase in influenza testing rates. For example, in New South Wales, there was a seven-fold increase in tests done in 2019 compared with 2009.<sup>3</sup> However, influenza notifications dramatically declined in 2020 in all age groups (Box 1), most likely due to increased hygiene and physical distancing measures and the implementation of border closures to reduce transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) — the virus that causes COVID-19.

Influenza-associated morbidity and mortality rates also likely underestimate the true influenza-associated burden related to underascertainment bias and other factors.

## Influenza vaccination recommendations and funding

All people in Australia aged 6 months or more are recommended to receive annual influenza vaccination, with free influenza vaccines for the highest risk groups provided by the National Immunisation Program (NIP).<sup>4</sup> Vaccination is only contraindicated for people who have experienced anaphylaxis in association with a previous dose or any component of an influenza

vaccine.<sup>4</sup> Children aged 6 months to 9 years receiving the vaccine for the first time require two doses at least 4 weeks apart; those aged 9 years or more require only one dose in their first year of receipt.<sup>4</sup>

Until recently, there was limited funding for, and promotion of, influenza vaccination in children. In 2018, following the large 2017 influenza season (Box 1), and underpinned by evidence of paediatric disease burden, vaccine safety and efficacy,<sup>2,6,7</sup> all Australian states and territories, except the Northern Territory, followed Western Australia's 2008 initiative in funding influenza vaccination for all children aged 6–59 months; the NT followed in 2019 (Box 2). The NIP expanded in 2019 to include Aboriginal and Torres Strait Islander peoples of all ages (closing the funding gap for those aged 5 to < 15 years), and in 2020, the influenza vaccine was added to the NIP for all children aged 6–59 months.<sup>5</sup>

## Influenza vaccine effectiveness

Influenza vaccine effectiveness is usually measured against either all laboratory-confirmed influenza (using disease notification data) or influenza-associated hospitalisation (a proxy for severe disease) and varies each year. In 2015, influenza vaccine effectiveness in children aged under 18 years estimated from data collected from sentinel general practitioner networks was 54%,<sup>8</sup> indicating that influenza-associated primary care visits more than halved in vaccinated children compared with unvaccinated children. In 2017, a year dominated by the influenza A subtype H3N2, for which the vaccine typically performs less well, the influenza vaccine effectiveness against hospitalisation for influenza was estimated to be 30% in children;<sup>6</sup> however, in 2018, an influenza A subtype H1N1 predominant year, vaccine effectiveness against paediatric influenza hospitalisation was 78%.<sup>9</sup>

Despite moderate effectiveness, at an individual and population level, influenza vaccination still prevents significant morbidity and mortality. For example, with 55% of population coverage and an adjusted vaccine effectiveness of only 32% (95% CI, 16–44%) for children aged 5–17 years during the 2017–2018 influenza season in the United States, vaccination was still estimated to have prevented 1.4 million illnesses, 711 000 medical visits, 3700 hospitalisations, and 89 deaths of children aged 5–17 years.<sup>10</sup>

## Influenza vaccine safety

In April 2010, early in the Australian influenza vaccination season, the Australian Government's Chief Medical Officer suspended the use of influenza vaccine in children aged 5 years or less due to an

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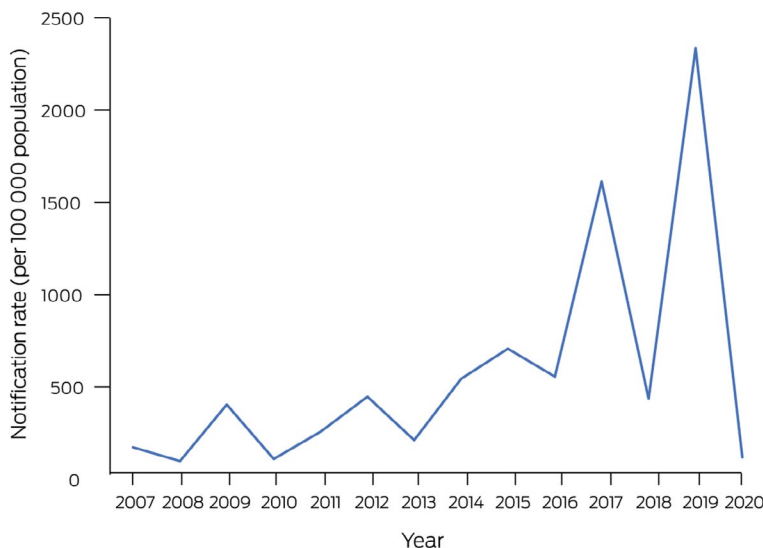
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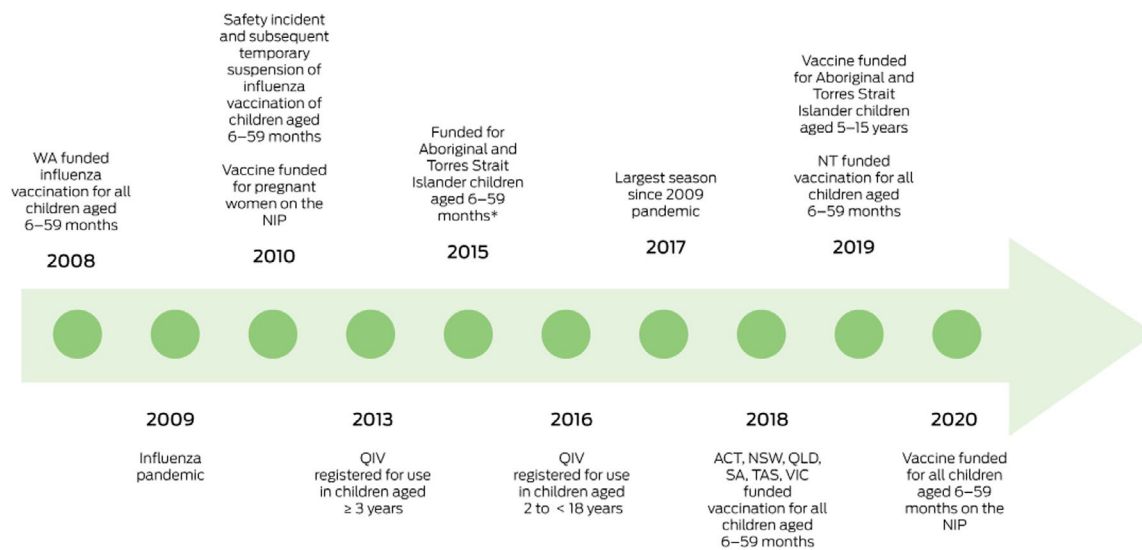
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### 1 Notification rates of laboratory-confirmed influenza in children aged less than 5 years in Australia, 2007-2020\*



\* Influenza testing rates also increased over this time period.<sup>3</sup> Source: National Notifiable Diseases Surveillance System, as at 18 February 2021. ◆

### 2 Significant events in influenza disease and vaccination policy in Australia



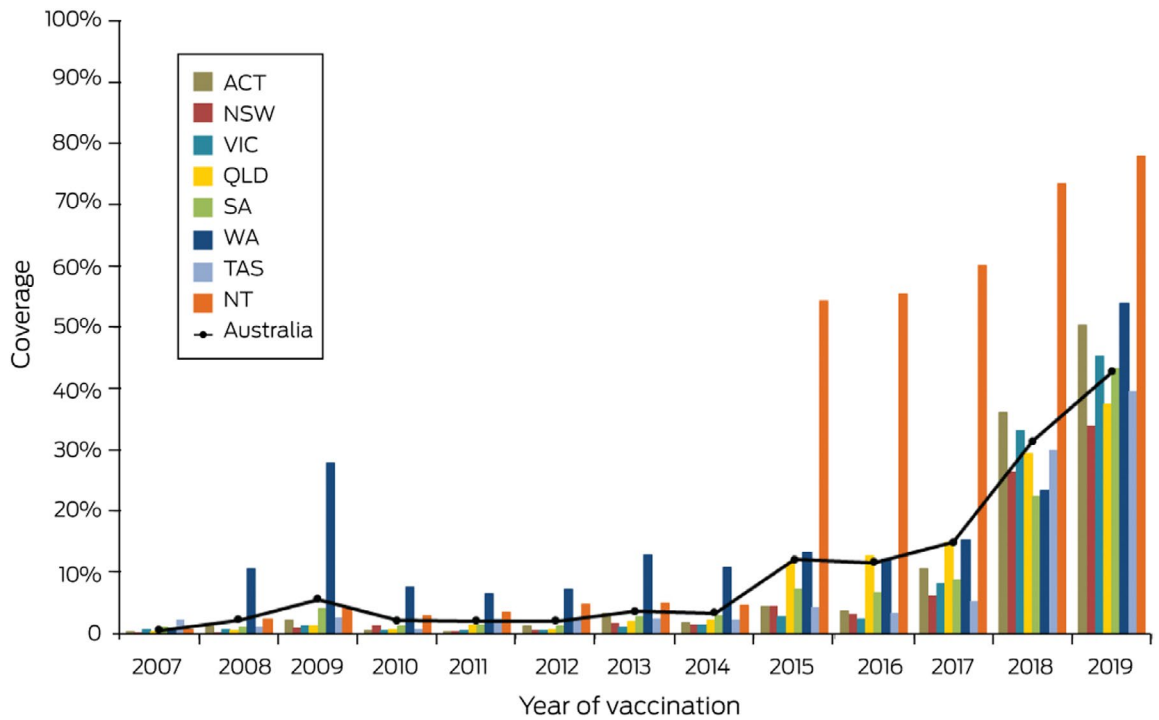
ACT = Australian Capital Territory; NSW = New South Wales; NT = Northern Territory; QLD = Queensland; SA = South Australia; TAS = Tasmania; VIC = Victoria; WA = Western Australia; QIV = quadrivalent influenza vaccine. \* Vaccine funded for Aboriginal and Torres Strait Islander people aged 15 years or more since 1999 (for all Aboriginal and Torres Strait Islander people aged ≥ 50 years, and Aboriginal and Torres Strait Islander people aged 15–49 years who have at least one of a range of underlying medical conditions that increase their risk of influenza or complications). Source: National Centre for Immunisation Research and Surveillance.<sup>5</sup> ◆

unexpectedly high rate of fever and febrile seizures in the 4–24 hours following influenza vaccine administration.<sup>11</sup> Influenza vaccination in children aged 5 years or less continued with non-CSL influenza vaccines from August 2010 onwards,<sup>12</sup> given they had no safety issues. The program suspension had negative effects on influenza vaccine attitudes, confidence and coverage in children in the following years.<sup>13</sup> However, recent evidence suggests that influenza vaccine safety concerns may no longer be a significant barrier to influenza vaccination of children in Australia. Rather, significant barriers include a lack of recommendation from a health care provider, difficulties in either remembering to make or getting an appointment for vaccination, a general lack of support for influenza

vaccination, or a lack of history of influenza vaccine uptake by the child or their parent.<sup>14</sup>

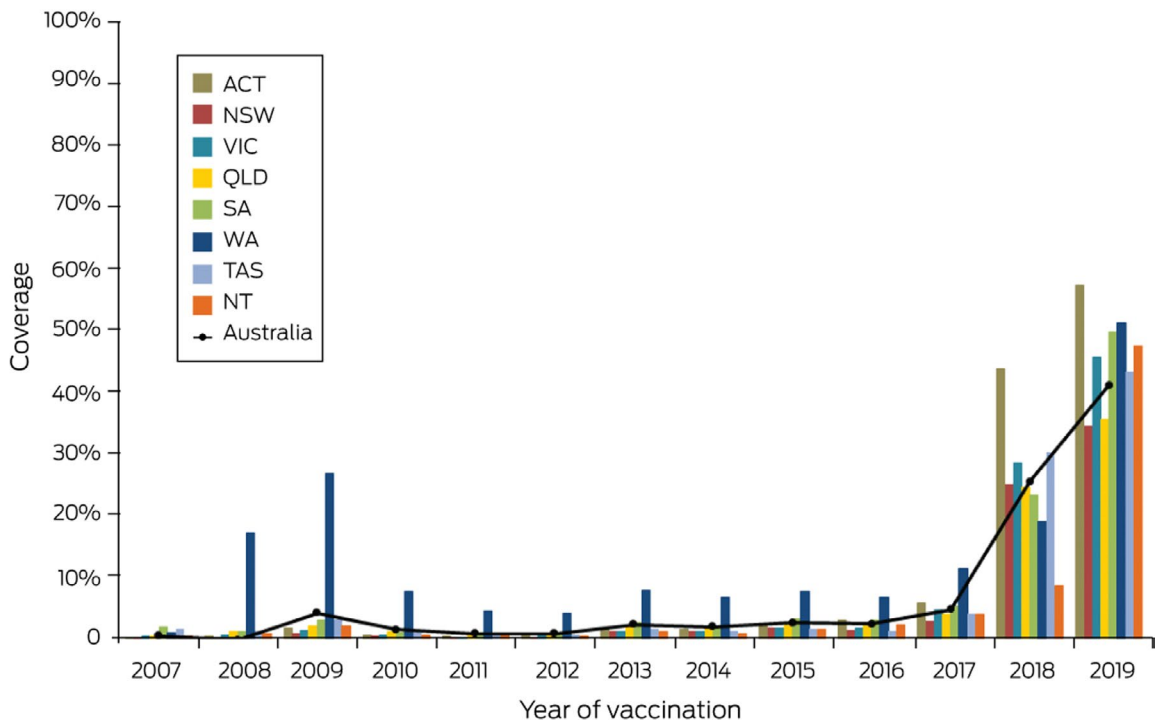
An independent review into the national response to the Fluvax (CSL) safety incident identified ways to strengthen the safe delivery of influenza (and other) vaccines in Australia.<sup>15</sup> In response to these recommendations, a national sentinel vaccine active safety surveillance system, known as AusVaxSafety ([www.ausvaxsafety.org.au](http://www.ausvaxsafety.org.au)) was established in 2014. In this system, people of all ages who receive an influenza vaccine (or their carers) at more than 350 participating sentinel clinics (as at March 2021) are sent a short message service (SMS) text message and/or email in the days after vaccination with questions

**3 Trends in recorded coverage of any dose of seasonal influenza vaccine among Aboriginal and Torres Strait Islander children aged 6 months to less than 5 years, by jurisdiction, 2007–2019**



ACT = Australian Capital Territory; NSW = New South Wales; NT = Northern Territory; QLD = Queensland; SA = South Australia; TAS = Tasmania; VIC = Victoria; WA = Western Australia. Source: Australian Immunisation Register, data as at 31 March 2020. ♦

**4 Trends in recorded coverage of any dose of seasonal influenza vaccine among non-Aboriginal children aged 6 months to less than 5 years, by jurisdiction, 2007–2019**



ACT = Australian Capital Territory; NSW = New South Wales; NT = Northern Territory; QLD = Queensland; SA = South Australia; TAS = Tasmania; VIC = Victoria; WA = Western Australia. Source: Australian Immunisation Register, data as at 31 March 2020. ♦

on whether they or their child experienced an adverse event following immunisation.<sup>7</sup> Overall, data from this system have shown a safety profile consistent

with that expected from clinical trials for all vaccine brands: approximately 10% of children’s carers report an adverse event following immunisation in their

child within 3 days of influenza vaccination, the most common being fever or pain, swelling or redness at the injection site.<sup>7</sup> Data from this ever-expanding vaccine safety monitoring system have consistently shown low and expected reporting rates of mild transient adverse events known to be associated with the influenza vaccine.

### Recorded influenza vaccine uptake

Since 2007, the number of influenza vaccine doses distributed and the recorded population coverage have increased in Australia, but with fluctuating uptake in children. Following the rapid attainment of high coverage in Western Australia in both Aboriginal and Torres Strait Islander and non-Aboriginal children aged 6–59 months from 2008, coverage decreased substantially after the 2010 safety incident (Box 3 and Box 4). Coverage in Aboriginal and Torres Strait Islander children increased after the NIP funding in 2015, with highest rates in the NT (55.8%) in 2015 (Box 3). Coverage also increased dramatically in non-Aboriginal children in 2018 (Box 4) following the introduction of state- and territory-based programs for all children aged 6–59 months. In 2020, the first year of NIP-funding for children aged 6–59 months, the reported uptake was 43.9%.<sup>16</sup> This estimate may be higher given the uptake was calculated using doses recorded between March and August 2020 (rather than a full 12-month period),<sup>16</sup> and overall, actual coverage is likely higher due to issues of under-reporting to the Australian Immunisation Register.<sup>17</sup> The number of influenza vaccine doses available around Australia for all ages has also increased, with 8.3 million distributed in 2017, to 18 million in 2020.<sup>18</sup>

While a 43.9% uptake in children aged 6–59 months in 2020 in Australia represents an improvement from

past low vaccination rates, Australia needs strategies to improve and sustain high coverage. These could include personalised vaccination reminders<sup>19</sup> and provision of greater access to influenza vaccination services.<sup>20</sup> Furthermore, given the influence of a recommendation from a health care provider on vaccine uptake,<sup>14</sup> implementing a combination of education, communication training, electronic prompts and standing order protocols<sup>21</sup> may assist health care providers in recommending influenza vaccination to all patients. Mandatory reporting of vaccination data to the Australian Immunisation Register, recently implemented in the context of the COVID-19 vaccine roll-out in Australia and extended to include other vaccines,<sup>22</sup> should also assist in ensuring more accurate vaccine coverage estimations of influenza and all vaccines.

### Conclusion

Influenza vaccine uptake in young children in Australia has increased in response to the progressive expansion of funding and is now delivered under the NIP. Further gains in uptake should ensure that protection against influenza disease in children is optimised during the ongoing COVID-19 pandemic and in years to come.

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