

# Influenza

## INFLUENZA VACCINES FOR AUSTRALIANS: INFORMATION FOR IMMUNISATION PROVIDERS

This fact sheet provides information for immunisation providers on seasonal influenza vaccines that are available in Australia.

### Disease and epidemiology

- Influenza is a contagious respiratory illness caused by the influenza virus. Influenza viruses are classified into types (A, B and C) and different strains of each type dominate each year.
- The elderly, those with pre-existing medical conditions and pregnant women are at greatest risk of severe complications from influenza, but even healthy people can get severe influenza. Aboriginal and Torres Strait Islander people are at higher risk of influenza and its complications than other Australians.
- In Australia, dozens of deaths and thousands of hospitalisations due to influenza are recorded each year.

### Who should be vaccinated

- Annual influenza vaccination is recommended for any person aged  $\geq 6$  months who wants to protect themselves from influenza.
- Annual influenza vaccination funded under the National Immunisation Program (NIP) is provided for people aged  $\geq 6$  months who are at increased risk of severe influenza including: adults aged  $\geq 65$  years; Aboriginal and Torres Strait Islander people aged 6 months to  $< 5$  years and  $\geq 15$  years; pregnant women; and individuals with specified medical conditions.
- One brand of trivalent influenza vaccine, Seqirus (previously bioCSL) *Fluvax*<sup>®</sup>, is **not** registered for use in children aged 6 months to  $< 5$  years and **must not** be given to children this age. The majority of influenza vaccines used in Australia can be given to people with egg allergy.

### Vaccines

- There are two types of inactivated influenza vaccines in Australia – trivalent (TIV; contains two influenza A strains and one influenza B strain) and quadrivalent (QIV; contains the same strains as TIV plus a second B strain).
- The strains used in seasonal influenza vaccines can change from year to year depending on which viruses are expected to predominate in each season.
- In 2016, certain QIVs are funded under the NIP. Both TIVs and QIVs are available for purchase in the private market.
- TIV typically provides protection against laboratory-confirmed influenza in approximately 60% of healthy adults  $< 65$  years of age who receive vaccine. QIV is expected to be at least as effective as TIV and may offer additional benefit through protection against the additional B strain it contains.

The Australian Technical Advisory Group on Immunisation (ATAGI) publishes annual advice on the use of influenza vaccines in Australia. In 2016 two advices are available:

- Advice for immunisation providers:  
[www.immunise.health.gov.au/internet/immunise/publishing.nsf/Content/ATAGI-advice-influenza-vaccines-providers](http://www.immunise.health.gov.au/internet/immunise/publishing.nsf/Content/ATAGI-advice-influenza-vaccines-providers), and
- Advice for individuals and families:  
[www.immunise.health.gov.au/internet/immunise/publishing.nsf/Content/atagi-information-influenza-public](http://www.immunise.health.gov.au/internet/immunise/publishing.nsf/Content/atagi-information-influenza-public)

## The disease

Influenza or ‘the flu’ is an acute viral illness that mainly affects the respiratory system.

### Causative agent

Influenza is caused by influenza viruses which are classified as type A, B or C.<sup>1</sup> Only influenza A and B viruses are included in seasonal influenza vaccines as they cause the majority of disease in humans. Type A influenza viruses are further categorised into subtypes according to two kinds of proteins on their surface: haemagglutinin (H) and neuraminidase (N).<sup>1</sup> Type B influenza viruses are categorised into lineages. There are two influenza B lineages that circulate among humans, Yamagata and Victoria. Both influenza A and B can be further broken down into different strains.

The genes for the two major surface proteins (H and N) mutate frequently and, in turn, influenza viruses are constantly changing. Relatively minor changes to the H and N genes of both influenza A and B are referred to as ‘antigenic drift’ resulting in new virus strains. Antibody cross-protection against drifted strains is likely to be reduced. If a major change happens in the H or N of influenza A it is called ‘antigenic shift’. Previous immunity is usually not adequate against disease from a ‘shifted’ strain. This creates the potential for a pandemic.

### Transmission

Influenza is spread easily, mainly through large particle droplets generated by sneezing and coughing.<sup>1,2</sup> Droplets containing the influenza virus also settle onto surfaces, and can then pass from hands to the nose, mouth or eyes. People with influenza can be infectious to others from the 24 hours before symptoms start until a week after the start of symptoms. In previously healthy individuals, symptoms typically subside within 5–8 days.

People of all ages are susceptible to influenza. The percentage of people in the general community affected by flu each year is typically 5–10%, but may be up to 20% in some years. This percentage is higher for children, with 10–40% infected each year.<sup>1-3</sup> Influenza is more easily spread where large numbers of people gather together.<sup>1</sup> As such, infection rates may be 2–3 times higher in closed populations (e.g. aged care facilities and households).<sup>4</sup>

### Clinical features

Influenza symptoms usually have a sudden onset. The most common symptoms are fever, dry non-productive cough, nasal congestion, headache, sore throat, and constitutional complaints such as myalgia, malaise and fatigue. The elderly may present with atypical symptoms

such as malaise and confusion, and more often develop pulmonary complications. Non-respiratory symptoms such as gastrointestinal complaints and calf muscle pain occur more frequently in children than in adults.<sup>1,3</sup>

Although most influenza infections are symptomatically worse and more severe than other viral upper respiratory tract infections, some may be mild.<sup>1-3</sup> However, even people with mild influenza illness can still potentially transmit the infection.

Serious complications from influenza occur in a small proportion of people who are infected.<sup>1-3</sup> Complications include pneumonia, myocarditis and neurologic complications, which can lead to hospitalisation and death. People at highest risk of complications from influenza include those with pre-existing medical conditions. However, previously healthy people can also have severe complications.

### Diagnosis

Laboratory tests are required to confirm an influenza infection. The virus can be detected in a nose or throat swab by viral culture or molecular methods. Serologic diagnosis can be established by measuring antibodies in acute and convalescent blood specimens. Laboratory tests are more commonly performed in hospitalised patients and are not often used in routine care.

### Treatment

Treatment of influenza, including bed rest and pain relief such as aspirin/paracetamol and fluid intake, generally aims to prevent or minimise symptoms.<sup>1-3</sup> Children <16 years of age must not be given aspirin or aspirin-containing medications while sick with influenza because of the increased risk of developing Reye syndrome, a condition that causes swelling in the liver and brain.

Antiviral medication, which requires a prescription, can help reduce the severity and duration of symptoms of influenza. To be effective, it needs to be administered within 48 hours of symptom onset.<sup>1</sup>

### Prevention

Vaccination is the only way to specifically prevent influenza infection and its complications (refer to [Who should be vaccinated](#)).

Practising cough etiquette (such as covering the nose and mouth with a tissue when coughing or sneezing) and washing hands before eating can help to reduce the likelihood of transmitting and contracting the influenza virus. Anyone who is unwell with influenza should stay home from work, school and social gatherings to prevent

close contact with other people which could lead to transmission of the virus.<sup>1-3,5</sup>

## Who should be vaccinated

Annual influenza vaccination is recommended for any person  $\geq 6$  months of age unless contraindicated (refer to [Contraindications](#)).

There are a number of groups who are at increased risk of influenza and its complications (refer to [Supplementary information, Epidemiology](#)) for whom annual influenza vaccination is strongly recommended. For some of these groups seasonal influenza vaccination is provided free of charge through the National Immunisation Program (NIP) on the basis of demonstrated cost-effectiveness as a public health intervention.<sup>6</sup> However, annual influenza vaccine should be actively promoted for all individuals at increased risk of severe complications from influenza, independent of funding mechanisms.

### Influenza vaccination is strongly recommended and funded on the NIP for the following groups:

- Aboriginal and/or Torres Strait Islander children aged 6 months to  $< 5$  years
- Aboriginal and/or Torres Strait Islander adolescents and adults aged  $\geq 15$  years.

*(Note: Influenza vaccine is also recommended, but not funded, for Aboriginal and Torres Strait Islander children aged 5 to  $< 15$  years; refer below.)*

- Adults aged  $\geq 65$  years
- Pregnant women (during any stage of pregnancy)
- Persons aged  $\geq 6$  months with a medical condition that increases the risk of influenza complications

*(Note: Influenza vaccine is also recommended, but not funded, for persons with other at-risk conditions; refer below.)*

The medical conditions that are associated with an increased risk of influenza complications are summarised in [Table 1](#) for easy reference.

### Influenza vaccination is strongly recommended but not funded on the NIP for the following groups:

- Children aged 6 months to  $< 5$  years

*(Note: Influenza vaccine is funded on the NIP for Aboriginal and Torres Strait Islander children aged 6 months to  $< 5$  years; refer above.)*

- Aboriginal and/or Torres Strait Islander children aged 5 years to  $< 15$  years

- Persons with certain medical conditions (in addition to those funded on the NIP):
  - Down syndrome
  - Class III obesity (body mass index  $\geq 40$  kg/m<sup>2</sup>)
  - Chronic liver disease
- Persons who may transmit influenza to children or adults at increased risk of influenza complications (e.g. healthcare workers)
- Residents of aged care facilities and long-term residential care facilities
- Homeless people
- Persons involved in the commercial poultry or pork industry, or in culling poultry or pigs during periods of confirmed avian or swine influenza activity
- Persons providing essential services
- Persons travelling during the influenza season, especially if it is known before travel that influenza is circulating in the destination region

Detailed information on influenza vaccine recommendations is provided in *The Australian Immunisation Handbook* (refer to [Additional resources for primary medical care/vaccination providers](#)).

### Contraindications

The only absolute contraindications to influenza vaccines are:

- anaphylaxis following a previous dose of any influenza vaccine
- anaphylaxis following any vaccine component.

*Note: People with a known egg allergy (including anaphylaxis) can be safely vaccinated with most influenza vaccines by staff that are able to recognise and treat anaphylaxis, in the unlikely event that it does occur (refer to [Supplementary information, Vaccine safety, Persons with known egg allergy](#)).*

### Vaccines

There are two types of inactivated influenza vaccines registered for use by the Australian Therapeutic Goods Administration (TGA):

- **trivalent influenza vaccines (TIVs)** which contain three strains of influenza virus (from two influenza A subtypes and one influenza B lineage). They have been used for many decades.
- **quadrivalent influenza vaccines (QIVs)** which contain the same three influenza virus strains as TIV plus a strain from the second influenza B lineage not in TIV.

Vaccines are registered based on evidence of their effectiveness and safety (refer to [Supplementary information](#)). Multiple registered influenza vaccine products are available each year which vary by the age group in which they can be used and their NIP availability.

The recommended seasonal influenza vaccines by brand, recommended age and NIP availability are summarised in [Table 2 for easy reference](#).

In circumstances where more than one influenza vaccine formulation is appropriate, QIV is recommended in preference to TIV, due to the additional influenza B strain that QIV contains.

More detailed information on seasonal influenza vaccines is provided in the *ATAGI advice for immunisation providers regarding the administration of seasonal influenza vaccines in 2016* (refer to [Additional resources for primary medical care/vaccination providers](#)).

### Dosage and administration

The preferred route of administration for influenza vaccines is by intramuscular injection; however, they may also be given by the subcutaneous route. The recommended vaccine dose volume varies by age and the number of vaccine doses varies by age and immune status of the vaccine recipient.

The recommended dose of seasonal influenza vaccine by age group is summarised in [Table 3 for easy reference](#).

Influenza vaccine should be given in autumn before the start of the influenza season as it takes up to 14 days for immunity to develop after vaccination.<sup>5,7</sup> However, influenza vaccine can still be given after virus circulation has commenced to provide protection for people who have not yet been exposed.

All influenza vaccines available in Australia may be co-administered with any other vaccine (refer to [Supplementary information, Vaccine safety, Infants and children](#)). Detailed information on the administration of influenza vaccines, including co-administration and vaccine interchangeability, is provided in *The Australian Immunisation Handbook* (refer to [Additional resources for primary medical care/vaccination providers](#)).

## Supplementary information

### Epidemiology

Influenza is a seasonal disease in temperate regions. Most cases in Australia occur during the winter months between June and September.<sup>8</sup> In the northern hemisphere, influenza usually occurs between December and the next April, whereas in the tropics, influenza can occur all year round.

Annual influenza epidemics are most often due to a single virus subtype or lineage. However, the circulating subtypes/lineages can be different from year to year and different subtypes/lineages may appear sequentially or simultaneously in the same season.<sup>9</sup> For example, in Australia between 2000 and 2011, the proportion of influenza B among circulating influenza strains each season ranged between 1% and 63%. The predominant B lineage (Yamagata or Victoria) also varied between seasons, with both lineages often co-circulating in various proportions from year to year.<sup>10</sup>

Influenza is an important cause of morbidity and mortality. The number of affected people varies considerably from year to year depending on the characteristics of the circulating virus strains and level of immunity in the population. On average, 85 deaths and approximately 4,000 hospitalisations are directly attributed to influenza annually in Australia, although this has long been recognised as a substantial under-estimate of the impact of influenza.<sup>5,11</sup> A study using mathematical modelling estimated that influenza is actually associated with more than 13,500 hospitalisations and 3,000 deaths each year in Australia, in people aged over 50 years.<sup>11</sup>

There are a number of groups who are at a higher risk of influenza and its complications and who experience increased morbidity and mortality associated with influenza compared to the rest of the population. The highest rates of influenza notifications and hospitalisations are seen in the elderly and children <5 years of age.<sup>8</sup> Aboriginal and Torres Strait Islander people experience a greater disease burden from influenza than non-Indigenous Australians across all age groups.<sup>12</sup> In addition, certain underlying medical conditions such as chronic heart, lung and neuromuscular disease, among others, also increase the risk of severe influenza complications compared with otherwise healthy individuals.<sup>13</sup> Pregnant women are more likely than other women to be hospitalised with influenza, and infants born to mothers who contract influenza during pregnancy are at risk of preterm birth and low birth weight.<sup>14</sup>

Occasionally a global outbreak of a new influenza A strain results in an 'influenza pandemic'. There have been four influenza pandemics since 1918. The last one was in 2009–2010, due to a novel influenza A(H1N1) subtype, also denoted A(H1N1pdm09), which caused an estimated 290,000 deaths worldwide.<sup>15</sup> In Australia, there were a total of 44,403 confirmed cases and a total of 213 pandemic influenza-associated deaths between May 2009 and November 2010.<sup>16</sup> Since the pandemic, the virus has continued to circulate, replacing the previously circulating seasonal H1N1 strain.

### **Vaccine effectiveness**

Influenza vaccine provides varying levels of protection against influenza virus, depending on age, whether a person is immunocompromised, and how good the match is between influenza strains in the vaccine and those circulating in the community.<sup>5</sup> Protection against viruses similar to those in the vaccine is thought to persist in an individual for up to a year, but recent evidence suggests protection may wane within one season.<sup>17,18</sup>

The majority of effectiveness studies have been done on TIVs due to their widespread use. A systematic review estimated the efficacy of TIVs in healthy adults <65 years of age to be 59%, but efficacy varied by influenza season and the match between circulating and vaccine strains.<sup>19</sup> There is a growing body of evidence demonstrating that the levels of protection achieved in young children are similar to those in older children and adults.<sup>20-22</sup> In the elderly, a limited number of randomised controlled trials have shown that the efficacy of inactivated influenza vaccine ranged from 43% to 60% depending on the setting (community versus nursing homes) and the outcome assessed.<sup>23</sup>

TIVs have been shown to be less effective in immunocompromised persons than in healthy individuals. However, given the risk of severe influenza outcomes in those who are immunocompromised, there is still a demonstrated benefit of influenza vaccination for this group.<sup>5,7,24,25</sup>

QIVs are anticipated to be at least as effective as TIVs based on clinical trials in children and adults showing similar immunogenicity to TIVs for the three shared influenza virus strains.<sup>26-29</sup> In these studies, QIV also stimulated antibodies against the B strain not included in TIV indicating that QIV has the potential to protect against a greater proportion of circulating influenza viruses in a given season. However, the magnitude of any additional benefit from QIV over TIV cannot be predicted for any season due to a number of considerations such as the influenza epidemiology that year, strain match and an

individual's previous immunity. More detailed information on choosing between QIVs and TIVs is provided in the *ATAGI advice for immunisation providers regarding the administration of seasonal influenza vaccines in 2016* (refer to [Additional resources for primary medical care/vaccination providers](#)).

### **Vaccine safety**

The common symptoms following influenza vaccination can mimic influenza infection, but are due to the vaccine's interaction with the immune system. The influenza vaccines currently registered do not contain live virus, and therefore cannot cause influenza.

Fever, headache, arthralgia and myalgia occur in <15% of those who receive influenza vaccine. These side effects may commence within a few hours of vaccination and can last for 1–2 days.<sup>5</sup> In children aged <5 years, these adverse events may be more pronounced. Local side effects, such as swelling, redness and pain at the injection site, are common after receiving influenza vaccine.<sup>5</sup> A range of controlled clinical trials have shown that the safety profile of QIV in adults and children is similar to that observed for TIV in the same age group.<sup>26-29</sup>

More severe immediate adverse effects such as hives, angioedema or anaphylaxis are rare consequences of influenza vaccination and likely represent an allergic response to a residual component of the manufacturing process, such as egg protein.<sup>5,30,31</sup> For further information refer to [Supplementary information, Vaccine safety, Persons with known egg allergy](#) below.

A small increased risk of Guillain-Barré syndrome (GBS) was associated historically with one influenza vaccine in the United States in 1976. But, since then, close surveillance has shown that GBS has occurred at a very low rate of less than 1 in 1 million doses of influenza vaccine, if at all.<sup>24,32</sup>

### **Infants and children**

Surveillance of influenza vaccine safety in young children through enhanced surveillance systems such as AusVaxSafety have shown that influenza vaccine is safe in children <5 years of age, with low rates of fever and medical attendance reported after vaccination.<sup>33</sup>

In young children, febrile convulsions are a relatively common response to fever of any cause, most often occurring among children 12–23 months of age.<sup>34</sup> Febrile convulsions related to influenza vaccination are uncommon, occurring at a rate of less than 1 per 1,000 vaccinated individuals. One vaccine formulation, Seqirus (previously bioCSL) *Fluvax*<sup>®</sup> is not registered for use in children <5 years of age due to high rates of fevers and

febrile convulsions demonstrated in this age group in 2010.<sup>35</sup> The use of this vaccine in children aged 5 to <9 years of age is **not** recommended unless an alternative vaccine is not available, as an increased risk of fever has also been demonstrated in this age group.<sup>34</sup>

The recommended seasonal influenza vaccines by brand, recommended age and NIP availability are summarised in [Table 2](#) for easy reference

A slightly higher risk of fever and febrile convulsions in children aged 6 months to <5 years (especially those aged 12–24 months) has been reported following the concurrent administration of inactivated trivalent influenza vaccine and the 13-valent pneumococcal conjugate vaccine;<sup>36</sup> however, more recent data has not demonstrated the same findings. Thus, it is acceptable to administer these vaccines concurrently when both vaccines are indicated.<sup>37</sup>

#### **Pregnant women**

All influenza vaccines in Australia are inactivated vaccines, which can be safely given to pregnant women at any stage during pregnancy. The rate of adverse events after vaccination in pregnant women is no different to the rate in women who are not pregnant. In addition, studies of mother–baby pairs have shown that receiving the influenza vaccine while pregnant does not increase maternal or foetal complications during pregnancy.<sup>38</sup>

A number of high quality studies have demonstrated that influenza vaccination during pregnancy provides protection not only to the mother but also to her newborn in the first few months of life when they are most vulnerable.<sup>39–43</sup>

For further information, refer to the NCIRS fact sheet on [Vaccinations during pregnancy](#).

#### **Persons with known egg allergy**

Influenza vaccine viruses are grown in embryonated hens' eggs and, as a result, may contain small amounts of ovalbumin, an egg-derived protein. However, the risk of anaphylaxis associated with influenza vaccination of egg-allergic patients is very low. Persons with known egg allergy, including anaphylaxis, may be safely vaccinated with influenza vaccines that contain less than 1 µg of ovalbumin per dose. Most influenza vaccine formulations now meet this criterion. However, the product information of the vaccine to be given should be checked for the vaccine's ovalbumin content prior to vaccine administration. Given that there is still a very small risk of anaphylaxis, it is essential that persons with a history of a serious allergic reaction to eggs are vaccinated in facilities with staff who are able to recognise and treat anaphylaxis.

Additional information on influenza vaccination of individuals with an allergy to eggs, including risk, dosage and observation period, can be found in the [Australasian Society of Clinical Immunology and Allergy \(ASCI\) guidelines](#).<sup>31</sup>

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## **Additional resources for primary medical care/vaccination providers**

- *The Australian Immunisation Handbook*, 10th edition – the most up-to-date clinical recommendations are contained in the online version of the *Handbook*  
[www.immunise.health.gov.au/internet/immunise/publishing.nsf/Content/Handbook10-home](http://www.immunise.health.gov.au/internet/immunise/publishing.nsf/Content/Handbook10-home)
- Immunise Australia website  
[www.immunise.health.gov.au](http://www.immunise.health.gov.au)
- Australian Technical Advisory Group on Immunisation (ATAGI) advice for immunisation providers regarding the administration of seasonal influenza vaccines in 2016  
[www.immunise.health.gov.au/internet/immunise/publishing.nsf/Content/ATAGI-advice-influenza-vaccines-providers](http://www.immunise.health.gov.au/internet/immunise/publishing.nsf/Content/ATAGI-advice-influenza-vaccines-providers)
- Australian Technical Advisory Group on Immunisation (ATAGI) information for individuals and families on the influenza vaccines available in 2016  
[www.immunise.health.gov.au/internet/immunise/publishing.nsf/Content/atagi-information-influenza-public](http://www.immunise.health.gov.au/internet/immunise/publishing.nsf/Content/atagi-information-influenza-public)
- Therapeutic Goods Administration (TGA) statement on 2016 seasonal influenza vaccines  
[www.tga.gov.au/media-release/2016-seasonal-influenza-vaccines](http://www.tga.gov.au/media-release/2016-seasonal-influenza-vaccines)
- Therapeutic Goods Administration (TGA) statement on 2016 seasonal influenza vaccines for use in children  
[www.tga.gov.au/alert/flu-vaccine-2016-seasonal-influenza-vaccines-use-children](http://www.tga.gov.au/alert/flu-vaccine-2016-seasonal-influenza-vaccines-use-children)

## Appendix

**Table 1: Medical conditions that are associated with an increased risk of influenza complications and for which individuals are eligible for vaccination under the NIP\***  
(from ATAGI advice for immunisation providers regarding the administration of seasonal influenza vaccines in 2016 – refer to [Additional resources for primary medical care/vaccination providers](#))

Category	Vaccination strongly recommended for (but not limited to) individuals with the following clinical conditions
Cardiac disease	Cyanotic congenital heart disease Congestive heart failure Coronary artery disease
Chronic respiratory conditions <sup>†</sup>	Severe asthma (for which frequent hospitalisation is required) Cystic fibrosis Bronchiectasis Suppurative lung disease Chronic obstructive pulmonary disease (COPD) Chronic emphysema
Chronic neurological conditions <sup>†</sup>	Hereditary and degenerative CNS diseases <sup>†</sup> (including multiple sclerosis) Seizure disorders Spinal cord injuries Neuromuscular disorders
Immunocompromising conditions <sup>‡</sup>	Immunocompromised due to disease or treatment (e.g. malignancy, transplantation and/or chronic steroid use) Asplenia or splenic dysfunction HIV infection
Diabetes and other metabolic disorders	Type 1 diabetes Type 2 diabetes Chronic metabolic disorders
Renal disease	Chronic renal failure
Haematological disorders	Haemoglobinopathies
Long-term aspirin therapy in children aged 6 months to 10 years	These children are at increased risk of Reye syndrome following influenza infection

\* **Note:** ATAGI strongly recommends influenza vaccination for persons who have the conditions listed below (but vaccination is **not funded** under the NIP for such persons unless they fall under one of the categories above):

- Down syndrome
- Obesity (class III), defined as body mass index (BMI)  $\geq 40$  kg/m<sup>2</sup>
- Chronic liver disease (defined as histological evidence of fibrosis or cirrhosis, or clinical evidence of chronic liver disease).

Further details are provided in *The Australian Immunisation Handbook* (refer to [Additional resources for primary medical care/vaccination providers](#)).

<sup>†</sup> Persons who have any condition that compromises the management of respiratory secretions or is associated with an increased risk of aspiration should be vaccinated.

<sup>‡</sup> Persons with certain immunocompromising conditions (i.e. haematopoietic stem cell transplant, solid organ transplant) receiving influenza vaccine for the first time post transplant are recommended to receive 2 vaccine doses at least 4 weeks apart (irrespective of age) and 1 dose annually thereafter.

**Table 2: Seasonal influenza vaccines available for use in Australia in the 2016 influenza season, by brand, recommended age and NIP availability**

(adapted from ATAGI advice for immunisation providers regarding the administration of seasonal influenza vaccines in 2016 [Table 1] – refer to [Additional resources for primary medical care/vaccination providers](#))

Age group	Seasonal influenza vaccines	
	NIP-funded (for eligible groups)*	Not NIP-funded (available on the private market)
<6 months	Not indicated for this age group	
6–35 months (<3 years)	FluQuadri Junior (QIV) <sup>†</sup>	FluQuadri Junior (QIV) <sup>†</sup> Fluarix (TIV) Influvac (TIV)
3–8 years	Fluarix Tetra (QIV) <sup>‡</sup>	FluQuadri (QIV) <sup>‡</sup> Fluarix (TIV) Influvac (TIV)
≥9 years	Fluarix Tetra (QIV) <sup>‡</sup>	FluQuadri (QIV) <sup>‡</sup> Fluarix (TIV) Influvac (TIV) Fluvax <sup>§</sup> (TIV)

\* Certain QIVs are available on the NIP for certain eligible groups who are at increased risk of influenza and its complications. For further details, refer to the ATAGI advice for immunisation providers regarding the administration of seasonal influenza vaccines in 2016 and the Immunise Australia website.<sup>44</sup>

† FluQuadri<sup>®</sup> Junior vaccine is given as a 0.25 mL dose and specifically registered for use in children aged 6 to 35 months only (refer to Table 3 Recommended doses of influenza vaccine by age).

‡ FluQuadri<sup>®</sup> and Fluarix<sup>®</sup> Tetra are given as a 0.5 mL dose and are registered for use in persons ≥3 years of age (refer to Table 3 Recommended doses of influenza vaccine by age).

§ Seqirus (previously bioCSL) Fluvax<sup>®</sup> is registered for use in persons ≥5 years of age. ATAGI does not recommend the use of this vaccine in children aged <9 years. (Further details are provided in the ATAGI advice for immunisation providers regarding the administration of seasonal influenza vaccines in 2016 – refer to [Additional resources for primary medical care/vaccination providers](#)).

**Table 3: Recommended doses of influenza vaccine by age**

(adapted from ATAGI advice for immunisation providers regarding the administration of seasonal influenza vaccines in 2016 – refer to [Additional resources for primary medical care/vaccination providers](#))

Age	Dose (volume per dose)	Number of doses required	
		In the first year of influenza vaccination	If previously received 1 or more doses of influenza vaccine
6 months to <3 years*	0.25 mL <sup>†</sup>	2	1
≥3 to <9 years*	0.5 mL <sup>‡</sup>	2	1
≥9 years	0.5 mL <sup>‡</sup>	1 <sup>§</sup>	1

\* Children aged 6 months to <9 years receiving influenza vaccine for the first time require 2 doses, at least 4 weeks apart, to maximise the immune response to the vaccine strains. For children who have received 1 or more doses of trivalent or quadrivalent influenza vaccine in a previous year, only 1 dose of influenza vaccine is required in the current season and all seasons thereafter (irrespective of whether TIV or QIV is being used).

† If a child aged 6 months to <3 years inadvertently receives a 0.5 mL dose of influenza vaccine, no immediate action is necessary, and any additional dose(s) required that season or in future seasons should be given following standard recommendations. There is some evidence that a 0.5 mL dose of inactivated influenza vaccine is immunogenic and safe in children <3 years of age.<sup>26,45</sup>

‡ If a child aged ≥3 years or an adult inadvertently receives a 0.25 mL dose of influenza vaccine, an age-appropriate dose (0.5 mL) should be repeated. Any additional dose(s) required that season or in future seasons should then be given following standard recommendations.

§ Two doses, at least 4 weeks apart, are recommended for persons with certain immunocompromising conditions (i.e. haematopoietic stem cell transplant or solid organ transplant) receiving influenza vaccine for the first time post transplant (irrespective of their age).

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