

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 in 2017. It can be used in conjunction with the NCIRS fact sheet [Influenza vaccines – frequently asked questions](#) which provides responses to common questions about influenza viruses and seasonal influenza vaccines.

- Influenza remains a common cause of hospitalisation and death in Australia.
- Annual influenza vaccination is recommended for any person aged ≥ 6 months who wants to protect themselves from influenza and is strongly recommended for groups at higher risk of disease.
- Annual influenza vaccination is funded under the National Immunisation Program (NIP) for people aged ≥ 6 months who are at increased risk of severe influenza including:
 - adults aged ≥ 65 years
 - Aboriginal and Torres Strait Islander people aged 6 months to < 5 years and ≥ 15 years
 - pregnant women
 - individuals with specified medical conditions (refer to [Table 1](#)).
- The strains used in seasonal influenza vaccines can change from year to year depending on which viruses are predicted to circulate in each upcoming season.
- In 2017, only quadrivalent influenza vaccines (QIVs) are funded under the NIP and available for purchase in the private market.
- Influenza vaccine reduces the risk of laboratory-confirmed influenza on average by 50–60% (range 38–86% in recent Australian studies) in adults and children aged ≥ 6 months who receive the vaccine, although there can be variation year by year.
- Providers are reminded that influenza vaccinations given to people of all ages should be reported to the Australian Immunisation Register.
- Providers are also reminded to vaccinate pregnant women at any time of the year and any stage of pregnancy. Vaccination of pregnant women provides protection to mothers and their newborn infants (via transplacental antibody transfer).

The Australian Technical Advisory Group on Immunisation (ATAGI) publishes annual advice on the use of influenza vaccines in Australia:

www.immunise.health.gov.au/internet/immunise/publishing.nsf/Content/ATAGI-advice-influenza-vaccines-providers

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.¹ 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).¹ Type B influenza viruses are categorised into two lineages (Yamagata or Victoria). Both influenza A and B can be further broken down into different strains.

The genes for the H and N proteins on the virus surface mutate frequently which results in constant change to influenza viruses. These minor changes to the H and N proteins of both influenza A and B are referred to as ‘antigenic drift’ and result 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.^{1,2} 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 24 hours before symptoms start until 1 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.^{1–3} Influenza is more easily spread where large numbers of people gather together.¹ As such, infection rates may be 2–3 times higher in closed populations (e.g. childcare centres, aged care facilities and households).^{4,5}

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.^{1,3}

Although most influenza infections are symptomatically worse and more severe than other viral upper respiratory tract infections, some may be mild.^{1–3} Serious complications from influenza occur in a small proportion of people who are infected.^{1–3} 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 rapid antigen-based tests, viral culture or more commonly by molecular methods, such as polymerase chain reaction (PCR). Serologic diagnosis can be established by measuring antibodies in acute and convalescent blood specimens.

Treatment

Treatment of influenza, including bed rest, pain relief such as aspirin/paracetamol and fluid intake, generally aims to prevent or minimise symptoms.^{1–3} 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 the most effective, it needs to be administered within 48 hours of symptom onset.¹

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.^{1–3,6}

Who should be vaccinated

Annual influenza vaccination is recommended for any person ≥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 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.⁷ However, annual influenza vaccine should be actively promoted for all individuals at increased risk of severe complications from influenza, regardless of eligibility for free vaccine.

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 ≥ 15 years
- Adults aged ≥ 65 years
- Pregnant women (during any stage of pregnancy)
- Persons aged ≥ 6 months with a medical condition that increases the risk of influenza complications

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
- 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 ≥ 40 kg/m²)
 - 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: Egg allergy is not a contraindication to influenza vaccine. Persons with egg allergy, including anaphylaxis, can be safely vaccinated with influenza vaccines. Persons with a history of anaphylaxis to egg can be vaccinated with a full vaccine dose in medical facilities with staff experienced in recognising and treating anaphylaxis.

Vaccines

Currently in Australia, only quadrivalent influenza vaccines are available. They contain:

- A (H1N1) – an A/Michigan/45/2015 (H1N1)pdm09* like virus
- A (H3N2) – an A/Hong Kong/4801/2014 (H3N2) like virus
- B (Victoria lineage) – a B/Brisbane/60/2008 like virus
- B (Yamagata lineage) – a B/Phuket/3073/2013 like virus

* New strain (differs from strain in 2016 vaccine)

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

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

More detailed information on seasonal influenza vaccines is provided in the *ATAGI advice for immunisation providers regarding the administration of seasonal influenza vaccines in 2017* (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](#).

Recent evidence suggests that protection against influenza may start to decrease from 3–4 months following vaccination and optimal timing of vaccination may need to take this into consideration.^{8,9} While influenza continues to circulate, it is never too late to vaccinate.

All influenza vaccines available in Australia may be co-administered with any other vaccine (refer to [Supplementary information, Safety in 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.¹⁰ 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.¹¹ For example, after the 2009 pandemic, A/H1N1 strains were predominant throughout 2010, 2011 and 2013, but in 2012 A/H3N2 was the predominant strain. B viruses co-circulated in most years but were the most common strain identified in 2015.¹² Additionally, within each season, the predominant B lineage (Yamagata or Victoria) can vary, with both lineages co-circulating in certain years.¹³

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. Between 2006 and 2013 (excluding the 2009 pandemic year), an average of 87 deaths and approximately 4,800 hospitalisations due to influenza occurred annually in Australia,¹⁴ although this has long been recognised as a substantial under-estimate of the impact of influenza.^{6,15} 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, just in people aged over 50 years.¹⁵

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.¹⁴ Aboriginal and Torres Strait Islander people experience a greater disease burden from influenza than non-Indigenous Australians across all age groups.^{14,16} 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.¹⁷ 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.¹⁸

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.¹⁹ 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 2010.²⁰ 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.⁶ Australian studies have estimated vaccine effectiveness of between 38% and 86% in adults and children aged >6 months.^{21–24} Effectiveness may vary in different age groups and substantial variation can also occur from year to year dependent on the matching of vaccine strains to circulating strains.

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 from 3–4 months after vaccination.^{8,9}

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. Local side effects,

such as swelling, redness and pain at the injection site, are also not uncommon. These side effects may commence within a few hours of vaccination and can last for 1–2 days.⁶ A range of controlled clinical trials have shown that the safety profile of quadrivalent influenza vaccines (QIV) in adults and children is similar to that observed for trivalent influenza vaccines (TIV) in the same age group.^{25–28}

More severe immediate adverse effects such as hives, angioedema or anaphylaxis are rare consequences of influenza vaccination.^{6,29,30}

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.^{31,32}

Safety in infants and children

Surveillance of influenza vaccine safety in young children through active enhanced surveillance systems such as AusVaxSafety have shown that influenza vaccine is safe in children aged 6 months to <5 years, with low rates of fever (approximately 4%) and medical attendance (1%) reported after vaccination.³³ In 2017, active surveillance by AusVaxSafety will be conducted in persons of all ages and data will be made available on a weekly basis at www.ausvaxsafety.org.au.

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.³⁴ Febrile

convulsions related to influenza vaccination are uncommon, occurring at a rate of 1 per 1,000 or less in vaccinated individuals.^{35,36}

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.³⁵ These vaccines are not routinely administered together in Australia and more recent data has not demonstrated the same association with febrile convulsions.³⁷ It is acceptable to administer these vaccines concurrently when both vaccines are indicated.³⁸

Safety in 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 fetal complications during pregnancy.³⁹

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.^{40–44}

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

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
- Immunise Australia website
www.immunise.health.gov.au
- Australian Technical Advisory Group on Immunisation (ATAGI) advice for immunisation providers regarding the administration of seasonal influenza vaccines in 2017
www.immunise.health.gov.au/internet/immunise/publishing.nsf/Content/ATAGI-advice-influenza-vaccines-providers

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 2017 – 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 [†]	Severe asthma (for which frequent hospitalisation is required) Cystic fibrosis Bronchiectasis Suppurative lung disease Chronic obstructive pulmonary disease (COPD) Chronic emphysema
Chronic neurological conditions [†]	Hereditary and degenerative CNS diseases [†] (including multiple sclerosis) Seizure disorders Spinal cord injuries Neuromuscular disorders
Immunocompromising conditions [‡]	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 also strongly recommends influenza vaccination for persons who have the following conditions (but vaccination is **not funded** under the NIP for such persons unless they also fall under one of the categories in the table above):

- Down syndrome
- Obesity (class III), defined as body mass index (BMI) ≥ 40 kg/m²
- 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](#)).

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

[‡] 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 2017 influenza season, by brand and recommended age

(adapted from ATAGI advice for immunisation providers regarding the administration of seasonal influenza vaccines in 2017 [Table 1] – refer to [Additional resources for primary medical care/vaccination providers](#))

Vaccine	FluQuadri Junior 0.25 mL (Sanofi Pasteur)	FluQuadri 0.50 mL (Sanofi Pasteur)	Fluarix Tetra 0.50 mL (GSK)	Afluria Quad* 0.50 mL (Seqirus)
Registered age group				
<6 months	No			
6 to 35 months (<3 years)	✓	No	No	No
≥3 to 18 years	No	✓	✓	No
≥18 years	No	✓	✓	✓

* **Please note that Seqirus Afluria Quad is NOT registered for use in children aged <18 years.**

Table 3: Recommended doses of influenza vaccine by age

(adapted from ATAGI advice for immunisation providers regarding the administration of seasonal influenza vaccines in 2017 – 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 any prior dose of influenza vaccine
6 months to <3 years*	0.25 mL [†]	2	1
≥3 to <9 years*	0.5 mL [‡]	2	1
≥9 years	0.5 mL [‡]	1 [§]	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.

† 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.^{26,45}

‡ 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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