

## PNEUMOCOCCAL VACCINE

Over 90% of children in Australia have been fully vaccinated whereas only 9% of adults have received the recommended vaccines under the National Immunisation Program (NIP) – the recommended vaccines being influenza, the pneumococcal vaccine, and now the shingles vaccine. All vaccines listed in the NIP Schedule are free. Pneumococcal vaccine is preventive against pneumococcal disease caused by *Streptococcus pneumoniae* serotypes. It is estimated that over one-third of all community-acquired pneumonia and about half of hospital-acquired pneumonia is due to pneumococci bacteria. Pneumococcal disease can cause severe invasive disease, including meningitis, pneumonia and bacteraemia, and non-invasive disease, including otitis media and sinusitis. Invasive pneumococcal disease disproportionately affects Aboriginal and Torres Strait Islander (ATSI) children and adults. Pneumococcal vaccine is recommended for all adults aged 65 years and older and Aboriginal and Torres Strait Islander adults aged 50 years and older.

### Pneumococcal disease

*Streptococcus pneumoniae* is transmitted from person to person through contact with respiratory droplets of colonised people. Almost all pneumococcal disease begins with nasopharyngeal colonisation. Pneumococci may spread from the nasopharynx into adjacent sites to cause non-invasive disease such as sinusitis, otitis media or pneumonia (without bacteraemia). Common symptoms of pneumonia include fever and chills, coughing, difficulty breathing and chest pain. Major categories of invasive pneumococcal disease include:

- meningitis
- pneumonia with bacteraemia
- bacteraemia

Meningitis is associated with the highest case-fatality rate and possible neurological sequelae among survivors. Bacteraemia without focus, including at bones, joints and soft tissues is the commonest clinical category in young children. Treatment of pneumococcal disease is use of appropriate antibiotics. Intravenous benzylpenicillin is the drug of choice for pneumococcal pneumonia, followed by oral amoxicillin. For patients hypersensitive to penicillins, ceftriaxone or cefotaxime is recommended.

For adults with immediate hypersensitivity to penicillins, oral or IV moxifloxacin or oral doxycycline is recommended in the Therapeutic Guidelines.

### Products

There are 2 major types of pneumococcal vaccines - pneumococcal conjugate vaccine (PCV) and pneumococcal polysaccharide vaccine (PPV). Vaccine formulations vary in the number of pneumococcal serotypes included in the vaccine (valency). Polyvalent pneumococcal vaccines included in the NIP include:

- 23vPPV (Pneumovax 23)
- 13vPCV (Prevenar 13)

Under the NIP, Pneumovax 23 vaccine is available free to groups considered at risk of pneumococcal infection including all:

- Aboriginal or Torres Strait Islander aged 50 years of age and over and those aged 15 to 49 years of age with medical at risk factors
- children aged four years of age who have a chronic medical condition and considered at high risk of increased complications from a pneumococcal infection
- persons 65 years of age and over

23vPPV is around 60-80% effective in adults. Immune responses to 23vPPV are similar in older people (aged 70–80 years) and younger people (aged 50–60 years), but poor in people who are immunocompromised. Following the national funding of 23vPPV in 2005, there was a 35% decline in total invasive pneumococcal disease in people aged 65 years and older. 13vPCV is recommended under the NIP for healthy infants and young children. It is also recommended for people with chronic conditions that are associated with an increased risk of pneumococcal infection.

### Risk factors

Immunocompromised people are at the highest increased risk of pneumococcal infection, including:

- Asplenia
- Organ transplant

*continued over*

- Myeloma
- Lymphoma
- Hodgkin lymphoma
- Chronic renal failure

People with chronic disease have an increased risk of complications from pneumococcal infection, for example:

- Diabetes
- Alcohol dependence
- Chronic heart disease
- Severe asthma in adults
- Chronic liver disease

Tobacco smoking is associated with an increased risk of pneumococcal disease. Pneumococcal immunisation is recommended for all people with COPD. Vaccination also reduces the likelihood of an exacerbation of COPD, with a number needed to treat (NNT) of 8 to prevent one exacerbation. A significant additive effect of pneumococcal immunisation to annual influenza immunisation has been shown. Australian diabetes guidelines recommend vaccination with pneumococcal vaccine in people with diabetes aged less than 65 years, and revaccination at 65 years of age or after 10 years, whichever is later. People with type 2 diabetes aged older than 65 years of age require a single dose and revaccinate after five years. Australian guidelines recommend pneumococcal vaccination in people with end stage kidney disease.

### Dose

A single dose of 23vPPV is recommended for all non-Indigenous adults at 65 years of age. A second or subsequent 23vPPV dose is no longer recommended for non-Indigenous adults other than for those adults who have conditions predisposing them to increased risk. Adults aged more than 65 years who did not receive a dose at 65 years of age are recommended to receive a single catch-up dose of 23vPPV as soon as possible. For ATSI adults aged 50 years, a dose of 23vPPV is recommended, followed by a second dose 5 years after the first dose. All adults with at-risk conditions are recommended to receive up to 3 lifetime doses of 23vPPV. For ATSI people with medical risk factors, initial vaccination is recommended at age 15 to 49 years. The second 23vPPV dose is recommended approximately 5 to 10 years (minimum 5 years) after the first 23vPPV dose; with a third dose at age 50 years or at least 5 years after the second dose. For non-Indigenous adults, the 3rd dose of 23vPPV is recommended at age 65 years or at least 5 years after the second dose.

The intramuscular route is preferred. A 3-fold greater rate of injection site reactions is found following administration of 23vPPV by the subcutaneous route. Pneumococcal vaccine can be administered at the same time as the influenza vaccine. The herpes zoster or shingles vaccine Zostavax can be given at the same time as 23vPPV, using separate injection sites and syringes.

### Adverse effects

Local reactions are common, more so after 13vPCV (71–82% of participants) than after 23vPPV (62–76%). Adverse events are usually mild and self-limiting. Adverse reactions should be reported. Systemic reactions such as myalgia, fever and chills are common with Pneumovax 23. Local and systemic adverse events are more common after a repeat dose of 23vPPV than after the 1st dose in adults.

In people who receive 23vPPV:

- about 50% or more have some soreness after the 1st dose
- about 20% have swelling and redness
- up to 5% have moderate or severe local adverse events that limit arm movement after the 1st dose
- up to 10% have fever  $\geq 37.5^{\circ}\text{C}$ , but high fever is uncommon

### Summary

*Streptococcus pneumoniae* is responsible for a considerable burden of illness and death in adults, usually from pneumonia and less often from invasive pneumococcal disease. There is consistent strong evidence that vaccination is effective in preventing invasive pneumococcal disease. A dose of Pneumovax 23 should be given to all adults at 65 years of age. A second dose is no longer recommended for non-Indigenous adults aged 65 years and over without conditions that predispose them to an increased risk of invasive pneumococcal disease.

### References

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- Kidney Health Australia. Chronic kidney disease management in general practice, 3rd edition 2015.*
- Cochrane Database of Systematic Reviews 2013, Issue 1.*
- COPDX Guidelines – Version 2.54 (June 2018).*
- Aust Prescr 2013;36:88-93.*

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