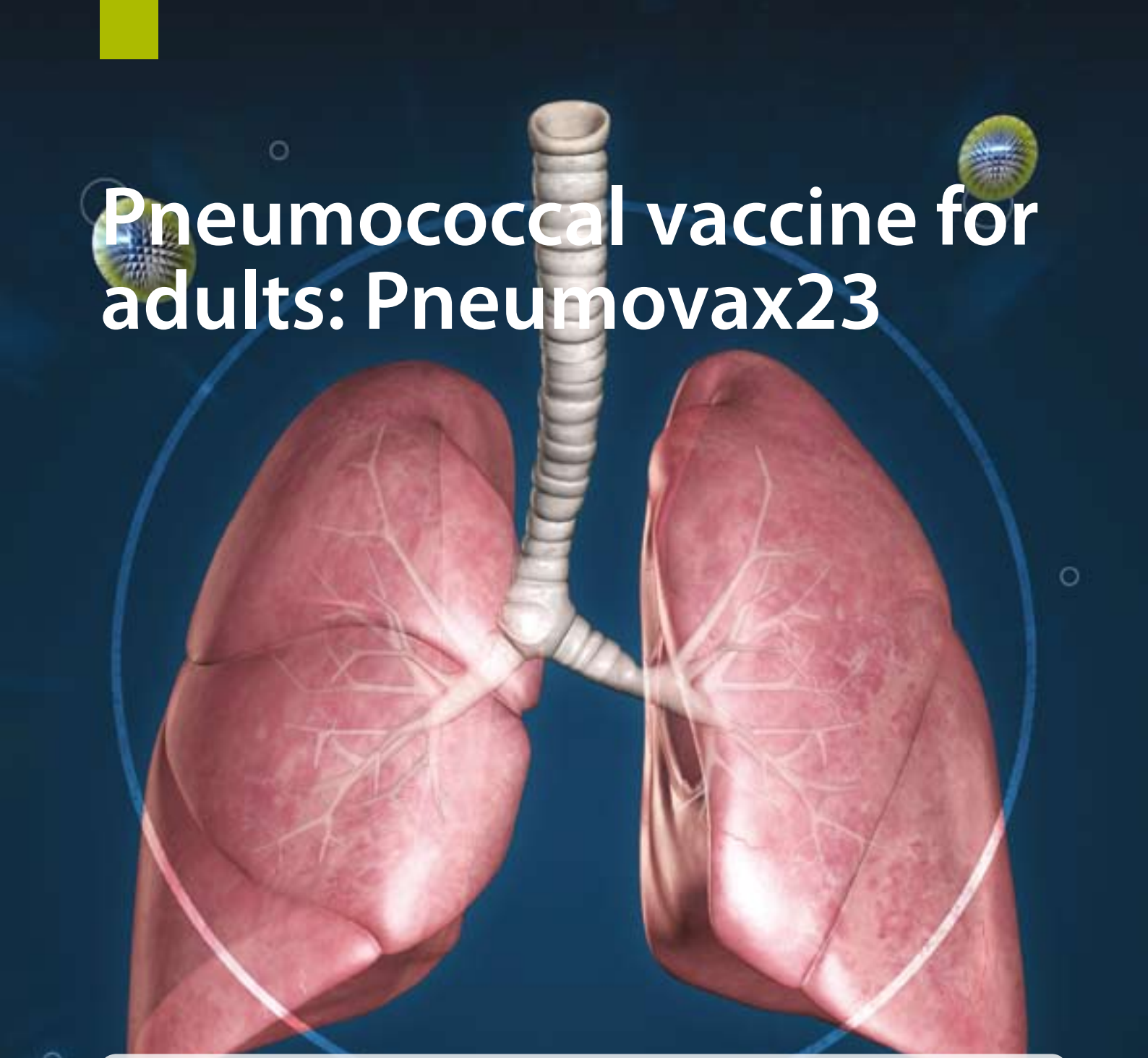
Pneumococcal vaccine for adults: Pneumovax23



Key concepts

- Invasive pneumococcal disease caused by *Streptococcus pneumoniae* can result in life-threatening pneumonia, meningitis and septicaemia
- Vaccination is the only method for preventing invasive pneumococcal disease
- Pneumovax23, a pneumococcal vaccine, is recommended (but not funded, except post-splenectomy) for all adults aged over 65 years, as well as people at increased risk of invasive pneumococcal disease due to co-morbidity or immunodeficiency
- A good opportunity to offer pneumococcal vaccination is prior to or during vaccination clinics for adults at high risk of seasonal influenza
- Pneumovax23 can be administered at the same time as the seasonal influenza vaccine

The threat of invasive pneumococcal disease

Streptococcus pneumoniae is a bacterium commonly found in the nose and throat. Most people carry these bacteria without ever developing invasive disease, but in some cases, transmission of the bacteria via respiratory secretions can lead to serious illness.

Pneumococcal infection is a frequent cause of respiratory illnesses such as otitis media, bronchitis and sinusitis. More serious illness can occur when *S. pneumoniae* invades normally sterile tissue, leading to pneumonia, meningitis, septicaemia and less frequently peritonitis, osteomyelitis and infective arthritis.[1]

Invasive pneumococcal disease, particularly pneumonia, is a significant cause of morbidity and mortality in New Zealand and worldwide. Those most at risk are young children, older adults (> 65 years) and people who are immunodeficient. Māori and Pacific peoples, particularly children, are also at higher risk of pneumococcal disease.

Of further concern is the increasing resistance of pneumococcal disease to antimicrobials and the rapid worldwide spread of resistant strains.[2] New Zealand has a high rate of antibiotic resistance among *S. pneumoniae* – penicillin, erythromycin and cefotaxime resistant strains are present.[3]

Vaccination is the only method for preventing invasive pneumococcal disease.

Different types of pneumococcal vaccine are available

There are over 90 different serotypes of *S. pneumoniae*, some of which more commonly affect children and others of which are more prevalent in adults. Several different pneumococcal vaccines are available (Table 1), targeting different virus strains.

Prevenar is a seven-valent, protein conjugate pneumococcal vaccine for children aged between six weeks to nine years. It has been part of the National Immunisation Schedule since 2008. This vaccine targets the seven most common strains of *S. pneumoniae* responsible for serious illness in children.

Synflorix is a new conjugate vaccine, which protects against ten serotypes of *S. pneumoniae*. It will replace Prevenar on the Immunisation Schedule in New Zealand in July 2011 for all children (see Page 48 "Pneumococcal vaccination in children").

Prevenar13 is another new conjugate vaccine which protects against 13 serotypes. It will be available only for children at high risk of pneumococcal disease (to use in these children instead of Synflorix).

Pneumovax23 is a 23-valent, polysaccharide vaccine, available for adults and high-risk children aged over two years (after receiving Prevenar or Prevenar13). Capsular polysaccharide vaccines such as Pneumovax23 are not used in young children as they induce antibodies via a mechanism that immature immune systems are unable to respond consistently to.[4]

Table 1: Summary of pneumococcal vaccine recommendations

Group	Current vaccine recommendation	Vaccine recommendation from July, 2011
Children	Prevenar	Synflorix
Children at high risk of pneumococcal disease	Prevenar + Pneumovax23 (after age two years)	Prevenar 13 + Pneumovax23 (after age two years)
Adults	Pneumovax23	Pneumovax23

Pneumovax23 for adults

Pneumovax23 vaccine contains antigens of 23 different serotypes of *S. pneumoniae*, which are responsible for more than 90% of cases of invasive pneumococcal disease.[2] This is the most appropriate and effective vaccine for adults.

Pneumovax23 is only funded for people pre- and post-splenectomy and in high-risk children aged two years or over. However, Pneumovax23 is recommended for adults at increased risk of invasive pneumococcal disease, i.e. people aged over 65 years, as well as people at increased risk due to co-morbidity or immunodeficiency.

How effective is the vaccine?

Pneumovax23 has an overall efficacy of 60–70% in adults, i.e. it will prevent pneumococcal illness in 60–70% of people who are vaccinated.[2] Efficacy is much higher in healthy populations but people who are immunodeficient or have chronic health conditions do not consistently develop immunity after vaccination.[2] The duration of effectiveness of Pneumovax23 in this group is also unclear.[5]

In adults aged over 65 years, Pneumovax23 appears to reduce the risk of pneumococcal bacteremia, but no benefit has been consistently demonstrated for protection against contracting non-bacteremic pneumococcal pneumonia.[6] However, a two-year study of older people with chronic lung disease found that vaccination prevented 43% of hospitalisations for pneumonia and 31% of deaths.[7] This suggests that while Pneumovax23 may not prevent pneumonia in older people, it may lessen the severity of the illness.

The Pneumovax23 vaccine has no significant effect on nasal carriage of *S. pneumoniae* in adults, therefore does not reduce spread to unvaccinated people, i.e. it has no herd immunity effect.[2]

N.B. Conjugate vaccinations such as Prevenar that are used in children do have a herd immunity effect and reduce transmission of pneumococcal disease to everybody.

Who should be vaccinated?

Consider vaccination with Pneumovax23 for the following people:[8]

- Aged 65 years or older
- Chronic cardiovascular disease, e.g. congestive heart failure, cardiomyopathies
- Chronic pulmonary disease, e.g. chronic obstructive pulmonary disease, asthma
- Diabetes, alcoholism, chronic liver disease (cirrhosis), or cerebrospinal fluid leaks
- Chronic renal failure or nephrotic syndrome
- Functional or anatomic asplenia, e.g. sickle cell disease, splenectomy
- Immunocompromising conditions or immunosuppressive treatment, e.g. HIV infection, congenital immunodeficiency, haematologic and solid tumors, treatment with alkylating agents, anti-metabolites, long-term systemic corticosteroids, radiation therapy, and organ or bone marrow transplantation
- Candidate for, or recipient of, cochlear implant

N.B. There is debate about some of these indications as there is currently limited evidence to support the routine use of pneumococcal vaccine in people with asthma[9] or for preventing infections in nephrotic syndrome.[10]

How to vaccinate

A good opportunity to discuss pneumococcal vaccination is prior to or during vaccination clinics for adults at high risk of seasonal influenza. Currently only adults pre- and post-splenectomy are eligible for funded Pneumovax23 (upon secondary care recommendation). Other adults must fund it themselves at a cost of approximately $55 - $75 (manufacturer's price of vaccine is $40).

Administering Pneumovax23

Contraindications:

- A history of a serious reaction (such as anaphylaxis)

after a previous dose or to a vaccine component (bovine protein, phenol).

Precautions:

- Moderate or severe acute illness with or without fever. It should be given to pregnant or lactating women only if clearly needed.[11]

Administration:

- Inject a single dose subcutaneously or intramuscularly to the deltoid (or lateral mid-thigh if preferred)
- It is safe to administer Pneumovax23 at the same time as seasonal influenza vaccine (but on different sites, e.g. right and left deltoid)

Frequency of administration

There is some debate over the frequency of administration of Pneumovax23 in adults, due to the lack of clarity surrounding its duration of effectiveness in some groups.

The general consensus is:

- People aged over 65 years require only one dose
- People aged under 65 years could consider a second dose at age 65 years (if five years or more have elapsed since the first vaccination)
- People with high risk conditions (i.e. immunodeficient or chronic co-morbidities), should receive a second dose three to five years later
- People who are post-splenectomy should receive a second dose three to five years later and a third dose when they are 65 years (or three to five years later than second dose if aged over 65 years)

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Pneumococcal vaccine in children

Vaccination against pneumococcal disease is included on the National Immunisation Schedule, as young children are more susceptible to complications of pneumococcal disease. Currently children are vaccinated using the seven-valent vaccine Prevenar (i.e. covers seven strains of *S. pneumoniae* most commonly seen to cause illness in children). However, from July 2011, a new vaccine, Synflorix, will replace Prevenar on the schedule. Synflorix is a 10-valent conjugate vaccine, which provides cover for ten strains of *S. pneumoniae*.

Synflorix will be recommended for all infants, from age six weeks, as a three-dose series of vaccines, with an interval of at least one month between doses, and a booster dose at age 15 months (i.e. the same regimen as Prevenar).

Synflorix is not routinely recommended for children aged over five years. However, older children (aged 6-18 years) with an increased risk of pneumococcal disease (e.g. they are immunodeficient or having a cochlear implant), who have already received Prevenar when they were infants, can be given additional protection with either Synflorix or Pneumovax23.

Children aged under five years with certain chronic medical conditions may be eligible for the high-risk pneumococcal programme (Table 2). These children are recommended to receive Prevenar13, a thirteen-valent conjugate vaccine, instead of Synflorix or Prevenar. After the full childhood schedule of Prevenar13 has been completed, these children should also receive Pnemovax23 vaccination

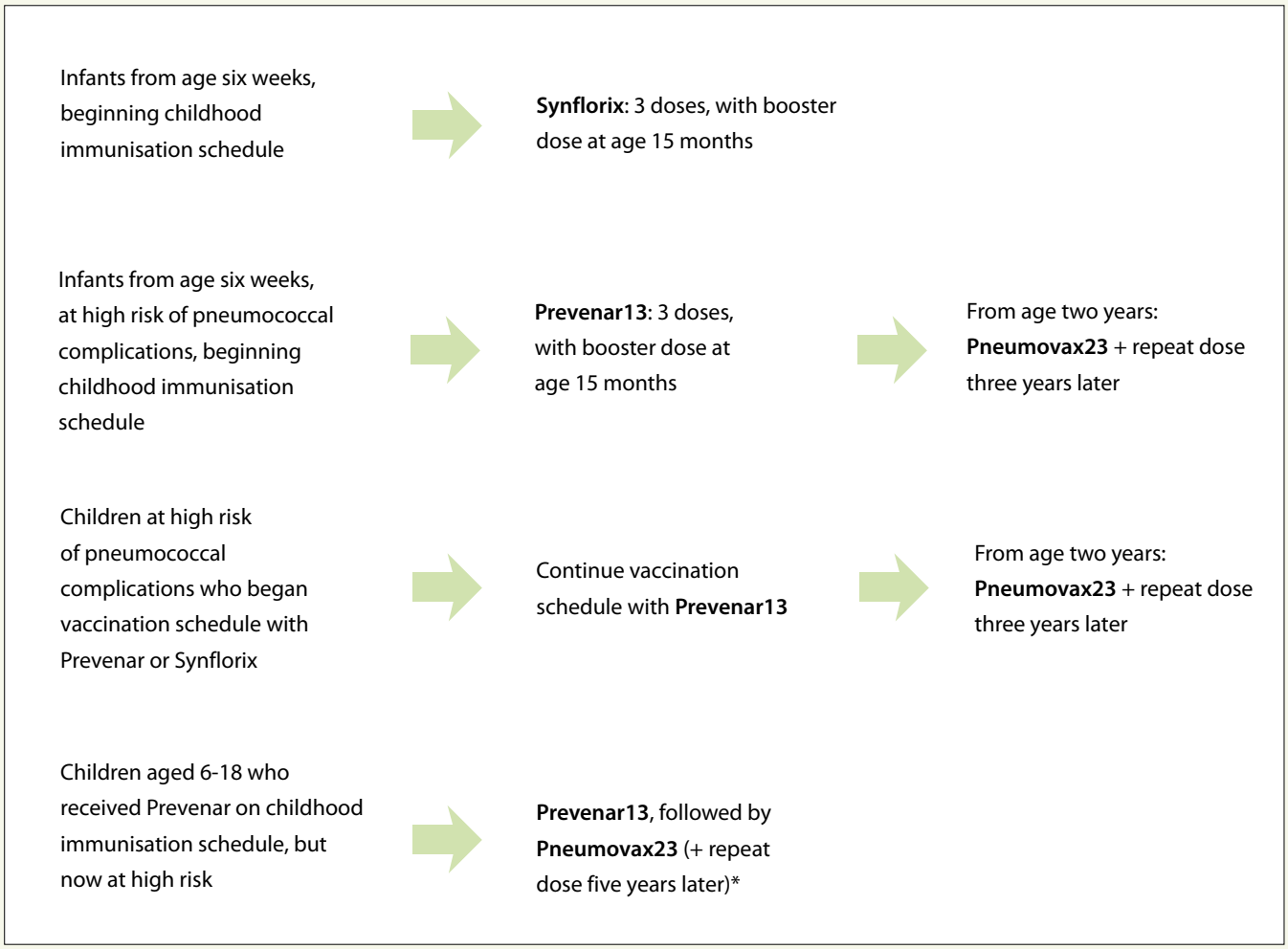

Figure 1: Summary of pneumococcal vaccine recommendations for children from July, 2011

*Updated from print version August 2011

when aged over two years, and at least eight weeks after the last dose of Prevenar13. A repeat dose of Pnemovax23 is recommended after three years.

N.B. If high-risk children have started on Prevenar or Synflorix, then they can complete the course with Prevenar13 followed by Pneumovax23

Table 2: Children eligible for high risk pneumococcal programme

Aged under five years with the following conditions:

- On immunosuppressive therapy or radiation therapy
- Primary immune deficiencies
- HIV
- Renal failure or nephrotic syndrome
- Organ transplants
- Cochlear implants or intracranial shunts
- Chronic CSF leaks
- On corticosteroid therapy for more than 2 weeks, at daily prednisone dose of ≥2 mg/kg or a total dose ≥ 20mg
- Pre-term infants, born at under 28 weeks gestation
- Chronic pulmonary disease (including asthma treated with high dose corticosteroid therapy)
- Cardiac disease with cyanosis or failure
- Insulin dependent diabetes
- Down's syndrome

Refer to the 2011 Immunisation Handbook for further information and guidelines on immunising high risk children. This Handbook is due to be released mid-year.

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