# ANZSGM Position Statement

## Immunisation for Older People
### An essential approach to maintaining wellbeing and quality of life

#### About the Australian and New Zealand Society for Geriatric Medicine (ANZSGM)

The ANZSGM is a society of medical practitioners engaged in the practice of Geriatric Medicine or related disciplines. Membership of the Society is open to registered medical practitioners who demonstrate a commitment to clinical practice, research, education and administration in Geriatric Medicine and allied specialties and to those undergoing training in these fields.

#### Acknowledgements

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## Summary

Vaccination of people 65 and above is essential for reducing the risk of respiratory and other diseases, and their complications, and may also have other benefits, including a reduced risk of dementia. Smarter vaccines help overcome the immunosenescence that otherwise reduces vaccination effectiveness and increases the risk of microbial disease in older people. Recommended vaccines include those against influenza, COVID-19, Pneumococcal disease, RSV, shingles, pertussis and tetanus. Travel vaccinations, health worker vaccination and meningococcal vaccination may also be appropriate. Vaccination rates are well behind those of younger people and are falling- strategies to overcome this will be discussed.

## Introduction

Immunisation is a vital part of healthy aging. Vaccination has been one of the greatest achievements of modern medicine—preventing and, in some cases, eradicating infectious diseases. It remains the main strategy for preventing severe viral and bacterial infections, reducing the serious consequences of disease, and improving the quality of life for those infected. Embracing immunisation not only protects individual health but also strengthens community well-being.

## Challenges in creating a vaccine for older people

### Heterogeneity of the older population

Older people often have a reduced primary response to vaccination, and outcomes inducing long-term protective immunity after vaccination are variable (1). This increases the risk of acute and long-term sequelae of the vaccine target. Older people are diverse individuals with varying health status, chronic health conditions and various degrees of frailty. This diversity creates an extra layer of complexity in creating a vaccine strategy that meets all their needs. Host, virus and vaccine-related factors all impact upon vaccine effectiveness.

### Immunosenescence

Inducing antigen-specific T cell and B cell responses results in immunological memory against offending pathogens, producing protection against disease. Both the quality and quantity of immune cells decline with older age. Aging is associated with various biological changes, including reduced Naïve T cells (2), increased aging T cell numbers, reduced ability to recognise a range of antigens (3) and impaired memory T cell responses (4). Immunosenescence is a collective term that describes changes in the innate and adaptive immune system that occur with aging. A decrease in T-cell production is a hallmark. Cellular senescence is associated with increased susceptibility to infection, age-related diseases and malignancies, as cells undergo arrested cell cycles, develop morphological abnormalities, lose proliferative ability, and become resistant to apoptosis (5). However, there is still much to learn.

## Balancing efficacy and safety

Research is crucial to understanding the full extent of these biological effects of aging. Changes observed include thymic involution, reduced naïve-to-memory T and B cell ratios, mitochondrial dysfunction, genomic instability, and stress responses. Immunosenescence may result in poorer vaccination outcomes in older people. Diminishing antibody titres post-vaccination have been observed in older people compared to their younger counterparts (6). To overcome this generally reduced response, smarter vaccines are needed, and these have been developed.

## Adjuvant systems / High dose antigen / mRNA

Given the vulnerability of older individuals to adverse events, vaccines must be carefully formulated to optimise their health benefits while limiting adverse outcomes. Stripping pathogenic components from the microbe to produce purified antigen vaccines can reduce the immunogenicity required to generate sufficient innate immune responses (7). This is often overcome by increasing the number of antigens or adding adjuvants. The development of adjuvant technologies has transformed the global vaccination landscape. These work by mimicking signals of infection, activating innate immune cells such as dendritic cells and monocytes, and eliciting adaptive immune responses. An adjuvant system is used in vaccines for influenza (MF59), shingles ($AS01_b$), respiratory syncytial virus ($AS01_e$), and the COVID-19 vaccine Novavax (Matrix-M). Other approaches include utilising high doses of antigens and mRNA technologies to overcome immunosenescence.

# Other benefits of vaccination

## Disease-associated complications

The benefits of vaccination go beyond the prevention of acute infectious disease at an individual level. Vaccination in older people can reduce disease-associated complications and positively impact the fragility of older people, resulting in an overall reduction in healthcare burden, morbidity, and mortality. Pneumococcal and influenza vaccination has been shown to reduce overall healthcare burden, with a 33% reduction in ischemic stroke episodes, a 48% reduction in myocardial infarctions, and a 55% reduction in admissions to critical cardiac units compared to unvaccinated individuals over 65 years old with chronic diseases (8). Immunisation has been shown to reduce long-term health complications by reducing acute infections and their complications (9). Vaccination also has non-specific effects on health. In a small, double-blind, randomised trial, the Bacille Calmette-Guérin (BCG) vaccine protected against new respiratory infections: 42.3% incidence in the placebo arm versus 25% in the BCG vaccination arm (10).

## Association with reduced risk of dementia

Multiple studies have shown a link between vaccinations and a reduced prevalence of dementia.

- **Shingles vaccine**

Emerging evidence suggests that the recombinant shingles vaccine reduces the risk of dementia (11). A meta-analysis of over 100,000 patients receiving herpes zoster vaccination showed a reduced risk of dementia, with an odds ratio of 0.84 (CL 0.05–1.43) (12). Other cohort studies of live attenuated or

adjuvanted Zoster antigen-vaccinated individuals found a 72% reduction in dementia incidence (13). A study in England and Wales, comparing older people over 80 years, who were naturally randomised to receive live attenuated zoster vaccine, found a 4.8% relative risk reduction of death due to dementia (14).

- **Influenza vaccine**

In a meta-analysis of nearly 300,000 older people (mean age 75.5 ± 7.4 years) with no dementia diagnosis at baseline, the risk ratio for dementia diagnosis was lower at 0.67 (CI 0.06–0.94) (15). Population-based cohort studies also found that zoster and influenza vaccination were associated with reduced hazard ratios for dementia diagnosis (16).

- **Tetanus, Diphtheria and Pertussis vaccine**

A meta-analysis of multiple vaccinations, including tetanus, diphtheria, and pertussis vaccines, also showed a lower hazard ratio of 0.69 (CI 0.58-0.82) for dementia diagnosis among vaccinated individuals (17).

- **Bacillus Calmette-Guérin vaccine**

A meta-analysis found intravesical BCG vaccination lowered the risk of Alzheimer's dementia incidence by 26% (18). A study by Greenblatt et al. also found similar protection against Alzheimer's dementia from other vaccinations (19).

- **Other vaccines**

These risk reductions are also observed with other vaccinations, including pneumococcal, hepatitis A (HR 0.78), hepatitis B (HR 0.82), rabies (HR 0.43), and typhoid (HR 0.80) vaccination (17).

The pathophysiology behind these observations has been unclear. Infectious disease has been speculated to be linked to the development of dementia. One theory suggests that the involvement of the Transactivation response element DNA-binding protein 43 (TDP-43) in the viral infection is the key (20). TDP-43 is an insoluble aggregate associated with several neurocognitive disorders, including amyotrophic lateral sclerosis, frontotemporal lobar degeneration, and limbic-predominant age-related TDP-43 encephalopathy (LATE) (21). On the other hand, a retrospective analysis of electronic health records from over 33 million patients aged 65 and over in the United States showed that a history of herpes simplex virus infection has an odds ratio of 2.15 (CL 1.84–2.50) for the diagnosis of dementia. These odds are higher in HSV-1 and HSV-2 coinfection, at 3.47 (CL 2.29 – 5.23) (22). Further research is needed to prove the causative pathway between viral infection and dementia.

Other immunological factors link Bordetella pertussis (BP) bacterial colonisation to BP-specific mucosal immunodeficiency and BP toxins, which activate microglia, induce inflammation, and initiate and accumulate amyloid plaques and tau tangles (23).

## Antibiotic resistance

Vaccination can also reduce antibiotic resistance. These apparently separate topics are linked by treating infections in older people. Determining the underlying causes of an acute respiratory infection in older people can be challenging, especially in community or aged care settings where respiratory virus polymerase chain reaction (PCR) testing is not readily available. The subsequent risk of inappropriate antibiotic use can lead to increased antibiotic resistance (24).

## The role of Geriatricians

Vaccination in older people is not just against acute infectious disease or mortality. There is an important public health dimension. The majority of acute respiratory illnesses in older people are viral in origin (25). The most commonly encountered viruses include respiratory syncytial virus, influenza virus, human metapneumovirus, rhinovirus, and human coronavirus (25). If older adults were vaccinated against these viruses, acute respiratory illnesses could be substantially reduced. Secondary bacterial and non-respiratory infections can also be prevented and reduced with vaccination, with the efficacy of vaccination against these being greater in older people.

Studies have found that physician recommendations are a strong determinant of vaccination (26) and specialist recommendations to the primary care physician and to the patient are likely to also increase vaccine uptake. If medical practitioners offer and advocate vaccinations to their patients, acceptance increases, even among those who previously held negative attitudes towards vaccination (27). Vaccination history is also an integral component of comprehensive geriatric assessment, providing insight into an older person's preventative healthcare status and providing an opportunity to encourage vaccination.

***Summary and ANZSGM recommendation for vaccination over 60 years old***

| **Disease** | **Vaccine Brand Name** | **Schedule (how often)** | **Australia Funded** | **New Zealand Funded** | **ANZSGM recommendations (for those 60 and older)** |
|---|---|---|---|---|---|
| Shingles (Herpes Zoster) | Shingrix | 2 dose courses, 2nd dose 2-6 months after the first dose (can be given as little as one month apart if high risk- eg immunocompromised) | √ but only if 5 years after Live Attenuated HZV vaccination | √ only if 1st dose given in age 65 | All over 65<br>Consider from age 60 |
| Influenza | Fluad Quad, Fluzone high dose Quad | Annually, before influenza season | √ | √ | Annually from age 60 |
| Respiratory Syncytial Virus | Arexvy, Abrysvo, mRESVIA | Once- likely revaccination needed after 3-5 years | × | × | 65 years and over, consider at age 60 |
| COVID-19 | Comirnaty, Spikevax, Nuvaxovid | Booster every 6-12 months before winter | √ | √ | Every 6 months from age 75<br>Every 12 months from age 65 |

**√ = indicates the vaccine is publicly funded for adults over 65 years old or younger if ATSI or in a high-risk category**

**×= indicates the vaccine is not currently funded but available via private script (some may be funded- DVA)**

| Disease | Vaccine Brand Name | Schedule (how often) | Australia Funded | New Zealand Funded | ANZSGM recommendations |
|---|---|---|---|---|---|
| Pneumococcal disease | Prevnar 13 (13vPCV)<br>Pneumovax (23vPPV)<br>Capvaxive (21vPCV) | Once | √<br>Currently only 13vPCV from age 70<br>×<br>For all other vaccines | ×<br>Risked based funding only | 21vPCV once off from age 65, at least one year after previous Pneumococcal vaccination.<br><br>Consider polysaccharide vaccine boosters in high-risk patients |
| Tetanus /Pertussis/Diptheria | Boostrix | Every 10 years or after high-risk wound | √ (at GP or immunisation clinic only) | √ | Once every 10 years from age 65<br><br>Consider primary vaccination course (3 doses) for tetanus if not previously given |
| Meningococcal disease | Meningococcal B<br>Meningococcal ACWY<br>Meningococcal C | Schedule depending on the vaccine brand | √ only for people with medical condition increasing risk of invasive disease | √ only for people with medical condition increasing risk of invasive disease | Consider one course of Men ACWY vaccine and one course of Men B vaccine in higher risk groups from age 65- includes those communally living, travelling to a high-risk country or undertaking Haj or other mass events |

**√ = indicates the vaccine is publicly funded for adults over 65 years old or younger if ATSI or in a high-risk category**
**×= indicates the vaccine is not currently funded but available via private script (some may be funded- DVA)**

| Disease | Vaccine Brand Name | Schedule (how often) | Australia Funded | New Zealand Funded | ANZSGM recommendations |
|---|---|---|---|---|---|
| Measles | Measles- Mumps-Rubella combination vaccine<br><br>(Monovalent vaccine not available in Aus/NZ) | Two IM injections, 4 weeks apart | √ | √ | A course vaccination for those born after 1966 in Australia or 1969 in New Zealand, especially for those travelling internationally as it is a main source of acquiring measles in Australia and New Zealand |

## Shingles

Shingles (Herpes Zoster) is caused by the reactivation of the dormant varicella-zoster virus (VZV) in the sensory ganglia nerves following primary infection with the virus in childhood (28). Up to 99.5% of adults over 50 have been infected with VZV and are at risk of developing shingles (29). Up to 1 in 3 people will develop shingles at some point in their lifetime due to VZV reactivation. In Australia, there are about 560 cases of herpes zoster per 100,000 population per year in all age groups, whilst this incidence rises to 1174 cases per 100,000 population per year in people over 50 years old (30).

The trigger for virus reactivation is thought to be immunosenescence, particularly less T cell activity, which occurs with age, or immunosuppression from medical therapy or illness (31).

Chronic effects of shingles can include post-herpetic neuralgia, which affects up to 30% of patients with shingles (32), herpes zoster opthalmicus in up to 30% of cases (29), and, in rare cases, loss of vision (33). This can have a significant impact on quality of life (34).

Antiviral therapy within 72 hours of rash onset reduces acute pain, duration of the viral rash, viral shedding, and ocular complications (35). However, it does not reduce post-herpetic neuralgia. This emphasises the importance of prevention rather than relying on treatment. Treatment for post-herpetic neuralgia pain with analgesic agents can have limiting adverse effects, commonly involves polypharmacy and is rarely fully effective. Vaccination against the herpes zoster virus is the best way to reduce the impact of shingles in a population.

| Vaccines | Vaccine type | Vaccine efficacy (VE) | Dose | Key Clinical information |
|---|---|---|---|---|
| Shingrix | Recombinant adjuvanted Antigen, glycoprotein E and adjuvanted system AS01b, | 88.8% (95% CI, 68.7% to 97.1; p<0.001) against post-herpetic neuralgia (36)<br><br>91% (>70yo) against shingles related complications (37)<br><br>VE of 73% (CI 62.9-80.9%) after 11 years post vaccination in those > 70 years old (38) | 2 IM doses, 2-6 months apart<br><br>Co-administration: YES, but administration of two adjuvanted vaccine can increase adverse reaction risk | Second dose is important as it generates 4-fold increase in cellular immune response<br><br>Booster after 2 doses not recommended given good VE over 10 years<br><br>Recommended to wait 12 months before vaccination for those who had shingles |
| Zostavax (not funded, superseded by Shingrix) | Live attenuated | 51% in those over 60 years old (39) | Single dose subcutaneous | No longer recommended<br><br>Zostavax-induced immunity decreases substantially to 15% after 10 years<br><br>Those received Zostavax should wait for 12 months before getting Shingrix, for funded Shingrix, this needs to be 5 years after Zostavax |

## Influenza

Influenza is a common infection that affects people of all ages, with seasonal outbreaks during the winter months in temperate climates. Influenza pandemics occur at unpredictable intervals, with high rates of morbidity and mortality. This is often related to the frequent mutation of genes encoding the haemagglutinin (HA) and neuraminidase surface glycoproteins, which are not circulating in human populations (40). This results in infection due to a lack of prior immunity to the new viral strain. HA antigenic shift leads to a pandemic, and antigenic drift allows circulating strains to evade herd immunity. The great pandemics, such as the 1918 outbreak, were caused by major antigenic shifts. In contrast, the 2017 influenza season was largely driven by a mismatch between the vaccine and the circulating H3N2 strain.

Fever, myalgia, upper respiratory symptoms, and malaise characterise influenza in healthy adults. Recovery is expected within 5 to 7 days (41). However, a high burden of influenza hospitalisation occurs in older people, especially those with underlying medical comorbidities. Influenza in older adults, especially in those who are frail, can result in loss of function and independence. It is responsible for a considerable burden of hospitalisation, reduces autonomy and increases mortality (42). The relative risk of myocardial infarction is six times higher within one week of influenza infection (43). Vaccination remains the best strategy to prevent severe disease and its complications.

| Vaccines | Vaccine type | Vaccine efficacy (VE) | Dose | Key Clinical information |
|---|---|---|---|---|
| Fluad Quad | Adjuvanted Quadrivalent Inactivated vaccine (standard antigen dose with MF59 adjuvant) | 51% against hospitalisation for pneumonia and influenza (44)<br><br>VE changes greatly depending on the dominant circulating strain | One IM dose before influenza season<br><br>Co-administration: YES | Immunity declines during the year, annual vaccination needed |
| Fluzone | High dose inactivated vaccine (higher antigen content) | 24% (CI 9.7-36.5) greater efficacy compared to standard dose in those over 65 years old (45) | One IM dose before influenza season<br><br>Co-administration: YES | Immunity declines during the year, annual vaccination needed |
| Vaxigrip/Tetra/Afuria Quad | Standard inactivated vaccine | Variable due to season | 1 IM dose before influenza season | Only use if high dose or adjuvanted vaccine not available |

## Respiratory syncytial virus (RSV)

RSV is a common respiratory virus that may lead to lower respiratory tract infection. It is a single-stranded RNA virus with two surface glycoproteins, G and F proteins (46). The G protein is responsible for viral attachment to host cells, and the F protein is responsible for the fusion of the viral and host cell membranes. The F protein undergoes a dynamic conformational change from a pre-fusion trimer to a stable post-fusion state. It can be classified into two groups: RSV A and RSV B.

Quantifying the incidence is challenging, as respiratory virus testing by polymerase chain reaction is mainly performed in the hospital setting. However, since mandatory reporting was introduced in Australia, the number of reported tests has been slowly increasing, with the highest number of positive cases among those aged 75 and above (47). The annual infection rate is around 3- 10% (48). It is a seasonal virus that co-circulates with other respiratory viruses (49). In healthy older people, RSV has a disease burden, hospitalisation rate, and mortality rate similar to those of influenza (50, 51). A New Zealand study also showed that the incidence rate ratio for RSV infections was higher amongst older people with comorbidities (52). In hospitalised older adults over 60 years old, RSV infection may result in greater morbidity and mortality compared to influenza infection.

Although RSV was first isolated in 1955, an effective vaccine was not developed until recently (53). Substantial understanding of the function of the fusion glycoprotein has enabled effective vaccine development (47). These involved using lyophilised recombinant RSV glycoprotein F stabilised in pre-fusion conformation as the antigen component that's reconstituted at the time of use with AS01e adjuvant as the adjuvant suspension component or sterile water, depending on the manufacturing instructions

| Vaccines | Vaccine type | Vaccine efficacy (VE) | Dose | Key Clinical information |
|---|---|---|---|---|
| Arexvy | Recombinant prefusion F + adjuvant (AS01e) | 82.6% (CI 57.9-94.1) against RSV related lower respiratory tract infection (LRTI)<br><br>94% (CI 62.4-99) in those 70-79 with medical comorbidities against severe RSV infection (54) | Single dose IM<br><br>Co-administration: YES | 67.2% in patients over 60 years old after 17.8 months of follow-up over two RSV seasons (55)<br><br>By the third RSV season, the vaccine efficacy remains around 60.3% for those aged 60 to 69 and 70.6% for those aged 70 to 79. |
| Abrysvo | Bivalent RSV A and B | 66.7% (CI 28.8-85.8) against LRTI with more than 2 symptoms<br><br>85.7% (CI 32-98.7) against LRTI with more than 3 symptoms (56) | Single dose IM<br><br>Co-administration: YES | VE declined slightly, from 88.9% in season one to 77.8% (CL 51.4-91.9) in season two for RSV-associated lower respiratory tract infection with three symptoms |
| mResvia | mRNA F glycoprotein vaccine | VE of 83% (CI 66-92) against REV related LRTI with 2 symptoms<br><br>VE of 68% (CI 50.9-79.7) against RSV associated acute respiratory disease (57) | Single dose IM | Duration of protection still under investigation |

## COVID-19

COVID-19 is an infectious disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It emerged in December 2019 and resulted in a global pandemic in early 2020. COVID-19 is an enveloped, non-segmented RNA virus with four main structural proteins: spike (S) glycoprotein, small

envelope (E) glycoprotein, membrane (M) glycoprotein, and nucleocapsid (N) protein. The S protein facilitates the virus's binding to host cells by interacting with the angiotensin-converting enzyme 2 expressed in the lower respiratory tract cells (58). As the virus replicates, small genetic changes occur, leading to the development of variants that can alter its transmissibility, disease severity, or resistance to immunity. There are three main categories of classification: variants of concern, variants of interest, and variants under monitoring (59).

COVID-19 is spread by contact with respiratory droplets from the infected persons. COVID-19 symptoms can vary from asymptomatic infection to critical illness and death. Common presenting symptoms include fever, dry cough, dyspnoea, chest distress and fatigue (60, 61). A small number of patients presented with gastrointestinal symptoms, including anorexia and diarrhoea (61). Older people are at the highest risk of severe illness from the COVID-19 virus, especially if they are frail (62),and are at greater risk of functional decline after hospitalisation with COVID-19 (63). Older people are more likely to need intensive care unit admission and mechanical ventilation than younger adults (64).

Oral antivirals are available in Australia for those aged 70 and older, and in New Zealand for those aged 65 and older, regardless of risk factors or symptoms, and for those aged 50-69 with risk factors for severe disease.

<table>
<tr><th>Vaccines</th><th>Vaccine type</th><th>Vaccine efficacy (VE)</th><th>Dose</th><th>Key Clinical information</th></tr>
<tr><td>Comirnaty (Pfizer)<br><br>(Only COVID vaccine in NZ)</td><td rowspan="2">mRNA vaccine<br><br>These vaccines use messenger RNA encapsulated in lipid nanoparticles to instruct host cells to produce a spike protein. The spike protein is displayed on the host cell surface and recognised as a foreign antigen, prompting an immune response</td><td>94.7% (CI 66.7-99.9) for those over 65 years old (65)<br><br>Co-administration: YES</td><td>Single dose IM</td><td rowspan="2">6 monthly booster is recommended for those over 65 years old and 6 monthly for those 75 and over<br><br>6 – 12 monthly booster is recommended for those over 65 years old</td></tr>
<tr><td>Spikevax (Moderna)</td><td>94.1% (CI 89.3-96)<br><br>Co-administration: YES</td><td>Single dose IM</td></tr>
<tr><td>Nuvaxovid</td><td>Protein subunit vaccines<br><br>This vaccine contained purified spike proteins manufactured in cells by the laboratory. An adjuvant is included to boost the immune response. The immune cells recognise it as a foreign antigen, which launches an immune response against it</td><td>89.7% (CI 80.2-94.6) after 2 doses, 3 weeks apart (66)</td><td>2 doses, 3 weeks apart</td><td>Alternative to those unable to use mRNA-based vaccines</td></tr>
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| Sinovax/Sinopharm | Inactivated virus vaccines<br><br>This vaccine contains inactivated viral surface proteins, including the spike protein, which the immune system recognises and provokes an immune response | VE ranging from 50-79% (67) | | Not currently available in either Australia or New Zealand |
|---|---|---|---|---|
| Vaxzevria/Janssen | Viral vector vaccines<br><br>This vaccine uses a harmless virus, often adenovirus, to deliver genetic material encoding the spike protein into the host cell | VE 73% against disease | | Not currently available in either Australia or New Zealand |

## Pneumococcal disease

Streptococcus pneumoniae infection is the most common bacterial cause of community-acquired pneumonia in adults. Streptococcus pneumonia is an encapsulated gram-positive coccus that can colonise the respiratory system. Its polysaccharide capsule is the most important virulence factor of pneumococci (68). Circulating serotypes of pneumococcal infection among adults generally reflect paediatric infection patterns, which have changed rapidly over the years (69). There are over 90 strains of streptococcus pneumoniae, with each serotype eliciting type-specific immunity (70). The conjugated vaccines cannot effectively address nearly all the serotypes causing invasive disease. Childhood vaccination has reduced the prevalence of some pneumococcal strains, necessitating newer polyvalent vaccines for older adults. The main aim of vaccination is to prevent Invasive Pneumococcal Disease (IPD), which includes bacteraemia and pneumococcal meningitis. Pneumococcal disease can cause serious illness in older adults. This is an exclusive human pathogen.

| **Vaccines** | **Vaccine type** | **Vaccine efficacy (VE)** | **Dose** | **Key Clinical information** |
|---|---|---|---|---|
| Prevenar 13 (13vPCV) | Conjugated PCV<br><br>Conjugate vaccines attach the purified capsular polysaccharide antigens from the pneumococcal bacteria capsule to a carrier protein, improving the antibody response compared to the | CAPiTA RCT in those aged 65 years and older, VE 46% against vaccine type community acquitted pneumonia (VT-CAP), 45% against nonbacteremic VT-CAP, 75% against IPD (76) | Single dose IM | Long used in adult, coverage for 12 serotypes |
| Vaxneuvance (15vPCV) | | No RCT VE%, systematic review showed non inferior compared to PCV 13 | Single dose IM | |

| Prevenar 20 (20vPCV) | polysaccharide vaccine.<br><br>The number after the PCV signifies the number of streptococcus pneumonia strains in the vaccine.<br><br>21vPCV differs substantially from 20vPCV | No VE studies | Single dose IM | Contains similar polysaccharide conjugates to Prevenar 13 plus 7 additional strains |
|---|---|---|---|---|
| Capvaxive (21vPCV) | | Approval based on immune response data, no published RCT VE% | Single dose IM | Approved in 2025 by TGA Australia, is under evaluation in New Zealand<br><br>This is not 20vPCV +1 |
| Pneumovax 23 (23vPPV) | Polysaccharide PPV | Approximate 60-70% against IPD in older adults | Single dose IM or S/C | Although it was initially recommended as a primary vaccination against pneumococcal disease, it was replaced by PCV 13 in 2020 in Australia but is still recommended in NZ |

## Tetanus

Tetanus is caused by Clostridium tetani, a gram-positive rod that forms endospores. The endospores are found in manured soil and can enter the body through wounds. Once it enters the wound, the bacillus can grow anaerobically and produce a potent protein toxin, tetanospasmin and tetanolysin. Death with tetanus is rare, but the burden of the disease disproportionately affects older people, with all deaths from tetanus infections observed in those above 65 years old (71). None of the deaths occurred in those with vaccination status in line with recommendations. Tetanus is a notifiable disease in Australia and New Zealand.

## Pertussis

Pertussis is caused by the bacterium Bordetella pertussis (BP), a gram-negative, encapsulated coccobacillus. It is spread through contact with infectious individuals, including coughing and sneezing. Once inhaled, the bacteria adhere to the ciliated epithelium in the nasopharynx. They secrete tracheal cytotoxin, which kills ciliated epithelial cells and inhibits their mucus-secreting function, which clears debris from the airways. It can also cause lymphocytosis, altering insulin secretion and increasing histamine sensitivity (72). Pertussis is not just a childhood disease. A national surveillance data study suggests possible under-recognition, underreporting, and underdiagnosis of Pertussis incidence in older adults across Australia and New Zealand (73). Diagnosis via isolation of the organism using Polymerase chain reaction (PCR) for BP has the greatest sensitivity but variable specificity in the first three weeks of illness. The detection sensitivity decreases rapidly after five days of antibiotics.

| Vaccines | Vaccine type | Vaccine efficacy (VE) | Dose | Key Clinical information |
|---|---|---|---|---|
| dTpa Boostrix | Combination of Tetanus toxoid, diphtheria and pertussis | 92% effective against primary pertussis infection<br><br>Immunological response to a single vaccination in older people over 69 years old is around 58.3% and improved in previously vaccinated people (74) | Single IM dose | Adjusted vaccine effectiveness reduced to 41% at eight or more years since the last vaccination (75)<br><br>Unlikely to need more than 4 doses over a lifetime |

## Travel Vaccination

Older people travel in greater numbers and should consider travel vaccinations on top of routine vaccinations. Travel vaccination should be specific to the countries they are visiting. Individualised advice according to their medical conditions or other immunosuppressing conditions is essential. Other factors to consider include exposure to infectious agents, altitude and temperature changes, hygiene and, access to medical care.

## Vaccination of healthcare workers

Vaccination of healthcare workers is essential to protect both themselves and the patients they care for, particularly among vulnerable populations. The individual also benefits from a reduction of disease-specific disability as well as absenteeism. The vaccination programs for healthcare workers differ based on occupational risks, such as exposure to blood and body fluids, high-risk exposure to drug-resistant tuberculosis cases, and the location of their work, ranging from laboratory workers routinely working with specific organisms to remote Aboriginal and Torres Strait Islander communities.

Although a recent Cochrane systematic review found that healthcare vaccination programs did not reduce the number of residents infected with influenza or hospital admissions, it did show fewer deaths from any cause among residents of aged care facilities where healthcare workers are vaccinated against influenza (76). Other major variabilities are not recorded in this systematic review, such as social distancing and other infection control measures.

## Conclusion

Vaccination remains a cornerstone of preventive healthcare for older adults, offering significant protection against infectious diseases. The benefits of immunisation in this population clearly outweigh the risks, with vaccines shown to reduce morbidity, hospitalisation, and mortality, while also alleviating pressure on the healthcare system. Although concerns about vaccine safety and efficacy may contribute to hesitancy, robust evidence supports the favourable risk-benefit profile of vaccines in older adults. Therefore, it is essential that older individuals are provided with clear, accurate, and accessible information to support informed decision-making. Engaging healthcare providers and leveraging trusted communication channels are critical strategies to promote vaccine confidence and update.

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Ph: (+61) 02 9241 2412
Email: admin@anzsgm.org
Website: www.anzsgm.org

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145 Macquarie St Sydney, NSW 2000
Ph: (+61) 02 9241 2412
Email: admin@anzsgm.org
Website: www.anzsgm.org

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Email: admin@anzsgm.org
Website: www.anzsgm.org

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145 Macquarie St Sydney, NSW 2000
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Email: admin@anzsgm.org
Website: www.anzsgm.org