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MedicineToday

THE PEER REVIEWED JOURNAL OF CLINICAL PRACTICE

Supplement

February 2019

Vaccinations for adults

65 years and over

Importance and challenges of vaccination in older people

Enhancing influenza vaccination in older people

Reducing pneumococcal risk in people aged 65 years and over

Herpes zoster: improving protection in older people

Other vaccine recommendations for older people

Strategies to increase vaccination rates in older people

Patient handout: Vaccinations for people aged 65 years and over

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FOREWORD FROM THE SUPPLEMENT EDITORS

Older people suffer disproportionately from infections with vaccine-preventable diseases, particularly influenza, pneumococcal disease, herpes zoster and pertussis. The decline in functionality of T cells that occurs with age, known as immunosenescence, leads to more severe disease in older people when infected and also to reduced responses to vaccines. This problem is compounded by generally lower vaccine coverage rates in this age group.

This supplement reviews the available vaccines for people aged 65 years and over in Australia and their use. It outlines the key risk-benefit discussions for each of the recommended vaccines and presents practical strategies for GPs to improve vaccine uptake in their practices. Case studies highlight important issues, and the vaccine pipeline moving forward is also described. We hope that these articles help you discuss and promote vaccination to your older patients.

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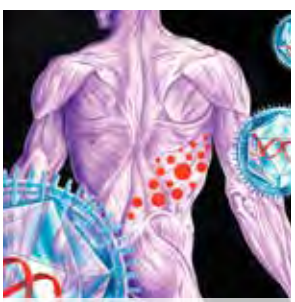

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Importance and challenges of vaccination in older people

PAUL VAN BUYNDER MB BS, MPH, FAFPHM
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Infectious diseases contribute significantly to morbidity, ongoing functional decline and mortality in older people. Several of these diseases are preventable by vaccination, but vaccine coverage is suboptimal for all of these. New approaches are required to improve vaccine coverage among people aged 65 years and over.

KEY POINTS

- A decline in immune function with ageing increases the impact of infectious diseases in older people.
- This immunosenescence also decreases the effectiveness of vaccines in older people.
- Older people should be provided with pneumococcal, herpes zoster and booster pertussis vaccines as well as annual influenza vaccine.
- Poor data on vaccine coverage and burden of disease have hampered efforts to increase vaccine coverage; some patients and clinicians are sceptical about the need for vaccines and their effectiveness. Better monitoring might help combat this.
- A new approach to advocacy involving a broader partnership base is required, to educate the public and deliver vaccines.
- Vaccines recommended on a scientific basis should be funded under the National Immunisation Program.

Older people undergo an age-related decline in immune responses resulting in greater susceptibility to infection and reduced responses to vaccination.[1] This decline in immune function, termed immunosenescence, affects both innate and adaptive immune systems. Essential features of immunosenescence include reduced natural killer cell cytotoxicity on a per cell basis, and decreased pools of naive T and B cells. There is an accumulation of late-differentiated effector T cells, commonly associated with cytomegalovirus infection, which contributes to a decline in the capacity of the adaptive immune system to respond to novel antigens. The reduced functional capacity of T cells is the main effect of the ageing process.[2] Immunosenescence is a major contributory factor to the increased frequency of morbidity and mortality among older people and the reduction in vaccine responsiveness in this age group, especially frail patients.

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Infectious diseases are significant in older people not just because of their increased severity (e.g. more than 90% of influenza deaths are in people aged over 65 years) but also because of their impact on functional capacity after the illness. Data show that hospitalisation for influenza is highly likely to lead to 'catastrophic disability', defined as a loss of three levels of capacity for activities of daily living.[3] Typically, older people who are independent at home and are hospitalised with influenza need assistance with care on discharge.

Similar data exist for people with shingles. A French study showed ongoing deficits in physical, social and psychological functioning after older people developed postherpetic neuralgia.[4]

Vaccines available for older people

Although not all recommended vaccines are funded for older people in Australia, GPs should ensure that every 65-year-old patient receives:

- an enhanced influenza vaccine and ongoing annual vaccination
- first-dose 23-valent polysaccharide pneumococcal vaccine, with boosters if required
- herpes zoster vaccine
- an acellular pertussis vaccine booster if this has not been given in the previous 10 years.

Vaccine coverage in older people

In Australia, accurate data on vaccine coverage levels are available for the paediatric vaccination program but not for vaccination coverage of older people. The most recent national survey of vaccine coverage in older adults was conducted in 2009. Estimates derived from more recent ad-hoc surveys suggest that:

- about 75 to 80% of older people receive influenza vaccines each year
- about 50% have received a pneumococcal vaccine
- about 25 to 30% have received a herpes zoster vaccine (albeit more in the 70 to 79 years age group)
- fewer than 10% have received a pertussis booster in the past 10 years.

The recent expansion of the Australian Childhood Immunisation Register (ACIR) into a whole-of-life Australian Immunisation Register (AIR) has the potential to improve data on older people over time. However, this will depend on the support of GPs to input data as they vaccinate older people. It will also require data entry at other sites where vaccines are provided, such as pharmacies. Further, the absence of a mechanism to input historical data will reduce the accuracy of coverage data for all vaccines other than the annual influenza vaccine for many years.

Burden of vaccine-preventable disease in older people

Similarly, accurate data on vaccine-preventable disease rates in older people are not available. Many older people with influenza are not tested or notified to public health authorities; presenting symptoms may be a worsening of a chronic condition, or confusion alone, and more than half of patients have no fever.[5] Many patients with shingles are diagnosed clinically and are not investigated. Most patients with pertussis present with a chronic cough and do not have a swab taken. About 20% of patients presenting with a chronic cough of more than two weeks' duration have pertussis.[6] Community-acquired pneumonia is rarely confirmed as being due to *Streptococcus pneumoniae* (pneumococcus).

The failure to describe adequately the morbidity and mortality associated with vaccine-preventable diseases in older people is a major impediment to improving vaccine uptake. Lack of awareness of the significance of a problem reduces the likelihood of preventive action. Despite the high percentage of older people developing shingles (with 50% of 85-year-olds having had the disease[7]) and the seriousness of postherpetic neuralgia, a community survey conducted by a vaccine manufacturer found that only 4% of older people were concerned about the disease. The lack of understanding of the significance of these illnesses extends to healthcare providers, with few understanding the seriousness of pertussis infection for older people themselves, not only for their newborn grandchildren.

Improving vaccine uptake in older people

Some pre-conditions and requirements for improving vaccine uptake in older people are outlined in the Table.

TABLE. KEY PRE-CONDITIONS FOR IMPROVING VACCINE UPTAKE IN OLDER PEOPLE

Pre-condition	Requirement
Develop awareness and belief in the significance and severity of disease	Advocacy with public, professionals and government
Develop awareness and belief that available vaccines are effective and safe	Advocacy with public, professionals and government
Fund the recommended vaccines	Advocacy with professionals and government
Develop a broad-based program that maximises access to vaccines	Involvement of nurse immunisers, pharmacists and other health professionals after appropriate training
Develop program targets and a monitoring and surveillance system of both disease and vaccination coverage	Advocacy with professionals and government

Better understanding of disease burden and vaccine benefits

Developing a better understanding of the balance of risks versus benefits of vaccines in older people involves engaging not just health practitioners but also the public, media and governments. The initial step involves providing strong evidence about the burden of vaccine-preventable disease, put simply, and incorporating health literacy development.[8] Having available product champions from among target groups as well as skilled media performers is important once messages are ready, as is engaging nontraditional partners in message development, such as groups representing aged people or people living with chronic diseases.

Although providing education to GPs that emphasises whole-of-life vaccination and vaccination of older people is necessary, opportunities also exist to involve nurse immunisers, immunisation alliances, pharmacists and key nongovernment organisations such as COTA (formerly Council on the Ageing), Diabetes Australia and other organisations representing target groups. Despite the lack of support for these 'nontraditional' sources of vaccination in some sectors, their scope is increasing, and they should be involved in messaging to ensure consistent activity.[9] Although many older people still use traditional media, an increasing proportion access the internet, and enhanced promotional activity on social media might also improve uptake.

Largely due to immunosenescence, many vaccines are only partly effective in older people, leading to a reduced commitment to their use by both the public and health professionals. Modified messages about vaccination are required to address this. For example, although some older people develop influenza despite being vaccinated, their illness will be attenuated, and they will be less likely to be hospitalised.[10] Also, new enhanced influenza vaccines produce a better response than traditional inactivated influenza vaccines. GPs need to convey the dangers of not being vaccinated.

Older people largely do not believe they need many recommended vaccines. We need to create and build demand by better describing the burden of disease and the safety and effectiveness of available vaccines.

Systems approaches in general practice

GPs also need to develop strategies to increase coverage within their practices. These strategies should include a systems approach to identify target populations and engage with them. For example, use of electronic records and desktop software to recall patients in target age groups for initial and repeat vaccines is effective and possible in all primary care clinics.

Role of government

Multiple models exist around the world for vaccine funding policies: co-pay percentages, fixed costs with subsidies, full funding or no funding at all. Any policy must be simple, and identifying who qualifies should not be overly complex. Although accepting incremental gains is important as we move forward, the only vaccine programs in the world that meet targets are fully funded. Funding for pertussis booster vaccine in older people is needed in Australia.

Maximising access to vaccination

Broadening the base of sites to access vaccine beyond general practice will help increase coverage. Nurse-managed public immunisation clinics, immunisation by pharmacists and immunisation clinics in nursing homes have all been successful in increasing coverage.[11] Opportunistic settings have been used in other countries, including an influenza vaccine van in the car park before a major football game in the US city of Seattle and immunisation clinics in supermarkets.

Recording, monitoring and evaluating vaccine programs in older people

To ensure improvements in vaccination programs for older people, program targets should be set and linked to monitoring and surveillance systems for both the disease and vaccination coverage. In particular, recording the burden of disease and its personal and financial impacts is crucial for obtaining financial support for programs.

Accurate recording of the time of vaccine administration is important for

developing a recall system, measuring vaccine coverage, monitoring vaccine safety and providing payments for providers.

Conclusion

The uptake of vaccination in older people is suboptimal but attracts little focus at present. A move to a whole-of-life approach to immunisation and acknowledgement that preventive health care should be fair and equitable for all are needed. A national strategy should be developed that incorporates improved messaging about the risks versus benefits of vaccination and better data on vaccine coverage as well as disease incidence and outcome. The public messaging strategies should be freely available for use by other organisations and suitable for multiple-use formats. For example, enabling groups such as Diabetes Australia, the Heart Foundation and others to use pre-developed messages with their constituencies will aid message dissemination.

An increased focus on vaccination is needed in primary care, as well as better linkages between vaccination activities there and in other settings such as pharmacies. Targets for improved outcomes should be set and monitored. MT

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Enhancing influenza vaccination in older people

PAUL VAN BUYNDER MB BS, MPH, FAFPHM

Seasonal influenza disease can be particularly severe in older people, but conventional trivalent and quadrivalent inactivated influenza vaccines can be ineffective in this age group when influenza A(H3N2) strains predominate. New enhanced trivalent vaccines are available and should be used in people aged 65 years and over.

Illness due to influenza virus infection poses a severe burden on Australian healthcare systems. Globally, the WHO estimates that seasonal influenza causes three to five million cases of severe illness and 290,000 to 650,000 deaths annually.[1] Influenza is a disease that affects both industrialised and developing countries. Although data from the developing world are limited, it is estimated that each year 99% of deaths in children under 5 years of age with influenza-related lower respiratory tract infections occur in developing countries.[2] However, influenza more often results in severe disease in people with chronic underlying conditions and in older people and most influenza-associated mortality occurs in older adults.[3]

KEY POINTS

- In Australia, the vast majority of cases of serious influenza disease and influenza-related deaths occur in adults aged 65 years and over; long-term sequelae that impact on activities of daily living are also common in this group.
- Standard influenza vaccines induce suboptimal antibody titres and show suboptimal levels of effectiveness in older adults. Two enhanced influenza vaccines are now available in Australia and should be used in older people; both have a good safety profile.
- During the 2019 influenza season in Australia, an adjuvanted trivalent vaccine that has been shown to provide enhanced protection in older adults is recommended and funded under the National Immunisation Program (NIP) for people aged 65 years and over.
- A high-dose version of the standard trivalent vaccine also provides enhanced protection in older people and is recommended for use in this group but is not funded under the NIP this year.
- The additional benefit of extra influenza B coverage and hence the need for a quadrivalent vaccine in older people has not been established. However, the benefit would be substantially less than the additional protection provided by enhanced vaccines.
- Influenza vaccine coverage in older people is about 75% each year; general practice staff are key partners in increasing this level of vaccination.

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In 2017, the largest nonpandemic influenza season on record in Australia, more than 90% of the reported 1100 influenza-related deaths were in adults aged over 65 years.[4] Much of the impact of influenza in older people is hidden and manifests as previously undetected underlying medical conditions or as a worsening of existing conditions, especially cardiovascular disease.[5] For example, acute influenza can lead to decompensation in patients with congestive heart failure or diabetes mellitus and to an increased risk of myocardial infarction and stroke. As patients with these conditions are rarely tested for influenza, the burden of disease is greatly underestimated.[6]

Influenza can present differently in older adults, who often have a lower incidence of fever, more frequent lower respiratory symptoms such as cough, wheezing and chest pain, and atypical disease, with anorexia, mental status changes or unexplained fever as the only presenting symptoms.[7,8] Patients with underlying chronic obstructive pulmonary disease (COPD) may experience worsening respiratory status. Heart failure may be an unrecognised complication. Pneumonia is a relatively common complication, especially in people with chronic cardiopulmonary disease.

Of great importance are recent data that show influenza causing hospitalisation negatively affects functional status in older people and leads to a decline in capacity for activities of daily living after the infection.[9] As populations age, the occurrence of permanent disabilities due to influenza-related illness is increasing, causing major suffering and mandating the search for effective prevention programs.

Influenza viruses

There are two major influenza virus types that cause human illness, influenza A and B viruses, each with their own characteristics and effect on different community groups. Most severe human illness is due to influenza A viruses, further subdivided into A(H1N1) and A(H3N2) subtypes according to the two surface proteins haemagglutinin (H) and neuraminidase (N). Influenza A has its greatest impact on older adults and young infants, whereas influenza B is more likely to occur in the under 20 years age group.[10]

The highest rates of influenza-related morbidity and mortality occur in people aged over 65 years infected with A(H3N2) strains. There is a direct relationship between seasons when an influenza A(H3N2) strain is the predominant strain in circulation and increased hospitalisations with influenza-associated respiratory and circulatory conditions.[11]

No link has been shown between levels of circulation of influenza B viruses and excess mortality or seasonal surges in hospitalisations.[12]

When I first diagnose a patient with diabetes, I don't ask them if they feel like taking insulin. Similarly, in winter when flu vaccine becomes available, I tell patients it has arrived and that I will give it to them while they are there. I get very few discussions or refusals. This is best practice.

US geriatrician

Influenza vaccine responses in older people

Immunosenescence, an age-related decline in immune function, impairs the ability of older adults to fight natural infections and also results in suboptimal immune responses to influenza vaccines.[13] Both adaptive and innate immunity decline with increasing age in the population aged over 65 years.

Although some studies have found little protection from the use of standard influenza vaccine in this older age group, conclusions are clouded by the mismatch in some years between viral strains in the vaccine and those circulating in the population, and the different outcomes evaluated. Indeed, studies have shown that inactivated influenza vaccine may halve the incidence of laboratory-proven and clinical influenza.[14] Even when vaccination failed to stop infection, it did decrease the severity of disease, as evidenced by lower hospitalisation rates and fewer admissions to intensive care units.[15]

Influenza vaccine effectiveness in older people varies with the circulating strain, being lower in years when influenza A(H3N2) predominates. Older adults have the poorest antibody-mediated immune responses to the A(H3N2) components of vaccines and also display lower cellular immunity to influenza A(H3N2).

Influenza vaccines

Influenza vaccination is recommended and funded in Australia for all people aged 65 years and over. Previously, the most widely used influenza vaccines were trivalent formulations of inactivated haemagglutinin and neuraminidase antigens representative of the predominant A(H1N1), A(H3N2) and B strains, using the selected strains recommended by WHO for each season. More recently, both influenza B strain lineages (B/Yamagata and B/Victoria) have been included in new quadrivalent influenza vaccines. The WHO recommended strains for the trivalent and quadrivalent influenza vaccines for the 2019 southern hemisphere influenza season are listed in Box 1.

Quadrivalent influenza vaccines may have benefit in children, who experience the highest burden of influenza B. However, they are relatively less advantageous for older people, in whom most serious disease is attributable to influenza A(H3N2), with little disease or serious disease being due to influenza B. Adding additional lineage coverage for influenza B to vaccines for older people would be of little benefit, as it has no impact on overcoming immunosenescence and improving effectiveness against influenza A disease.

Enhanced vaccines are required to provide adequate protection in older people.[16,17] The Australian Government funded two new enhanced vaccines for people aged 65 years and over for the first time in 2018: an adjuvanted trivalent vaccine and a

1. WHO RECOMMENDED COMPOSITION OF INFLUENZA VIRUS VACCINES FOR USE IN THE 2019 SOUTHERN HEMISPHERE INFLUENZA SEASON[1]

Quadrivalent egg-based vaccine viruses	Trivalent egg-based vaccine viruses
• A/Michigan/45/2015 (H1N1) pdm09-like virus • A/Switzerland/8060/2017 (H3N2)-like virus • B/Colorado/06/2017-like virus (B/Victoria/2/87 lineage) • B/Phuket/3073/2013-like virus (B/Yamagata/16/88 lineage)	• A/Michigan/45/2015 (H1N1) pdm09-like virus • A/Switzerland/8060/2017 (H3N2)-like virus • B/Colorado/06/2017-like virus (B/Victoria/2/87 lineage)

TABLE. INFLUENZA VACCINES AVAILABLE FOR USE IN DIFFERENT AGE GROUPS IN AUSTRALIA FOR THE 2019 INFLUENZA SEASON

Brand name (manufacturer)	Type of vaccine	Age group
Trivalent vaccines		
Fluzone High-Dose (Sanofi-Aventis)	High-dose TIV	65 years and over
Fluad (Seqirus)	Adjuvanted TIV	65 years and over
Quadrivalent vaccines		
FluQuadri Junior (Sanofi-Aventis)	QIV	6 to 35 months
FluQuadri (Sanofi-Aventis)	QIV	3 years and over
Fluarix Tetra (GlaxoSmithKline)	QIV	6 months and over
Influvac Tetra (Mylan Health)	QIV	18 years and over
Afluria Quad (Seqirus)	QIV	5 years and over

Abbreviations: TIV = trivalent influenza vaccine; QIV = quadrivalent influenza vaccine.

high-dose trivalent vaccine. Both vaccines showed improved effectiveness in real-world studies and elicited greater antibody responses in clinical trials. In September 2017, the Chief Medical Officer of Australia issued guidance on the importance of vaccinating older patients and also of using the new enhanced vaccines in this specific age group.[18] Vaccines available in Australia in 2019 are shown in the Table.

Enhanced influenza vaccines

Adjuvanted influenza vaccine

The adjuvanted trivalent influenza vaccine not only enhances the magnitude of the immune response but also broadens the response to improve protection during years when vaccine strains do not match circulating viruses. The adjuvant MF59 is an oil-in-water emulsion based on squalene, which enhances both antigen presentation and T-cell priming. Importantly, a number of international studies of adjuvanted influenza vaccine found a significant increase in the response to influenza A(H3N2) in people aged over 65 years.[19,20] In 2019, the adjuvanted trivalent influenza vaccine is recommended as one of the two preferred vaccines for use in older people and is funded under the National Immunisation Program (NIP).

High-dose influenza vaccine

The high-dose trivalent influenza vaccine contains 60 mcg haemagglutinin per strain, instead of 15 mcg, and produces a dose-dependent increase in antibody response. Several studies have shown that it induces higher immune responses in older adults, with improved efficacy in clinical trials against influenza infection compared with the standard trivalent influenza vaccine. The high-dose vaccine also shows improved efficacy in clinical trials.[21,22] Although high-dose influenza vaccine is recommended as a preferred vaccine for use in older people, it is not funded under the NIP in 2019.

Benefit of enhanced vaccines.

The attributable additional benefit of using an enhanced vaccine will vary from year to year depending on the predominant circulating strain (H3N2 or not) and the degree of match with the vaccine strains. However, in several real-life effectiveness studies in older people, enhanced vaccines have shown on average about 25% extra protection against disease and even higher additional protection against severe disease.[20] Given the burden of disease associated with influenza in older people, this additional protection has enormous implications. During the severe 2013-14 influenza season in the US, the Centers for Disease Control and Prevention estimated that each 5% increase in vaccine effectiveness saved 86,000 hospitalisations in that year.

Safety of enhanced vaccines

In the two decades since the adjuvanted trivalent influenza vaccine was licensed, it has established a good safety record. An integrated analysis by the manufacturer of data from 20,000 vaccinees in the safety database obtained in the strict monitoring conditions of clinical trials of the vaccine revealed a higher risk of solicited local or systemic reactions, but no increase in severe adverse effects or longer-term consequences.[23]

Similarly, safety studies with high-dose trivalent influenza vaccine showed a small increase in local injection site reactions, most commonly pain at the site, and some increase in systemic adverse event rates. These reactions were largely mild and

2. CASE STUDIES ON INFLUENZA VACCINATION

A high-risk patient reluctant to receive influenza vaccine

Jennifer, aged 68 years, attends your surgery for a repeat prescription of angina medication. She has been relatively well but occasionally experiences pain on exertion that requires treatment with sublingual nitrates. You note that she has not received influenza vaccine this year or previously.

Is Jennifer in a high-risk group?

Jennifer is in a high-risk group because of both her age and heart disease. People vaccinated against influenza are much less likely to have a cardiac incident than those who are not vaccinated. Many influenza cases in older people present as worsening of a chronic condition.

Jennifer says she is concerned about being vaccinated. The last time she had a flu vaccine 20 years ago, she got the flu badly. She has not had a vaccine since.

What does Jennifer need to know?

There are many possible reasons that Jennifer may have had the 'flu' after vaccination in the past. These include:

- Influenza vaccine takes about two weeks to be effective. If a person is exposed to influenza virus in this period, they can be infected.
- Many other viruses circulate in winter, and Jennifer may have been infected by one of them.
- Influenza vaccine is not perfect; its effectiveness averages about 60%, varying from year to year. People can get influenza after receiving a vaccine, but the illness is usually milder and they are less likely to be hospitalised.

Because of Jennifer's medical conditions and age, it is imperative that she is vaccinated against influenza. Australia now imports enhanced vaccines that work better in older people, and she can receive one of these free today.

The new stronger vaccines may cause some local side effects at the injection site and a mild fever and aches for a day, but no increase in serious adverse effects has been seen.

While Jennifer is there you should also check her pneumococcal vaccination status.

As vaccine effectiveness wanes over time should Jennifer have a booster dose later in the season?

There are few data about the benefit of repeat influenza vaccination in the same season, but recent very late influenza seasons and significant summer outbreaks raise the question about how to deal with the decline in protection over time. When two doses of influenza vaccine were given in Hong Kong (a northern hemisphere and a southern hemisphere version), the increase in patient levels of immune markers was small. No technical advisory group in any country recommends two vaccine doses in a season. Also, only one vaccine is available on the 'free list' in Australia, so patients must pay personally for a second dose.

A number of GPs have responded to outbreaks late in the year by selecting groups of clinic patients with chronic diseases and revaccinating them. This is unlikely to cause harm, but the extent of benefit is unclear.

A man worried about influenza B

Peter, aged 72 years, presents at your surgery in March to discuss influenza vaccines. He is ambivalent about receiving the vaccine because after he was vaccinated two years ago, he still got the flu. However, he is worried about media reports of the influenza B Brisbane strain and wants to protect himself against it.

What would you advise Peter?

In 2017, when Peter contracted influenza after vaccination, the vaccine was poorly effective against the influenza strain circulating in the community, and Australia had a massive influenza outbreak. This year we have access to new enhanced vaccines that are much more effective in older people, and one of them, the adjuvanted trivalent vaccine, is available free of charge for this age group.

Although there has been much talk in the media about strains of influenza B virus, the greatest concern for older people is influenza A(H3N2) virus, which causes most hospitalisations and deaths. The enhanced vaccines provide better protection against this subtype. There are no enhanced quadrivalent vaccines available, and adding extra limited protection against influenza B virus will not help in older people. They should receive an enhanced trivalent influenza vaccine.

While Peter is there, you should also check his pneumococcal vaccine status.

Will you give Peter influenza vaccine now?

It is not recommended that you give Peter influenza vaccine now. We know that the effectiveness of standard inactivated influenza vaccines wanes with time after administration. In older people, this applies particularly to vaccine against A(H3N2) strains, which may show no effectiveness by four to six months after administration. Some immunological data suggest that the adjuvanted vaccine available on the National Immunisation Program in 2019 provides longer protection, but the clinical relevance is not known. There is little circulation of influenza virus before June in Australia, and delaying vaccine administration in older people until early May is appropriate.

self-limiting. Again, no increase in the rate of serious adverse events was seen.[24]

Timing of influenza vaccination in older people

Recent data on influenza vaccine effectiveness over the course of the influenza season suggest that in a predominant H3N2 season, vaccine effectiveness falls about 8% per month; vaccine may no longer be effective four months after administration. This has led to debate about delaying vaccination until around May in older people in Australia to ensure they remain protected later in the influenza season.

Data show continued immunological markers for more than six months after administration of adjuvanted trivalent influenza vaccine, so timing may be less crucial with this vaccine. Nevertheless, substantial influenza activity before June is uncommon, and delaying vaccine until May appears reasonable.

Role of general practice

Vaccination is an important component of promoting healthy ageing. Current coverage rates with influenza vaccine in older people are too low, at about 75%.[25] This coverage level would not be accepted in

children, and in view of the clear benefit of vaccination and the amount of influenza-associated disease in older people, 75% coverage should not be accepted in this age group either. GPs are key to improving vaccination rates.[26] Having a clear rationale about the high risk of influenza in older people and the benefit of vaccination with a new safe enhanced vaccine, and sharing this with all patients in target groups is important. This is particularly the case for those with chronic disease. Two case studies on influenza vaccination that illustrate this approach are shown in Box 2.

Conclusion

Influenza remains a major public health problem in Australia that causes significant severe disease, long-term disability and mortality in older people. The theoretical advantages of increasing the antigen content (high-dose trivalent influenza vaccine) or adding an adjuvant (adjuvanted trivalent influenza vaccine) has translated in real-world studies to improved protection for older people.

For this reason, the Australian Government Department of Health has made available and recommended the use of high-dose trivalent influenza vaccine or adjuvanted trivalent influenza vaccine in people aged 65 years and over. Adjuvanted trivalent influenza vaccine is also currently funded under the NIP for this age group. Healthcare practitioners should note recent recommendations and ensure that their older patients are offered seasonal vaccine designed specifically to protect older people. MT

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Reducing pneumococcal risk in people aged 65 years and over

PAUL VAN BUYNDER MB BS, MPH, FAFPHM

Disease due to pneumococcus (*Streptococcus pneumoniae*) remains a major source of illness in older people. Conjugated pneumococcal vaccines are used extensively in national paediatric programs, whereas a 23-valent polysaccharide vaccine is mainly used in older people and high-risk groups. Data from the Netherlands have led to licensing of a conjugated pneumococcal vaccine for older people in Australia. This review examines current recommendations on pneumococcal vaccines.

KEY POINTS

- Pneumococcus (*Streptococcus pneumoniae*) remains a major cause of illness in older people and the most important pathogen globally in respiratory infection deaths.
- A conjugated pneumococcal vaccine covering 13 serotypes (13vPCV) is used in the Australian paediatric program, and a polysaccharide vaccine covering 23 serotypes (23vPPV) is mainly used in older people and high-risk groups.
- Both invasive and noninvasive disease rates due to serotypes covered in the childhood 13vPCV program are declining in older adults.
- Data from a clinical trial in the Netherlands led to licensing of 13vPCV for older people in Australia in 2011, but this vaccine is not currently funded under the National Immunisation Program (NIP) for this group.
- Coverage rates for 23vPPV in Australia are suboptimal; all older people presenting for influenza vaccine should have their pneumococcal vaccination status checked and should receive 23vPPV if they have not previously received it.
- Recall and reminder systems should be used to ensure appropriately timed revaccination for those who require it.
- If an older person is to receive both 23vPPV and 13vPCV then 13vPCV should be administered first, followed by 23vPPV eight weeks later.

Infections caused by pneumococcus (*Streptococcus pneumoniae*) may involve a normally sterile site, such as blood or joint fluid (known as invasive pneumococcal disease or IPD) but are more commonly local mucosal infections, such as community-acquired nonbacteraemic pneumonia (CAP). Pneumococcal infection remains a major source of illness in older people. Globally, across all age groups, pneumococcus remains the most important pathogen in deaths due to respiratory infections.[1]

Data on IPD cases are relatively robust in many countries, but the contribution of pneumococcus to CAP is poorly understood. Assessing data for CAP with any cause and more specifically pneumococcal CAP is challenging as there is often no surveillance mechanism in place, and published studies have used various combinations of diagnostic tests, including blood culture, urinary antigen testing and sputum culture.

A review of national databases from 2004 to 2012 and published studies in Australia found the hospitalisation rate with pneumococcal pneumonia in people aged 65 years or over was 274 per 100,000 population, or 20% of all CAP hospitalisations.[2] GP visits for pneumococcal CAP averaged 455 per 100,000 annually. The hospitalisation rate for IPD in 2012 was 19 per 100,000; thus pneumococcal CAP hospitalisation rates were 15-fold higher than for IPD and the costs to the healthcare system were determined to be about 30-fold higher.[2]

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Trends in the burden of IPD

A conjugated pneumococcal vaccine covering 13 serotypes (13vPCV) is used in the Australian paediatric immunisation program, and a polysaccharide vaccine covering 23 serotypes (23vPPV) is more commonly used in older people and high-risk groups.

The use of pneumococcal vaccines in infants, initially a conjugate pneumococcal vaccine containing seven serotypes (7vPCV) and then conjugate vaccine containing 13 serotypes (13vPCV), has led to a decrease in carriage of the serotypes in these vaccines ('vaccine types') and also to a decrease in vaccine-type disease in older people through herd immunity. For example, an Australian review of IPD trends in non-Indigenous older people showed an ongoing substantial decrease in IPD due to the serotypes in 7vPCV since its introduction in 2004. A similar trend was evident against the additional six serotypes in 13vPCV after only three years of its use, and further decline continues.[3] A meta-analysis of the indirect effects of conjugated vaccines found the mean time taken to attain a 90% reduction in vaccine-type IPD was 8.9 years for 7vPCV serotypes and 9.5 years for the additional serotypes in 13vPCV but not 7vPCV.[4] Conversely, likely as a result of serotype replacement, the proportion of cases of IPD attributable to serotypes in 23vPPV but not 13vPCV is increasing, in Australia from 19% to 27%.[3]

Trends in the burden of community-acquired pneumonia

Although data on pneumococcal CAP are more limited than those on IPD and somewhat inconsistent, a decline in CAP caused by 13vPCV vaccine types is also expected as a result of the childhood vaccination program. This decrease has already been seen in unvaccinated young adults and older people in some studies.

For example, a cohort study of cases of nonbacteraemic pneumococcal pneumonia in adults in Nottingham, UK, described a 30% reduction in the proportion of cases caused by 13vPCV vaccine types within three years of the switch from 7vPCV to 13vPCV in the childhood program. This followed an 88% decrease in CAP caused by 7vPCV vaccine types.[5] In the US, an assessment of the impact of childhood 7vPCV, using the Nationwide Inpatient Sample database, found an annual reduction in pneumonia hospitalisations of 168,000, with most of these hospitalisations in older people.[6]

By ensuring patients aged 65 years and above are made aware of their increased risk of IPD and strongly encouraging vaccination against pneumococcal disease, GPs play a crucial role in helping reduce the pneumococcal burden

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Vaccine effectiveness against community-acquired pneumonia

Published estimates place the burden of hospitalisation due to CAP as at least an order of magnitude greater than that due to IPD.[2] Thus, the benefit of vaccines against CAP is important in determining approaches to vaccination of older people, even if the burden of disease is decreasing due to immunity to the serotypes in 13vPCV.

Vaccine effectiveness data for 13vPCV against CAP are available from the CAP-ITA study, a randomised controlled trial in people aged 65 years and over in the Netherlands. The study found a vaccine effectiveness of 45% against vaccine-type pneumococcal CAP, 22% against all-type pneumococcal CAP and 5% against all-cause CAP.[7]

Clinical studies and review documents have variously ascribed impacts of 23vPPV against pneumococcal CAP from no effect through to about 50% in many studies. Although the studies have methodological challenges and are difficult to compare, the weight of evidence from the 'better' studies suggests that the attributable vaccine effectiveness is not zero and is in the range up to 50%. For example, a multicentre Japanese study reported the vaccine effectiveness as 33%.[8] Protection against all-cause CAP with both vaccine types is similar and low, about 5%.[9,10]

Which vaccine(s) should we use in older people?

Current recommendations on pneumococcal vaccination in older people, developed by the Australian Technical Advisory Group on Immunisation (ATAGI) and published in the Australian Immunisation Handbook, vary depending on whether they have medical or other conditions that increase their risk of IPD.[11] Under ATAGI guidelines, there are two categories of increased IPD risk: A and B (described in Box 1).[11] Recommendations according to risk level are as follows.

Adults without conditions associated with increased risk of IPD

- A single dose of 23vPPV is recommended for all non-Indigenous adults at 65 years of age.
- Adults aged over 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.
- Aboriginal and Torres Strait Islander adults without medical conditions that are associated with an increased risk of IPD are recommended to receive:
  - a dose of 23vPPV at the age of 50 years
  - a further dose of 23vPPV five years later.

The minimum interval between any two doses of 23vPPV is five years. Adults are recommended to receive no more than three doses of 23vPPV in their lifetime.

Adults with conditions associated with an increased risk of IPD

- Adults with a newly identified or previously identified medical

1. CONDITIONS ASSOCIATED WITH INCREASED RISK OF INVASIVE PNEUMOCOCCAL DISEASE (IPD)*[11]

Category A: conditions associated with the highest increased risk of IPD

- Functional or anatomical asplenia, including:
  - sickle cell disease or other haemoglobinopathies
  - congenital or acquired asplenia (e.g. splenectomy), splenic dysfunction
- Immunocompromising conditions, including:
  - congenital or acquired immune deficiency, including symptomatic immunoglobulin (Ig) G subclass or isolated IgA deficiency (note: children who require monthly immunoglobulin infusion are unlikely to benefit from vaccination)
  - immunosuppressive therapy (including corticosteroid therapy 2 mg/kg or more daily of prednisolone or equivalent for more than one week) or radiation therapy, where there is sufficient immune reconstitution for vaccine response to be expected
  - haematological and other malignancies
  - solid organ transplant
  - haemopoietic stem cell transplant
  - HIV infection (including AIDS)
  - chronic renal failure, or relapsing or persistent nephrotic syndrome
- Proven or presumptive cerebrospinal fluid leak
  - cochlear implants
  - intracranial shunts

Category B: conditions associated with an increased risk of IPD

- Chronic cardiac disease
  - particularly cyanotic heart disease or cardiac failure in children
  - excluding hypertension only (in adults)
- Chronic lung disease, including:
  - chronic lung disease in preterm infants
  - cystic fibrosis
  - severe asthma in adults (requiring frequent medical visits and use of multiple medications)
- Diabetes mellitus
- Down syndrome
- Alcoholism
- Chronic liver disease
- Preterm birth at less than 28 weeks' gestation
- Tobacco smoking

* Adapted from The Australian Immunisation Handbook.[11]

condition(s) associated with the highest increased risk of IPD (category A), except haematopoietic stem cell transplant recipients, are recommended to receive:
  - a single dose of 13vPCV at the time of diagnosis
  - a dose of 23vPPV at least two months after 13vPCV
  - two further doses of 23vPPV at least five years apart.

Stem cell recipients should receive a course of three doses of 13vPCV over six months and then a follow-up dose of 23vPPV 12 months later.

- Adults who have a newly identified or previously identified condition(s) listed in category B (increased risk of IPD) are recommended to receive:
  - a dose of 23vPPV at diagnosis
  - two further doses of 23vPPV at least five years apart (see the case study in Box 2).

PneumoSmart vaccination tool

An online tool that can help identify the recommended pneumococcal vaccination regimen for individual patients is available at the PneumoSmart website (www.pneumosmart.org.au/clinicians/vaccination-tool). The PneumoSmart vaccination tool also indicates which vaccines are funded under the NIP or PBS.

When would we use conjugated pneumococcal vaccine in older people?

The vaccine 13vPCV was licensed for older people in many countries after a Netherlands study provided evidence that this vaccine gives good protection against vaccine-type IPD and moderate protection against CAP.[7] It was licensed for people aged over 50 years in Australia in 2011.

The role of 13vPCV in older people and the additional benefit over 23vPPV is contentious. Several countries, including Canada, the UK and Germany, assessed the possible cost versus benefit and decided against using 13vPCV in older people, staying with 23vPPV use. In the US, 13vPCV and 23vPPV are used sequentially in older people. An upcoming review may clarify the benefit of this approach compared with the use of 23vPPV alone.

Australia is still considering its position. Key issues are the degree of herd immunity provided by the childhood pneumococcal vaccination program and the question whether vaccine-type pneumococcal disease will continue to decline without a conjugate vaccine dose to older people. The Australian and New Zealand Society for Geriatric Medicine recommends that in unvaccinated older people, consideration should be given to first providing a dose of 13vPCV followed by 23vPPV two to six months later.[12] However, 13vPCV is funded only for children up to 5 years of age. Offering 13vPCV to older people with a high risk of serious consequences of CAP may be worthwhile, but they will need to pay privately for it.

Several studies have shown that 23vPPV induces a state of immune tolerance or hyporesponsiveness to subsequent vaccination, where the response to revaccination does not reach the levels

2. CASE STUDY: PNEUMOCOCCAL VACCINATION IN AN OLDER WOMAN WITH ASTHMA

Angie, aged 66 years, has adult-onset asthma with increasing symptoms over time. She has made four visits to the emergency department in the past year with acute exacerbations of her asthma, although she has not required hospital admission. She presents for a review of her asthma medication and influenza vaccination. She states she has never received pneumococcal vaccine and your desktop software has no record of it being given.

Would you offer Angie pneumococcal vaccine and if so, which vaccine should she have?

A substantial proportion of cases of severe disease and deaths in older people with influenza infection are associated with secondary bacterial infection, particularly pneumococcal infection. All Australians aged 65 years and older are entitled to free 23-valent pneumococcal polysaccharide vaccine (23vPPV) at 65 years of age. Angie is at particular risk of a poor outcome of pneumococcal infection because of her asthma and should receive 23vPPV.

Should Angie receive a booster of pneumococcal vaccine and if so, when?

Australian guidelines no longer recommend a routine pneumococcal vaccine booster five years after receipt of the first dose for non-Indigenous adults. Some groups at increased risk of invasive pneumococcal disease are recommended to have either one or two booster doses of vaccine at five-year intervals and are entitled to these vaccines free of charge under the National Immunisation Program.[11] People with severe chronic asthma, such as Angie, are included in those recommended to receive a single booster dose five years after the first dose. Many desktop software systems can program a recall for the next dose.

achieved with primary vaccination.[13] The clinical significance of this is unknown, but if both 13vPCV and 23vPPV are to be given then 13vPCV should be given first, followed by 23vPPV at least eight weeks later. If 23vPPV has already been received then administration of 13vPCV should be delayed for 12 months.

Role of general practice

The infant pneumococcal vaccination program in Australia has an average coverage of 93%, but uptake of 23vPPV remains suboptimal, at 54% national coverage in 2009 and less than 50% in 2015-16 based on a NSW Health survey.[14] Serotype replacement is occurring, with an increase in non-vaccine-type pneumococcal disease in Australia. Nevertheless, more effective prevention is possible if coverage rates are increased.

Conclusion

Despite the availability and use of 23vPPV in older people, making an impact on pneumococcal disease rates has been challenging. This is largely because of inadequate coverage, suboptimal effectiveness of this vaccine, serotype replacement and pneumococcal disease due to serotypes not covered in vaccines. In line with many other countries, Australia is reviewing its vaccine policy in older people now that 13vPCV has been licensed in this group. When patients request 13vPCV as well as 23vPPV, or their healthcare provider deems this desirable, then 13vPCV should either be given first or delayed for 12 months if 23vPPV has already been received. MT

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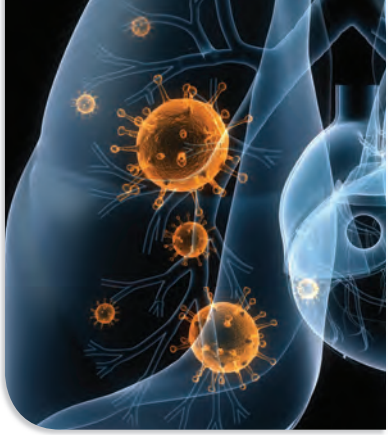
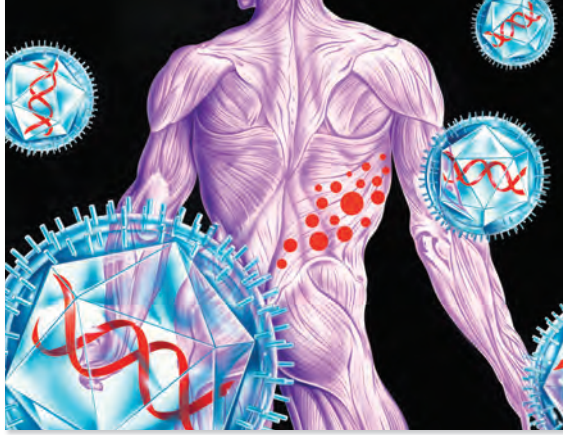
BONUS ONLINE CONTENT





SUPPLEMENT

Vaccinations for adults 65 years and over

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THE PEER REVIEWED JOURNAL OF CLINICAL PRACTICE

Herpes zoster
Improving protection in older people

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Although antivirals can help reduce the severity and duration of acute herpes zoster (HZ), the best protection against the disease is to boost an individual's immunity by vaccination with the live attenuated HZ vaccine. A new recombinant HZ subunit vaccine holds promise to further reduce the burden of HZ and its complications.

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KEY POINTS

- **Herpes zoster (HZ) is common and associated with a considerable burden of morbidity.**
- **Vaccination against HZ is the most effective strategy to provide increased protection against both acute zoster and postherpetic neuralgia.**
- **A recommendation from the GP to receive the zoster vaccination is the most effective strategy to increase HZ vaccine coverage.**

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Herpes zoster (HZ), or shingles, is a neurocutaneous disease that occurs when varicella-zoster virus (VZV) latent in sensory ganglia reactivates and replicates to cause dermatomal pain and a vesicular rash.[1,2] These events occur when VZV-specific cell-mediated immunity (CMI) falls below a critical level, which typically happens when it is compromised by disease, medical treatment or ageing.[3] The exact triggers for reactivation of the virus in an individual are unknown.

Exogenous, circulating wild-type virus episodically boosts adult T cell immunity (e.g. through exposure to children with chickenpox) so that reactivation usually occurs as a result of naturally waning CMI with age or induced immunosuppression.[4]

Up to one-third of the population is at risk of developing HZ during their lifetime, and two-thirds of people with the disease are aged 50 years or older.[5] In the Australian context, HZ affects 120,000 people every year.[6]

Risk factors

The increased incidence of HZ is most marked after 50 years of age and continues to rise with age. This is likely to be related to decline in CMI in older people.[3] Other risk factors for HZ include: female sex, being immunocompromised and having a family history of HZ.[7,8]

Reactivation of VZV leads to a localised inflammatory response, with nerve-cell damage and subsequent ganglionitis. The degree of inflammation correlates with both the disease severity and the risk of complications.[9]

The risk and severity of HZ is considerably higher in immunosuppressed individuals and proportional to the severity of immunosuppression. Therefore, it is recommended that individuals consider, in conjunction with specialist advice, having HZ vaccination before starting immunosuppressive therapy.

Guidance on the use of the HZ vaccine in patients who are immunocompromised, developed by the National Centre for Immunisation Research and Surveillance

(NCIRS),[10] is summarised below in the section on Prevention. Discussions between GPs and specialists (e.g. a haematologist) on whether the HZ vaccine can be used in a particular patient who is immunocompromised is recommended.

Clinical manifestations

HZ arises from the reactivation of the VZV after latent infection in the trigeminal and dorsal root ganglia and results in the virus being transferred along nerves to the skin. The exact mechanisms for reactivation are unknown but correlate with a reduction in controlling T cell immunity. A prodromal period of dermatomal pain often precedes the acute eruption by several days, occasionally longer. The character of the acute pain (neuritis) in the affected dermatome has been variously described as burning, deep aching, tingling, itching or stabbing.

Patients not uncommonly experience neuropathic pain. Depending on the degree of neuritis/ganglionitis, this includes:

- paraesthesia (burning and tingling)
- anaesthesia/dysaesthesia (reduced or altered sensation)
- debilitating allodynia (pain induced by nonpainful stimuli such as touch)
- hyperaesthesia (exaggerated or prolonged response to pain).

Although such symptoms usually start during the acute phase, they may also be associated with ongoing pain (for 30 to 90 days after onset) or chronic pain (beyond 90 days after onset). Moderate-to-severe pain persisting for more than 90 days is known as postherpetic neuralgia (PHN).

The acute rash of HZ is often pruritic as well as tender, and spreads throughout the affected dermatome (Figure). It evolves through a papular stage to a vesicular stage (lasting three to five days) and then crusts over five to seven days. Acute HZ takes two to four weeks to heal.

Zoster arises when the patient's cell-mediated immunity declines. As almost all the population has had varicella, most of us are at risk of zoster.

Acute HZ has a significant impact on patients' quality of life. In one recent study, three-quarters of the patients were experiencing significant pain within the first two weeks of onset, more than half had problems with their usual activities, 36% had issues with either mobility or anxiety and almost one in five had problems with self-care. The patients' doctors were more likely to underestimate rather than overestimate the patients' pain.[11]

Diagnosis

HZ is usually diagnosed clinically. Laboratory diagnosis (involving the detection of VZV antigens or nucleic acid from swabs of lesions, or by VZV-specific immunogloblin [Ig] M antibody tests) is recommended when the clinical picture is atypical or complicated. Examples include when there is persistent or recurrent rash, atypical rash such as a single lesion, central nervous system (CNS) involvement or disseminated rash with immunosuppression.[12,13]

Complications

Postherpetic neuralgia

The most frequent and important complication of VZV reactivation is PHN. One in five patients aged over 50 years with HZ will still report pain six months after HZ onset despite adequate antiviral therapy, and the incidence rises with age.[14,15]

The pathogenesis of PHN in the CNS is still being defined. It often leads to impairment of quality of life and prolonged hospitalisation, particularly in older people,[16] and treatment is difficult. Although oral aciclovir given within 72 hours of the onset of HZ rash does reduce the severity and duration of acute HZ, it does not reduce significantly the incidence of PHN.[17] Thirty to fifty percent of patients who have pain three months after the onset of zoster still have pain four years later.[14]

Risk factors for PHN include:

- older age
- greater prodromal pain
- severe pain and rash
- ophthalmic involvement.[18]

Severe immunosuppression and diabetes have also been shown to be significantly associated with PHN.[18]

Severity of disease at presentation and depression are the major correlates of pain burden in patients with acute HZ and PHN.[19]

The case study in Box 1 illustrates some of the issues in the management of patients with acute HZ and significant pain.

Other complications

VZV reactivation may also cause ophthalmic disease (1.5%), dissemination (1.3%), a wide variety of neurological symptoms (0.6%) including motor neuropathy, and vasculitis (0.2%).[20]

Box 2 lists the complications of VZV reactivation.[9,20-22]

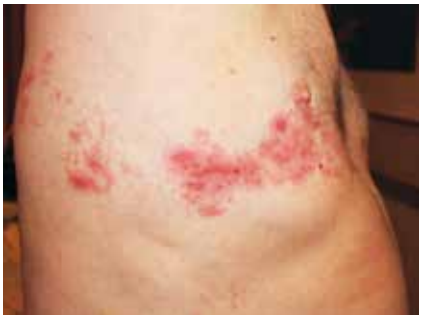

Figure. Typical dermatomal herpes zoster rash, showing vesicular regions on an erythematous papular base.

Treatment

Acute zoster

Pain relief

Analgesic treatment of acute HZ should follow the three-step WHO pain ladder, based on pain severity, and individual considerations:

- mild pain intensity – NSAIDs or other nonopioids
- moderate pain – nonopioids in combination with weak opioid analgesics
- severe pain – nonopioids combined with strong opioids, if needed.[23]

If a patient's pain severity at baseline is moderate to severe or other risk factors for PHN are present, it is worth considering supplementing with an antidepressant (e.g. amitriptyline, nortriptyline; not a licensed indication) or antiepileptic (gabapentin, pregabalin) drug.[23]

Herpes zoster antiviral therapy

Three antiviral drugs (aciclovir, valaciclovir and famciclovir) have established efficacy in the treatment of acute HZ by accelerating the resolution of lesions, reducing viral shedding and decreasing the severity of acute pain. They also reduce the overall duration of acute HZ pain. Valaciclovir and famciclovir are usually preferred because of their better oral absorption, higher blood levels and easier dosing.[24] Oral aciclovir does not reduce the incidence of PHN significantly and there is insufficient evidence to determine the effect of other antiviral treatments on PHN.[17]

1. CASE STUDY: MANAGING ACUTE ZOSTER AND POSTHERPETIC NEURALGIA

Jim, a healthy, active 77-year-old man, presented with a right hemithoracic sparse papular rash (T7-8) and mild pain (Zoster Brief Pain Inventory [ZBPI] one out of 10) for two days.

What is the likely diagnosis?

The likely clinical diagnosis is herpes zoster (HZ).

Swabs taken a day later were positive for varicella-zoster virus DNA.

What medications would you prescribe, if any?

The antivirals aciclovir, famciclovir or valaciclovir have established efficacy in the treatment of acute HZ and in reducing the overall duration of acute HZ pain and would be appropriate to prescribe.

Valaciclovir was prescribed; however, Jim took only one tablet (800 mg) as he forgot to take his medicines with him on a holiday cruise. The rash and pain worsened over the next three to four weeks (reaching eight out of 10 on ZBPI) and severely affected his daily activities. The rash resolved over four weeks but severe pain continued.

What treatment options would you consider now?

Topical lidocaine patches, gabapentin, pregabalin, tricyclic antidepressants or opiates could be considered, as they can reduce the pain burden from postherpetic neuralgia (PHN). You could also consider referring Jim to a pain specialist, especially if the pain is not responding adequately to your treatment.

The pain continued 12 weeks after the onset of the rash. Jim was prescribed pregabalin (dosage: 50 mg three times daily, gradually increasing to 300 mg daily over a week if tolerated) and paracetamol/codeine by his GP. A pain specialist diagnosed PHN 12 weeks after onset and continued Jim's pregabalin prescription. Jim's pain slowly subsided over eight months, with some discomfort for another four months. It was accompanied by nocturnal hyperaesthesia in the original dermatome.

On reflection, what would be a good management plan to monitor patients with acute HZ who have significant pain?

- See patients with acute HZ weekly; it is not uncommon for the pain to escalate.
- Regularly assess the severity of the pain with a visual analogue scale or numeric rating scale (0 = no pain, 10 = worst possible pain).
- Assess the patient's satisfaction with pain management (use a scale 0 = not satisfied to 10 = very satisfied), as well as the impact of the pain on the patient's activities of daily living.
- Consult a pain specialist if the patient's pain is still significant four weeks after the resolution of the skin lesions.
- If pain severity at baseline is moderate to severe or other risk factors for PHN are present, consider supplementing treatment with an antidepressant (e.g. amitriptyline) or antiepileptic (gabapentin, pregabalin) drug.

Corticosteroids

Controlled trials of prednisone (in doses of 40 mg daily for seven days, tapering by 5 mg daily over the subsequent two weeks) have shown benefit, particularly for acute HZ pain and quality of life.[25,26] In contrast, there is no evidence that corticosteroids reduce the incidence of PHN,[25] nor the total duration of pain.[27] Corticosteroids should not be used for acute HZ without concomitant administration of antiviral drugs, as they are immunosuppressive.

Postherpetic neuralgia

There is reasonable evidence that pharmacotherapy such as topical lidocaine patches, gabapentin, pregabalin, tricyclic antidepressants or opiates can reduce the pain burden from PHN.[28-33] Opioids should not be considered for first-line therapy, given the uncertainty regarding long-term efficacy and concern about safety.[34]

PHN remains difficult to treat. Fewer than half the patients with PHN in clinical trials of available therapies have had a 50% or greater reduction in pain.[14] In addition, adverse effects are common, particularly in older patients.[14]

Prevention

The best protection against HZ is to boost an individual's immunity by vaccinating

with the HZ vaccine. The live attenuated HZ vaccine is currently the only vaccination available in Australia to prevent HZ. This vaccine is effective in preventing HZ and PHN. It is licensed in Australia for adults 50 years and over. It is recommended for immunocompetent adults aged 60 years and older and is funded under the National Immunisation Program (NIP) for those aged between 70 and 79 years. As 95% of young adults have had varicella infection it is not necessary to check immunity.

Postherpetic neuralgia is difficult to treat. The best strategy is to try and prevent it by offering the HZ vaccine.

The efficacy of this vaccine was examined in the Shingles Prevention Study, a double-blind randomised-controlled trial conducted with more than 38,000 people over the age of 60 years.[35] Subjects received a concentrated (14-fold) form of the live attenuated varicella (Oka strain) vaccine and were followed for a median of 3.1 years. This vaccine was shown to be both safe and efficacious, preventing HZ in 51% of subjects, preventing PHN in 66% of subjects and reducing the burden of illness (a measure of severity and duration of pain) by 61%.

Although the efficacy of the live attenuated HZ vaccine in preventing shingles was found to be reduced in people over the age of 70 years and waned further with increasing age, the beneficial effect of the vaccine on the severity of illness and the incidence of PHN was similar among older subjects.[35,36]

Subsequent follow-up studies suggested efficacy may wane, probably over five to eight years.[36] This has led to suggestions that a booster may be necessary at 10 years, although there are no current international recommendations for this.

The HZ vaccine contains live, attenuated VZV and is therefore contraindicated in patients who are significantly immunocompromised. Disseminated HZ and death have occurred postvaccination in patients with malignant haematological disorders.[37,38]

Although anti-tumour necrosis factor biologics are listed as a contraindication to the live attenuated HZ vaccine, it appears safe in patients receiving these drugs.[39] However, more studies are needed to define vaccine safety with other biologics and in moderately immunocompromised patients.

Contraindications to the live attenuated HZ vaccine, including specific immunocompromising conditions, are listed in Box 3.[1,10] Comprehensive information on the safe doses of immunosuppressive therapy and timing restrictions for administering HZ vaccine in patients taking these medications are provided in the NCIRS fact sheets on HZ and the HZ vaccine.[10,40] In addition, it is suggested that all healthcare providers use the prevaccination checklist, a screening tool that highlights

2. COMPLICATIONS OF VARICELLA ZOSTER VIRUS REACTIVATION[9]

- **Cutaneous**: scarring, postinflammatory pigmentation changes, granulomata and bacterial superinfection
- **Ophthalmic**: keratitis/uveitis, corneal erosion and, uncommonly, retinal necrosis or optic neuritis. The incidence of ophthalmic herpes zoster (HZ) varies, but is often in the range of 0 to 2.9%[20]
- **Neurological**: most often PHN, occasionally motor and cranial neuropathies, vasculitis including cerebral arteritis, segmental motor weakness, myelopathy (e.g. transverse myelitis), encephalitis, Guillain-Barré syndrome and stroke (an increased incidence of stroke in the three to 12 months after HZ has been recently defined and is more common with ophthalmic HZ)[21,22]
- **Disseminated**: skin or other organs

3. CONTRAINDICATIONS TO RECEIVING THE LIVE ATTENUATED HERPES ZOSTER VACCINE* [1,10]

Primary or acquired immunodeficiency
- Haematological neoplasms: leukaemias, lymphomas, myelodysplastic syndromes
- Cellular immune deficiencies (humoral deficiencies affecting immunoglobulin [Ig] G or IgA antibodies are not a contraindication, unless associated with T cell deficiencies)
- Metastatic cancer
- Post-transplant: solid organ (on immunosuppressive therapy), haematopoietic stem cell transplant (within 24 months, or longer if ongoing immunosuppression or graft versus host disease is present)
- Immunocompromise due to primary or acquired (HIV/AIDS) immunodeficiency. Research suggests that in adults with HIV, a CD4+ count above 350 cells/mcL may be a safe level for administration of the herpes zoster (HZ) vaccine; however, it is recommended that clinicians confer with the patient's treating specialist before vaccination

Immunosuppressive therapy (current or recent)
- Chemotherapy or radiotherapy
- High-dose corticosteroids (20 mg or greater prednisone daily or equivalent for 14 days or more)†
- Most disease-modifying antirheumatic drugs (DMARDs) and all biologics‡

Other contraindications
- Pregnancy
- Confirmed anaphylactic reaction to a previous dose of varicella virus-containing vaccine or to any vaccine component (including neomycin or gelatin)
- Treatment with oral or intravenous antivirals (such as aciclovir) until 48 hours after cessation of treatment
- Other significant immunocompromising conditions

* If in any doubt about contraindications, seek specialist advice.
† Live attenuated HZ vaccine is not contraindicated for use in patients taking topical and or inhaled corticosteroids for corticosteroid replacement therapy.[10]
‡ For comprehensive information on the safe doses of immunosuppressive therapy for live attenuated HZ vaccine administration, refer to the NCIRS fact sheets on HZ and the HZ vaccine.[10,40]

4. CASE STUDY: HERPES ZOSTER VACCINATION IN A PATIENT TAKING CORTICOSTEROIDS

Maria, aged 78 years, has well-controlled type 2 diabetes, chronic obstructive pulmonary disease (COPD) and osteoarthritis in her left hip and right knee. She is seeing you today to obtain a repeat of her prescriptions. Just this week she finished a tapering course of prednisone for an exacerbation of her COPD. The course lasted 10 days and she was taking 50 mg for the first three days of the course.

Can Maria have the herpes zoster (HZ) vaccine today?
Patients taking a short course of a corticosteroid such as prednisolone can have the HZ vaccine provided that the dose and duration do not exceed the guidelines noted in Box 3 above. As the duration of Maria's corticosteroid treatment was less than 14 days, she could receive the HZ vaccine today.

Maria had a bout of HZ last year and is not sure whether she needs the vaccine.

What advice do you give to patients who have recently had acute HZ?
Recurrence of HZ in immunocompetent patients is uncommon, occurring in about 5% of the population.[42] It is unclear how long after experiencing acute HZ people are protected courtesy of their natural immunity being boosted. The HZ vaccine should be delayed for at least 12 months after acute HZ, although there is some evidence that cell-mediated immunity persists for up to three years.[43]

5. CASE STUDY: TIMING OF ZOSTER VACCINATION WITH OTHER VACCINATIONS

Tony, aged 74 years, is a healthy, active widower who plays golf regularly. He has well-controlled hypertension and hyperlipidaemia. He attends his GP for his annual influenza vaccination and asks whether he can also have 'this new shingles vaccine.'

Can you give the herpes zoster (HZ) vaccine at the same time as the influenza vaccine?
Yes, you can administer the live attenuated HZ vaccine at the same time as the influenza vaccine, but administer them in separate arms.

Are there any other vaccines that you should consider for Tony?
Yes, Tony is eligible for the pneumococcal vaccine (23-valent pneumococcal polysaccharide vaccine [23vPPV]) on the National Immunisation Program (NIP) Schedule, as he is in the 65 years and over age group. This can be given at the same time as the influenza vaccine. The 23vPPV can also be administered at the same time as the HZ vaccine, again in separate arms. An early study showed a slight diminution of several of the pneumococcal serotypes when given concomitantly with the HZ vaccine, but a subsequent larger study showed no greater likelihood of HZ in subjects receiving both vaccines.[60,61]

Tony has read that there is a 'better' shingles vaccine coming to Australia.

What advice would you offer Tony about this new HZ vaccine?
A new recombinant HZ subunit vaccine that has been shown in clinical trials to be efficacious and safe is currently being reviewed by both the Australian Technical Advisory Group on Immunisation and the Pharmaceutical Benefits Advisory Committee. At present, it has not been accepted on to the NIP and short supply in the US will add to the likely lead time before it is available in Australia.

Tony's GP should advise him to have the live inactivated HZ vaccine now and not delay the decision to have a vaccine against HZ.

the various contraindications to the live attenuated HZ vaccine (https://beta.health.gov.au/search/pre-vaccination).[41]

HZ vaccination in a patient with past HZ who has recently taken a course of corticosteroid is discussed in the case study in Box 4.[42,43]

Improving protection against herpes zoster

Increasing vaccine uptake

Since the HZ vaccine was launched on the Australian NIP in November 2016, its uptake has been strong in the 70- to 79-year-old age group, with estimated vaccine coverage levels now above 60% of the target group (personal communication, Jim Malamatinas, 5 December 2018). This estimate is based on doses of HZ vaccine delivered to GP practices and is not a formal estimate of coverage. The latter should be available in the next few months. Nevertheless, a significant proportion of the target group remain unvaccinated.

Several factors have been shown to affect the uptake of the HZ vaccine. One of the most important influences in patients having HZ vaccination is a recommendation from their GP. Some tips on discussing HZ vaccine with older patients appear on page 31 of this Supplement.

Patient concerns and beliefs that may decrease HZ vaccine uptake include:

- concerns about:[44-49]
  - the vaccine's efficacy
  - adverse effects from, and allergic reaction to, the vaccine
- beliefs that:[44-46,48,50]
  - there is no need for vaccine as they rarely get sick
  - they already have good immunity to HZ
  - they are at low risk of getting HZ
  - vaccines weaken the immune system and natural immunity is more important
  - the vaccine can cause HZ.

Difficulty in attending their GP and their GP not discussing the HZ vaccine have also been shown to reduce patients' HZ vaccine uptake.[44,46,49,51,52]

The following factors have been shown to increase the uptake of HZ vaccine:[44-54]

- GP recommending to have the vaccine
- older age
- female sex
- higher level of education
- friends or relatives affected by HZ or PHN
- belief that HZ can be severe
- higher awareness about HZ and the HZ vaccine
- regular user of influenza or pneumococcal vaccines
- having a regular GP
- availability of the vaccine.

A number of other factors, including the presence of chronic disease, such as diabetes, being a smoker, infrequent GP attendance and patient health status, have shown mixed or unclear effects on vaccine uptake.[46,55-59]

Improved zoster vaccines

The declining efficacy of live attenuated HZ vaccine with age, especially in those over the age of 70 years, has left a substantial unmet medical need in this growing population. Furthermore, this vaccine is contraindicated in severely immunocompromised patients, in whom HZ is common and often severe.

A new recombinant herpes zoster subunit vaccine HZ/su is available in the US and is also licensed in Canada, Europe and Japan. The new vaccine has been registered by the TGA but is not yet available in Australia (see the case study in Box 5).[60,61]

The HZ/su vaccine has several advantages over the live attenuated HZ vaccine:[3]

- its adjuvant system stimulates strong cellular and humoral responses
- it achieves higher levels of effectiveness against acute HZ and PHN (about 90%)
- it can be used in patients who are immunocompromised
- no significant decline in efficacy has been observed between years one and four postimmunisation, and immune responses plateau for up to nine years. Duration of efficacy beyond four years is currently being studied.[3,62,63]

Furthermore, in a recent systematic review of the two zoster vaccines, the HZ/su vaccine, was statistically superior to both the live attenuated vaccine (vaccine efficacy, 85%; 95% credible interval, 31 to 98%) and placebo (vaccine efficacy, 94%; 95% credible interval, 79 to 98%).[64]

Nevertheless, the HZ/su vaccine had a much higher incidence of both local and systemic adverse reactions. It was associated with statistically more adverse events at injection sites than the live attenuated vaccine (relative risk, 1.79; 95% credible interval, 1.05 to 2.34; risk difference, 30%; 95% credible interval, 2 to 51%) and placebo (relative risk, 5.63; 95% credible interval, 3.57 to 7.29; risk difference, 53%; 95% credible interval, 30 to 73%). There were also statistically more systemic adverse events in subjects receiving HZ/su than in the placebo and the live attenuated HZ vaccine groups (relative risk, 2.28; 95% credible interval, 1.45 to 3.65; risk difference, 20%; 95% credible interval, 6 to 40%).[64]

The immunogenicity and efficacy of HZ/su vaccine depends on a two-dose regimen. In the phase III trials, 96% of subjects returned for a second dose.[62,63] The compliance with a second dose in field conditions will become apparent soon from the US experience.

Conclusion

HZ is a common and often disabling condition in the older population. Although antivirals help to reduce the severity and duration of the acute phase, the main intervention available to reduce the incidence of PHN is vaccination with the live attenuated HZ vaccine.

A newer and more effective subunit recombinant HZ/su vaccine will become available to prevent HZ and will help to extend this protection to immunocompromised subjects.

GPs are key in achieving higher levels of vaccine coverage, as a recommendation to the patient to receive the HZ vaccine significantly increases the likelihood of the patient being vaccinated. MT

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Other vaccine recommendations for older people

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In addition to influenza, pneumococcal and herpes zoster vaccines, older people are recommended to have tetanus and pertussis booster vaccines and vaccines for special risk scenarios. A range of vaccines against other diseases with a high burden in older people are in the pipeline.

KEY POINTS

- Most tetanus cases and deaths are in older people.
- A tetanus booster vaccine is recommended for all adults at ages 50 years and 65 years if their last dose was more than 10 years previously; unvaccinated adults should receive a primary course plus boosters.
- Most older people are susceptible to pertussis, which can have severe consequences in this age group, as well as potentially infecting infants they contact.
- An opportune time for pertussis vaccination is at the time of tetanus vaccination, using the combined vaccine.
- Older travellers and healthcare workers should follow the same vaccine recommendations as younger people.

Several vaccines are recommended for older people in addition to the influenza, pneumococcal and herpes zoster vaccines already discussed in this Supplement.[1-3] For example, boosters of tetanus and pertussis vaccines are important in this age group. Further, older people in specific scenarios are at increased risk of vaccine-preventable diseases, and extra vaccines should be considered. These include older people with reduced immune function and travellers. Recommendations for these extra vaccines and specific risk groups are outlined here. Vaccines for older people in the development pipeline are also described.

Tetanus

In Australia, 80% of tetanus notifications and 90% of tetanus deaths since 1980 have been in adults aged over 50 years.[4,5] In the US, 60% of tetanus cases occur in people aged over 60 years.[6] Despite tetanus being mainly seen in the older population, the number of deaths from this disease is very low.

Almost all adult cases of tetanus occur in people who never completed a primary childhood immunisation series. A history of immunisation from patients, families or medical charts may be an unreliable indicator of tetanus immunity. Thus, the main thrust of any adult tetanus vaccination policy should be to ensure that everyone receives a primary immunisation series and booster vaccinations.

Seroprevalence studies in the US have shown that more than half of adults lack antibody levels that are considered protective against tetanus and support the need to give primary courses and boosters, especially to those with tetanus-prone wounds.[7] Older people have a good response to a single dose of tetanus vaccine.[8]

The 2018 edition of the Australian Immunisation Handbook recommends a booster dose of tetanus-containing vaccine for all adults at 50 years and 65 years of age if their last dose was more than 10 years ago.[9] Unvaccinated adults should receive a primary course of three doses, followed by boosters 10 and 20 years later. Tetanus

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1. CASE STUDY: AN OLDER COUPLE ENQUIRING ABOUT PERTUSSIS VACCINATION

Lily, 67 years, and her husband Cheng, 70 years, have come to see you to discuss whooping cough vaccination. Lily will be flying to the UK in three weeks to be with their daughter who is expecting a baby, their first grandchild. Her daughter asked her to have a booster pertussis vaccination before coming. Cheng has a bad back and has decided not to go with Lily.

What do you advise Lily?

You check your records and ask Lily whether she has had a pertussis booster in the past 10 years for any other reason (e.g. in combination with a tetanus booster vaccine). As she has not had a pertussis booster, you offer her the combined adult formulation of diphtheria, tetanus and pertussis vaccine (dTpa), advising that there is enough time before she travels for the vaccine to be effective.

You explain to her that pertussis in children in the first few months of life is very serious. Half the affected children are hospitalised, and about 1 to 2% of these die. About 70% of these children contract pertussis from a close family member, so a booster is very important. Infants need two to three vaccine doses for protection, so are not protected in their first four to six months of life unless they have received antibodies from their mother via the placenta.

You advise Lily that it is also important for her daughter to have a pertussis booster during the pregnancy. She should check that her daughter has had this.

What do you advise Cheng?

Although Cheng is not travelling, he should also have a booster pertussis vaccination. Recent data have highlighted the significance and seriousness of pertussis in older adults as well as in very young children. The incidence of disease is increasing in this group. The usual pertussis sequelae of a persistent three-month cough is significant in itself. In addition, complications requiring hospitalisation are also increasing, and there is also a small but real risk of mortality in older people with pertussis.

Past vaccination with an acellular pertussis vaccine provides protection for three to possibly 10 years and even past infection does not provide lifelong immunity. All people turning 65 years should have a pertussis booster if they have not had one in the past 10 years.

vaccine is available in combination with diphtheria vaccine (dT) or with diphtheria and pertussis vaccines (dTpa).[9] The latter differs from the childhood formulation (DTPa) as it contains smaller amounts of diphtheria and pertussis antigens.

Pertussis

The protection provided by acellular pertussis vaccination wanes rapidly, and full protection lasts on average up to five years. Similarly, pertussis infection does not provide lifelong immunity. Most older people are susceptible to pertussis, and data increasingly show that infection can have severe consequences in this age group.[10] Recent evidence shows that pertussis-associated deaths occur in older people as well as the very young.[10] Because of the increase in morbidity associated with pertussis in older people, they are recommended to have a single booster dose of dTpa, which is the only adult pertussis vaccine available, if they have not received this vaccine in the past 10 years.[11-13]

Vaccination is also supported for older people who intend to have close contact with infants (younger than 6 months), to prevent pertussis transmission in the period before the infants are fully protected by direct immunisation (see the case study in Box 1 and Special risk scenarios, below). However, increasing vaccination of pregnant women may soon reduce this need.

An opportune time for pertussis vaccination is at the time of tetanus vaccination, using dTpa. Reviewing the pertussis vaccination status of all people when they turn 65 years of age will protect them and reduce circulation in the community.

Meningococcus

Meningococcus (*Neisseria meningitidis*) strain W has emerged as the predominant meningococcus strain in Australia, surpassing strain B in 2016.[14,15] Strain W is a hypervirulent strain associated with a higher risk of invasive disease and mortality. In 2017, adults aged over 65 years accounted for 25% (24/94) of the total cases reported in Australia. Two meningococcal vaccines, a quadrivalent meningococcal conjugate vaccine covering strains A, C, W and Y and a meningococcal B vaccine, are available for adults through private prescription.

Meningococcal vaccination is recommended for adults with immunodeficiency, including those who have had a splenectomy and those with HIV infection, if they are a close contact of a person with meningococcal infection, and those taking the medication eculizumab.[16] It is not known whether patients taking other types of monoclonal antibodies are at increased risk of meningococcal disease. In 2017, the state of Victoria funded meningococcal vaccine for all gay and bisexual men and men who have sex with men, at any age.[17] In areas with regional outbreaks in any age group, vaccination against the prevalent strains should be offered to older people irrespective of additional risk factors.

Haemophilus influenzae

Vaccination against *Haemophilus influenzae* type b (Hib) is recommended for infants, children and some people who are immunocompromised. This includes patients who have undergone splenectomy and were not vaccinated in infancy or were incompletely vaccinated, functional and autologous haematopoietic stem cell transplant recipients and all solid organ transplant recipients.[18]

Special risk scenarios

People with reduced immune function

Although older age itself is associated with a reduction in most immune functions, in some people other conditions further reduce immune competency. In people who are immunocompromised, vaccination with a live vaccine (e.g. the live attenuated herpes zoster vaccine) is less safe, and response to vaccination with most other vaccines is reduced.

The live attenuated herpes zoster vaccine can be safely given to about 97% of older people. This includes those using corticosteroids in the following categories: those taking oral prednisolone at a dose less than 20 mg for less than two weeks; those using inhaled or topical corticosteroids; and those taking corticosteroids as replacement therapy. More detailed recommendations on whether a person is immunocompromised to the extent that they should not receive this vaccine have been recently published.[19]

Recommendations on vaccination for people about to become immunocompromised (e.g. by elective splenectomy or by taking higher-dose immunosuppressants) can be broadly summarised as: check current vaccination status and give any outstanding vaccines. More detailed advice for people about to undergo splenectomy are available from Spleen Australia (https://spleen.org.au).[20]

Grandparents and other older people exposed to children

Infants younger than 6 months, who are too young to have received a full course of pertussis vaccine, are at risk of being infected with pertussis, typically by an older relative such as a grandparent or great-grandparent. Pertussis vaccination should be offered to older people before contact with infants younger than 6 months. Increasing immunisation of pregnant women to protect their infants through passive immunity via the placenta may affect this recommendation.

No other additional vaccinations are recommended for older people in contact with younger people. Indeed, it is likely that protection works the other way – vaccination of younger people with conjugated pneumococcal vaccine and influenza vaccine protects older people through herd immunity.

Older travellers

Older people should be offered the same travel vaccinations as those recommended for younger people for the countries they are to visit. This is particularly important as travel becomes easier and safer, and thus more often undertaken by older people. Individualised advice according to older people's medical conditions and degree of immunosuppression is recommended; more details are available in the Australian Immunisation Handbook.[21]

Older healthcare workers

Increasingly, older people continue to work into their 60s and 70s, including in health care. Older healthcare workers should follow the same vaccination recommendations as their younger counterparts. This includes annual influenza vaccination. Influenza vaccine coverage of GPs is more than 70%, whereas coverage in hospital staff is less than 50%.[22,23]

Regional issues

Healthcare practitioners should remain aware of regional outbreaks, and adjust vaccination recommendations accordingly. Similarly, in some tropical regions the usual seasonal variations in influenza are less apparent, and vaccination at other times may need to be considered, subject to vaccine availability.

Vaccines in the development pipeline

Over the next few years, new vaccines for older people are likely to become available. These include more effective vaccines than those currently available (e.g. both a 15-serotype and a 20-serotype conjugate pneumococcal vaccine) and vaccines for infections not currently covered by vaccines (e.g. *Clostridium difficile*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* infections and possibly even malaria).

In addition, a range of vaccines are in the development pipeline against viruses responsible for considerable morbidity and mortality among older people. These include cytomegalovirus and respiratory pathogens such as respiratory syncytial virus and human metapneumovirus (Box 2).[24-35]

Vaccines against noninfectious diseases may also become available in the future. For example, research is underway on antiamyloid vaccines to prevent or modify Alzheimer's disease.[36]

2. SOME VACCINES FOR OLDER PEOPLE UNDER DEVELOPMENT

Cytomegalovirus vaccine
Cytomegalovirus (CMV) is a herpes virus that enters latency after acute infection, causing lifelong persistent infection. It is transmitted via saliva, sexual secretions and transplantation. Almost all adults in low- and middle-income countries have been infected with CMV when young.[24] CMV is a major driver of cellular immune differentiation and seems to enhance immunosenescence.[24-26] It causes considerable morbidity among transplant recipients. Studies are underway of candidate CMV vaccines.[27-29]

Respiratory syncytial virus vaccine
Respiratory syncytial virus (RSV) causes an influenza-like illness.[30] Its impact in older people is similar to that of nonpandemic influenza, both in nursing homes and in the community.[31] Current treatment of RSV infection is mainly symptomatic, and prevention relies on infection control strategies such as handwashing and droplet precautions. Vaccines against RSV are in development.[31,32]

Human metapneumovirus vaccine
Human metapneumovirus (HMPV) is a frequent cause of lower respiratory tract infections in older people, as well as young children and people who are immunocompromised. In nursing homes, it can cause severe disease, equivalent to an influenza outbreak.[33] Antiviral drugs are ineffective against HMPV. Several vaccine candidates are under development, but have not yet been tested in humans.[34,35]

Conclusion

Immunosenescence is a significant problem in older people that mandates offering them vaccines against a range of vaccine-preventable diseases. As well as influenza, pneumococcal and herpes zoster vaccines, booster vaccines against tetanus and pertussis are important in this age group.

A booster dose of tetanus-containing vaccine should be offered to all adults at

age 65 years if their last dose was more than 10 years ago. Reviewing pertussis vaccination status is also recommended for all people when they turn 65 years of age, as pertussis causes considerable morbidity and even mortality in older people. Those about to become grandparents should also be vaccinated. Older travellers and older people who are employed should follow the same vaccine recommendations as their younger counterparts. MT

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Strategies to increase vaccination rates in older people

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Coverage levels for recommended vaccines in older adults fall well below those in children. An important driver of vaccination is a recommendation from the person's GP. Tips for talking about vaccines and addressing patient misconceptions and specific practice strategies may help GPs increase vaccination rates among their older patients.

KEY POINTS

- Vaccination rates for recommended vaccines in older adults fall well below rates seen in children.
- One of the most influential drivers of vaccination is a recommendation from the person's GP.
- GPs can help increase vaccination rates by informing their older patients about the severity of vaccine-preventable diseases and the safety and effectiveness of vaccines.
- Other strategies to help increase vaccination rates include:
  - co-administration of vaccines
  - opportunistic vaccination
  - patient notification and recall programs.
- All vaccinations of older people can now be recorded in the expanded Australian Immunisation Register.

1. GP STRATEGIES TO HELP INCREASE VACCINATION RATES IN OLDER PEOPLE

- Recommend vaccination to all eligible patients in the general practice
- Co-administer vaccines when safe
- Routinely offer opportunistic vaccination
- Implement a practice-based notification and recall program
- Record all vaccinations in the Australian Immunisation Register

Australia has not achieved acceptable vaccination rates in older people for vaccines listed on the National Immunisation Program (NIP). More can be done to achieve vaccine coverage comparable to that in children, of whom about 94% are fully vaccinated. Suggested strategies for GPs to help improve vaccination rates among older people are summarised in Box 1 and discussed in this article.

Recommend vaccination to all eligible patients

Studies show that the most influential driver of vaccination is a recommendation from the person's healthcare provider. This can increase the likelihood of vaccination against influenza, pneumococcal disease and herpes zoster (HZ) 11-fold.[1-5] However, patient surveys have found that myths and misconceptions about vaccines in older people are common (Table 1).[4,5] These myths and misconceptions can act as barriers to vaccination. They include beliefs that:

- healthy people are not at risk of the disease targeted by the vaccine
- the disease is not serious
- the vaccine is ineffective or can itself cause the targeted disease
- natural immunity is better
- the risk of adverse effects is too high.

These misconceptions can be addressed by high-quality educational programs, ranging from one-on-one discussions through to societal-level campaigns. Both

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TABLE 1. FREQUENCY OF COMMON MISCONCEPTIONS ABOUT VACCINATIONS IN OLDER PEOPLE AND SUGGESTED GP RESPONSES TO MISCONCEPTIONS[4,5]

Misconception	Percentage of respondents who agreed or were unsure[4,5]			Suggested GP response*
	Herpes zoster (HZ)	Influenza	Pneumococcal disease	
I am healthy and rarely get sick, I don't need vaccination	39%	22%	40%	• Age is one of the greatest risk factors for these diseases • Almost all older people are at risk of HZ (shingles), as about 95% have had chickenpox, and the virus that causes both chickenpox and HZ lies dormant in the nerve roots next to the spinal cord • Vaccination boosts health status and protects against these diseases
The vaccine injection will not reduce my risk of becoming seriously ill from complications of the disease	16%	17%	27%	• The HZ vaccine is the only strategy that reduces the risk of both acute shingles and its complication, postherpetic neuralgia. The latter is very difficult to treat and the risk of it developing is not reduced by taking antivirals during an acute bout of HZ • The influenza vaccine provides good protection against influenza and even better protection against the complications of influenza • The polysaccharide pneumococcal vaccine provides reasonable protection against pneumococcal pneumonia and better protection against invasive pneumococcal disease such as meningitis and septicaemia • The pertussis vaccine provides good protection against pertussis and its complications for three to possibly 10 years
Natural immunity is better	32%	NA	NA	• Natural immunity would mean suffering the natural consequences of the diseases: – A bout of HZ is painful and debilitating and can lead to complications such as postherpetic neuralgia and stroke – Influenza often worsens existing chronic diseases and may lead to a heart attack or worsening of chronic obstructive pulmonary disease or diabetes – Pneumococcal pneumonia causes significant illness and mortality and is increasingly resistant to antibiotics – Pertussis disease does not provide lifelong immunity and older people have the highest rates of pertussis; pertussis can cause a cough that lasts three months, cracked ribs, hospitalisation and even death • Boosting immunity through vaccination is a much safer and more effective way of protecting against these diseases
I could get the disease from the vaccine	44%	67%	66%	• For HZ, it is extremely unlikely that patients with a normally functioning immune system will get the disease from the vaccine • For influenza, pneumococcal disease and pertussis, it is not possible to get the disease from the vaccine
Vaccines weaken the immune system	32%	NA	NA	• There is no evidence that vaccines weaken the immune system • For many diseases, vaccines are the only way of providing increased protection against the disease
Concern that the vaccine may be painful or cause side effects	47%	30%	46 to 50%	• Local reactions to the vaccines are relatively common but short lasting • Severe reactions are very uncommon

Abbreviation: NA = not available.
* Healthcare providers remain the most trusted advisors and influencers of vaccination decisions. A recommendation from a GP or practice nurse often counters myths and misperceptions about both the disease and the vaccine to protect against the disease.

healthcare providers and patients need evidence-based information on the risks associated with the various vaccine-preventable diseases, the effectiveness and safety of the vaccines and ways of achieving high levels of vaccine coverage.

Some suggested GP responses to common patient misconceptions about vaccination are shown in Tables 1 and 2. Tips for GPs talking with patients about influenza, pneumococcal, HZ and pertussis vaccination are shown in Boxes 2 to 5. A suggested patient handout about vaccination for people aged 65 years and over appears on page 33 of this supplement.

Other useful resources include the Australian Immunisation Handbook, National Centre for Immunisation Research and Surveillance fact sheets and the Australian and New Zealand Society for Geriatric Medicine position statement on Immunisation of Older People.[6-8]

TABLE 2. COMMON MISCONCEPTIONS ABOUT PERTUSSIS VACCINATION AND SUGGESTED GP RESPONSES

Misconception	Suggested GP response*
I wasn't aware that I need pertussis vaccination	• Older people have the highest rates of pertussis • Pertussis can be severe in older people, leading to a three-month-long cough and complications such as cracked ribs, hospitalisation and even death
I was vaccinated against pertussis as a child, I don't need another vaccination	• Pertussis vaccine provides good protection, but this protection starts to decrease after about three years • Older people are not protected by childhood pertussis vaccination and need a booster dose
Pertussis vaccination won't stop me getting whooping cough	• Although pertussis vaccination does not protect for life, it is very effective for at least three to possibly 10 years
I was diagnosed with pertussis 10 years ago, I don't need the vaccine	• Immunity from natural pertussis infection lasts up to 20 years in some people but for as little as four years in others, so a booster should be considered
I am concerned about the adverse effects of pertussis vaccination	• Adult pertussis vaccines contain less antigen than the childhood vaccines so cause fewer adverse reactions • Local reactions and mild fever or an unwell feeling may occur but severe adverse effects are rare

* Healthcare providers remain the most trusted advisors and influencers of vaccination decisions. A recommendation from the practice nurse or GP frequently counters myths and misperceptions about both the disease and the vaccine to protect against the disease.

Co-administer vaccines

Presentation of a patient for one vaccine, such as annual influenza vaccine, provides an opportunity to check current vaccination status and offer other vaccines. Despite some product information advice to the contrary, pneumococcal vaccine can be given at the same time as the live attenuated HZ vaccine (although they are best administered in different arms), and each of these can be given at the same time as influenza vaccine. However, the safety and efficacy of administration of all three together has not been established.

Support opportunistic vaccination

Other strategies that can help GPs increase vaccine coverage among older people in their practices include opportunistic vaccination and notification and reminder programs, which can act synergistically. Opportunistic vaccination captures the patient when they attend the practice; the vast majority of the older population visit a GP several times a year.[4,9]

A successful opportunistic vaccination program requires some planning. Suggested steps for GPs and practice staff to support opportunistic vaccination include:

- Display posters and leaflets about vaccinations for older people in the GP's waiting and consulting rooms.
- Routinely inform all eligible patients about each vaccine. A strategy is for the practice nurse to flag attending patients who are due for a vaccine in the appointment system after checking their vaccination status in the electronic record.
- Integrate vaccination into health assessments (e.g. ensure HZ vaccination is part of the age 75 years health assessment).
- Administer the vaccine and document this in the patient's electronic health record as well as the Australian Immunisation Register (AIR, see below).
- Give the patient information to take away that is relevant to their knowledge, interest and concerns or direct them to online patient information sites (e.g. www.ncirs.org.au/public, www.chop.edu/centers-programs/vaccine-education-center).
- Identify likely low-vaccination groups. Patients who attend the practice infrequently are less likely to receive recommended preventive care, such as vaccines. Reception staff can use the appointment system to generate a list of infrequent attenders (e.g. have not attended in the previous 12 to 18 months). This group could be sent an SMS or other electronic reminder suggesting they attend for vaccination.
- Implement standing orders to guide staff such as practice nurses to offer a range of vaccines after appropriate checks of eligibility and contraindications. Practice nurses could then administer the vaccine without the GP being present. Although this might mean patients are not billed, it will increase patient convenience and could be done in association with a GP appointment. For example, patients could see the practice nurse for vaccination while waiting to see the GP.

2. TIPS FOR GPS TALKING WITH OLDER PATIENTS ABOUT INFLUENZA VACCINATION

What is the risk of getting influenza?
In a typical year, 6 to 8% of the population get influenza. In a pandemic year, the risk is much higher. For example, in the pandemic year 2009, 25% of the population got influenza.

How serious is influenza?
Influenza is a serious disease for the very young (under 2 years old) and older people (over 65 years) and can be fatal. People aged over 65 years account for more than 90% of the deaths due to influenza.

How effective is influenza vaccine?
The standard quadrivalent flu vaccine reduces the risk of influenza by 50 to 60% in healthy adults and 30 to 50% in older adults. Newer enhanced vaccines such as the adjuvanted trivalent vaccine are 25% more effective than the standard vaccine in reducing hospitalisations and complications of influenza in older people.

How long does protection last?
Immunity provided by the standard influenza vaccines starts to decline three months after vaccination, particularly in older people. The decline is greater for H3N2 influenza strains. There is some evidence that the adjuvanted trivalent vaccine protects for up to six months and possibly longer.

What are possible adverse effects of the vaccine and how common are they?
Local reactions are the most common side effect of the influenza vaccine. Serious reactions are very rare. The enhanced vaccines are more likely to produce local and systemic side effects, but these are self-limiting and mild.

What is the risk of an allergic reaction to the vaccine?
The influenza vaccine is contraindicated in people with a history of anaphylaxis to influenza vaccine or any of the vaccine components. People with an egg allergy may be safely vaccinated, although those who have had an anaphylactic reaction to eggs should be considered for vaccination under medical supervision, for example in a hospital emergency department.

What is the risk of getting influenza from the vaccine?
The influenza vaccine is an inactivated vaccine. It is not possible to get influenza from the influenza vaccine.

3. TIPS FOR GPS TALKING WITH OLDER PATIENTS ABOUT PNEUMOCOCCAL VACCINATION

What is the risk of getting pneumococcal disease?
Similar to influenza, children younger than 2 years and people aged 65 years and over are at high risk of pneumococcal infection. Conditions associated with the highest increased risk of invasive pneumococcal disease include functional and anatomical asplenia and a range of immunocompromising conditions. Patients with cerebrospinal fluid leaks, including cochlear implants and intracranial shunts, and those with a range of chronic diseases are also at increased risk of invasive disease.

How serious is pneumococcal disease?
Patients who are hospitalised with community-acquired pneumonia caused by pneumococcus have a mortality rate of 5 to 15%, rising to more than 30% in those who are admitted to the intensive care unit. Community-acquired pneumonia causes a higher burden of hospitalisation and total costs than myocardial infarction, stroke and osteoporotic fractures in the older population. Invasive pneumococcal disease has a mortality rate of 8 to 12%.

How effective is pneumococcal vaccine?
The 23-valent polysaccharide pneumococcal vaccine (23vPPV) has an effectiveness of 25 to 35% against the pneumococcal serotype strains that cause community-acquired pneumonia, and 65 to 75% against invasive pneumococcal disease.

How long does protection last?
23vPPV provides protection for at least two years and possibly up to five years.

What are possible adverse effects of the vaccine and how common are they?
Local reactions are the most common adverse effects, including moderate pain, severe pain and/or large induration at the injection site. Among people aged 65 years and over, this composite endpoint was reported by 10% of people after primary vaccination and 30% after revaccination. Systemic reactions are relatively common, including fatigue (18%), headache (13%), myalgia (10%) and fever (1%).

What is the risk of an allergic reaction to the vaccine?
The risk of an allergic reaction to 23vPPV is very low. 23vPPV is contraindicated in patients with a history of hypersensitivity to any component of the vaccine.

What is the risk of getting pneumococcal disease from the vaccine?
23vPPV is an inactivated vaccine. It is not possible to get pneumococcal disease from this vaccine.

4. TIPS FOR GPS TALKING WITH OLDER PATIENTS ABOUT HERPES ZOSTER VACCINATION

What is the risk of getting herpes zoster (HZ)?
Lifetime risk of HZ (shingles) is about 30 to 35%. In the vaccine target group (age 70 to 79 years), this increases to 40%, and by the age of 85 years one in two people will have had HZ.

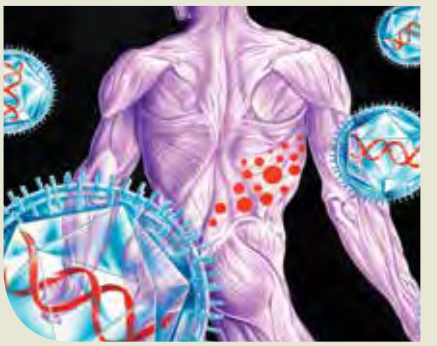
How serious is HZ?
The pain from acute HZ is moderate to severe, lasts up to a month and often has a significant impact on the person's daily activities. The most common complication, postherpetic neuralgia, typically scores 6/10 on pain scales and is very difficult to treat. It has a substantial impact on quality of life and often lasts several years.

How effective is HZ vaccine?
The current HZ vaccine reduces the likelihood of acute HZ by 50% and the incidence of postherpetic neuralgia by 61%.

How long does protection last?
The current vaccine protects against acute HZ for seven to nine years. No current guidelines suggest a HZ vaccine booster.

What are possible adverse effects of the vaccine and how common are they?
Local reactions are fairly common, and usually short-lived, including tenderness (26%), redness (36%) and swelling (35%). Severe reactions are rare (less than 2%), similar to the rate among people receiving placebo (1.3%).

What is the risk of an allergic reaction?
The risk of an allergic reaction to the current HZ vaccine is very low. However, the vaccine should not be given to people with a history of hypersensitivity to any of its components, including gelatin, or an anaphylactic or anaphylactoid reaction to neomycin (which is present in the vaccine in trace quantities). A history of contact dermatitis due to neomycin (the usual manifestation of neomycin allergy)



is not a contraindication to receiving live virus vaccines such as the current HZ vaccine.

What is the risk of getting the disease from the vaccine?
In people with a normal immune system, the risk of contracting varicella (chickenpox) from the vaccine is extremely low. People who are significantly immunocompromised must not receive the current HZ vaccine.

Occasionally, patients have strong views about vaccination and resist offers of vaccines. Although these views need to be respected, it is useful to understand the patient's exact concerns and whether they might be amenable to further information. A strategy to help avoid giving offence when repeatedly offering a vaccine is to say 'I understand your concerns about the […] vaccine and respect your decision. I find from time to time that patients change their mind, so raising the issue gives them an opportunity to discuss their wishes, address any concerns and possibly accept the vaccine if they wish'.

Implement notification and recall programs

Vaccination rates are likely to remain suboptimal, even with a planned opportunistic vaccination program, unless GPs also use a notification and recall strategy. This is particularly important for nonseasonal diseases, such as shingles. Suggested steps in a notification and recall/reminder program for GPs include:

- Appoint a co-ordinator. This increases the likelihood of teamwork, allocation of tasks and follow up of the impact.[10,11]
- Identify eligible patients. Practice software can be used to compile a list. GPs will need to determine whether they are the patient's usual GP, for example by checking the patient's electronic health record.
- Notify eligible patients about relevant vaccinations using one or more methods, ideally including an electronic strategy such as SMS messaging or an electronic reminder system. Examples of the latter include SmartVax (www.smartvax.com.au) and HotDoc (https://hotdoc.com.au). A birthday card reminder is another way of prompting patients to attend for vaccination.
- Administer the vaccine and record the vaccination in the patient's electronic record as well as the AIR. It can also be useful to give patients a small immunisation card that lists all the vaccines they have received. These cards are available from most state health departments and have the advantage of providing a portable summary of the individual's vaccine history.
- Send ongoing recalls and reminders to any missed or new eligible patients at appropriate intervals. A tailored phone call or SMS from the practice nurse coupled with a strong GP recommendation will further increase coverage rates and potentially save the practice the time and cost of sending repeated letters.[10] It is important to document reminders in the patient's electronic health record. Sending reminders is made easier for some patient target groups if they are captured in the electronic practice register; it is worthwhile setting up disease and high-risk practice registers for some conditions.[10]

Australian Immunisation Register

The AIR was extended to all age groups from November 2016, replacing the Australian Childhood Immunisation Register.[12] The AIR can record vaccinations given through general practice and community clinics, including vaccines funded under the NIP and privately funded vaccinations. It provides an opportunity to record vaccinations of older people and to make this

5. TIPS FOR GPS TALKING WITH OLDER PATIENTS ABOUT PERTUSSIS VACCINATION

What is the risk of getting pertussis?
The risk of getting pertussis is high. Protection provided by childhood vaccination wanes within a decade of the final dose, and protection after infection lasts only four to 20 years. Most older people are thus not immune to pertussis; they are at greater risk of disease than younger age groups.

How serious is pertussis?
Older adults usually develop an annoying and chronic cough that can last up to three months. One in five people who have a cough for more than two weeks are likely to have pertussis. Some older people with pertussis require hospitalisation and a small number die of the disease.

How effective is pertussis vaccine?
The vaccine has good effectiveness (about 84%).

How long does protection last?
Pertussis vaccine protects for three to possibly 10 years.

What are possible adverse effects of the vaccine and how common are they?
Adult pertussis vaccines contain lower amounts of antigens than paediatric vaccines. Possible side effects include local site reactions and mild systemic effects, which are self-limiting. Severe adverse effects are rare.

What is the risk of an allergic reaction?
The risk of an allergic reaction is very low, quoted as less than one in a million doses.

What is the risk of getting pertussis from the vaccine?
The pertussis vaccine consists of *Bordetella pertussis* antigens, not live organisms. It cannot cause pertussis.

information available to other GPs and healthcare practitioners, for example if the patient moves to a new general practice.

The data could also be used, when sufficiently complete and reliable, to identify and target regions achieving lower vaccination rates, and to identify high vaccination regions that can be further interrogated to demonstrate best practices.

Conclusion

Despite official recommendations on vaccination in older people and inclusion of many vaccines on the NIP, coverage levels in older adults are well below those in children. Strategies that might increase uptake of recommended vaccines among older people include government actions, such as listing all recommended vaccines on the NIP and improving national surveillance of vaccination coverage levels and disease rates in the older population to inform funding discussions. However, GPs also have the opportunity to help increase vaccination rates among their older patients. Suggested strategies include informing their older patients about the risks and potential severity of vaccine-preventable diseases and the safety and effectiveness of vaccines, co-administration of vaccines where this is safe, and adopting systematic practice strategies to support opportunistic vaccination and patient notification and recall systems. MT

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Vaccinations for people aged 65 years and over

This handout provides information on the importance of vaccination for people aged 65 years and over and the specific vaccinations that are recommended for this age group.

Reviewed by Associate Professor John C.B. Litt, Discipline of General Practice, Flinders University, Adelaide, SA; Professor Paul Van Buynder, School of Medicine, Griffith University, Brisbane, Qld; and Associate Professor Michael Woodward, Heidelberg Repatriation Hospital, Melbourne, Vic.

Why do I need to be vaccinated?

As you get older you lose some of the immunity that you had when you were younger. Your immune system becomes less effective in protecting against disease. This means that, compared with when you were younger:

- you are more likely to catch infections
- they are more likely to be severe
- you are more likely to take longer to recover
- you are more likely to develop complications of the infections and may need to be treated in hospital.

Some infections and their complications may also make it more difficult for you to carry out your activities of daily living for a long time after the infection.

A number of infections can be particularly serious as you get older. A safe and effective way to protect yourself against these infections is to be vaccinated against them.

Vaccination not only protects you from getting the disease, it can also help to prevent the spread of the infection in the community. The more people in the community who are immune to a disease, the more difficult it is for that disease to spread.

Vaccinations are particularly important if you have ongoing medical conditions, such as diabetes or heart disease, or if you missed any immunisations as a child, as you may experience more severe infections and complications in these cases.

Occasionally people do get an infection despite being vaccinated against it. However, in these cases, the infection is usually a less serious form of the disease. You are also less likely to develop complications even if you get the disease.

Which vaccinations do I need?

Influenza vaccination

What is influenza?

Influenza (or the flu) is a highly contagious disease caused by infection with the influenza virus. It is easily spread from person to person by sneezing or coughing, or touching contaminated objects with the virus on them.

If you catch influenza when you are older, you may have different symptoms than when you were younger. Fever is less common whereas cough, wheezing, chest pain and feeling confused are more common. If you have other medical conditions, such as chronic obstructive pulmonary disease (COPD), they may worsen when you get influenza, and some older people may develop serious complications such as pneumonia, a heart attack or heart failure. People over the age of 65 years are much more likely to die from influenza-related causes than younger people.

How can I protect myself against influenza?

Annual influenza vaccination is strongly recommended for people aged 65 years and older. Vaccination is needed every year, as the virus strains keep changing and a new vaccine must be made to match these. As well as protecting you against influenza, vaccination also reduces the risk of both having to be hospitalised for treatment and developing complications. Getting the influenza vaccine each year does not weaken the immune system.

Two new enhanced influenza vaccines are available for older people. One of these is available free of charge to people 65 years and over on the National Immunisation Program (NIP). You cannot get influenza from the vaccine because it does not contain any live virus – it is an inactivated vaccine. The most common side effects of enhanced influenza vaccination are swelling, redness and pain at the injection site.

Vaccination against pneumococcal disease

What is pneumococcal disease?

Pneumococcal disease is an infection caused by the bacterium *Streptococcus pneumoniae* (also called pneumococcus). Many people carry pneumococcus in their nose and throat and may have no symptoms, but the bacteria can spread within the body and cause pneumonia, meningitis (infection of the brain covering) and septicaemia (blood infection). The infection can be spread from person to person by coughing or sneezing or contact with mucus from the throat or mouth of an infected person.

How can I protect myself against pneumococcal disease?

Because older people are particularly susceptible to pneumococcus infection, vaccination against it is recommended when you reach 65 years of age.

A single dose of pneumococcal vaccine, which is effective against 23 of the most common strains of pneumococcus infecting older people, is available free of charge under the NIP for people aged 65 years and older. Aboriginal and Torres Strait Islander people can receive the vaccine from the age of 50 years under the NIP.

If you have other risk factors, you may need more doses or a different version of the vaccine. Your doctor will advise you on the vaccine and doses recommended for you.

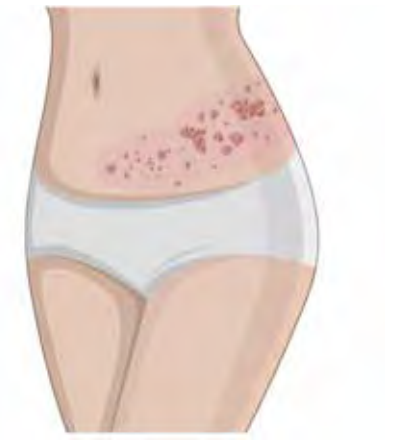
The pneumococcal vaccine contains no live bacteria, and so you cannot get pneumococcal disease from the vaccination. The most common side effects of pneumococcal vaccination are soreness, swelling and redness at the injection site.

Shingles vaccination

What is shingles?

Shingles (or herpes zoster) is a serious disease caused by reactivation of the virus that causes chickenpox – the varicella zoster virus. The first infection with the virus causes chickenpox. The virus then hides in the nerve root next to your spinal cord and is kept in check by the immune system. When a person's immune system is weakened (e.g. with ageing, some medical conditions or when taking certain medicines), the virus can be reactivated and cause damage to the nerve root. It then travels along the nerves to the skin, causing shingles.

People with shingles develop a blistering, painful rash in a narrow strip on one or other side of their body, commonly on their chest or abdomen. The associated pain can significantly affect quality of life. Shingles can also lead to serious complications, the most common being ongoing severe pain called postherpetic neuralgia that can last for several years. This is more common the older you are, is very difficult to treat, can lead to spells in hospital and has a significant effect on your quality of life. Other complications of shingles can include stroke and, depending where the rash is located, hearing loss and blindness.



How can I protect myself against shingles?

Vaccination against shingles is the only way to protect against both the disease and postherpetic neuralgia. Shingles vaccination is recommended for adults aged 60 years or older, and is particularly recommended for those aged 70 to 79 years. It is available free of charge on the NIP at age 70 years or, until 2021, if you are aged 71 to 79 years.

Your doctor will let you know if you can have this vaccine as it should not be given if you have specific uncommon medical conditions that significantly reduce your immunity (this is called being immunocompromised). A new vaccine is on the horizon that can be used in people who are immunocompromised but this will not be available for some years.

In the meantime, however, as the disease is so serious, you should not delay in having the currently available vaccine if your doctor advises it is safe for you to do so. You should ask your doctor whether this vaccine is safe for you. Shingles vaccine can be given at the same time as other vaccines, such as influenza or pneumococcal vaccine.

The shingles vaccine is a live vaccine containing virus particles that have been greatly weakened and altered. In older people with a normal immune system, the risk of getting shingles from the vaccination is extremely low. The most common side effects of the vaccine are minor swelling and redness at the injection site.

Booster vaccinations against pertussis, tetanus and diphtheria

Booster vaccinations against whooping cough (pertussis), tetanus and diphtheria are recommended if you have not had one in the past 10 years. A booster vaccine is an extra dose of a vaccine that you had when you were younger. If you missed having vaccinations for these infections when you were younger, you will need a full course of the vaccine. Your doctor will advise you on the vaccine recommended for you.

A vaccine is available that protects against all three infections. It is not covered under the NIP, so you would have to pay for this vaccine.

The vaccine is not a live vaccine, and so you cannot get these diseases from vaccination. The most common side effects are pain and a hardened area or swelling at the injection site.

Pertussis

Whooping cough, or pertussis, is a highly contagious disease caused by infection with the bacterium *Bordetella pertussis*. It is spread by breathing in aerosols if you are close to an infected person. The infection can be serious, particularly in young infants and in older people, and it can result in complications such as pneumonia, brain damage and even death.

The risk of getting whooping cough is high, and any protection that you might have had when you were younger wanes over time. For this reason, booster vaccinations against pertussis are recommended for people aged 65 years and older if they have not been given one in the past 10 years. Vaccination is also important if you have contact with infants, who are at a high risk of contracting the infection.

An additional advantage of having the pertussis vaccine is that you also get a boost to your immunity against tetanus and diphtheria, as the three vaccines are combined.

Tetanus

Tetanus is a serious disease caused by a bacterium found in soil called *Clostridium tetani*. These bacteria can enter an exposed wound, where they produce a toxin that causes painful muscle spasm, especially around the neck and jaw (lockjaw). This can be life-threatening.

A booster dose against tetanus is recommended for adults who have not had vaccine with tetanus in it in the past 10 years, or who have a tetanus-prone wound.

Diphtheria

Diphtheria is an infection caused by the bacterium *Corynebacterium diphtheriae*. The infection causes an upper respiratory tract infection that can result in an obstruction in the throat. The bacterium also produces a toxin that can cause heart failure and paralysis.

A booster dose against diphtheria is recommended for adults who have not had a vaccine with diphtheria in it in the past 10 years. MT

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WHERE CAN I FIND OUT MORE?

- **Australian Government Department of Health – Immunisation for seniors webpage**
  https://beta.health.gov.au/health-topics/immunisation/immunisation-throughout-life/immunisation-for-seniors
- **National Centre for Immunisation Research and Surveillance – fact sheets and questions and answers**
  www.ncirs.org.au/public
- **Vaccine Education Center, Children's Hospital of Philadelphia**
  www.chop.edu/centers-programs/vaccine-education-center
- **Australian Immunisation Handbook**
  https://immunisationhandbook.health.gov.au

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