The Centers for Disease Control and Prevention (CDC) recommends that all adults receive certain vaccines to avoid or reduce complications from preventable diseases in the United States. Vaccines that are recommended specifically for the elderly, defined as individuals 65 years and older, include influenza, shingles, pneumococcal, tetanus, diphtheria, and pertussis vaccinations. This article will provide an overview on the immunization recommendations for elderly adults, with a focus on patients in long-term care (LTC) facilities.

Secondary complications, hospitalization rates, and deaths associated with influenza are the highest in older adults (≥65 years) compared to other age groups. According to the CDC, the percent of influenza-related deaths from 1976-2007 was significantly higher in adults 65 years and older than other age groups. Additionally, Cummings et al. found that, in the 2010-2011 and 2012-2013 influenza seasons, 71-85% of influenza-related deaths were in individuals 65 years and older. Because of this, annual influenza vaccination for adults 65 years and older should be a high priority as it is cost-effective with large health benefits. Clinical evidence suggests that influenza immunization is most beneficial in fragile, elderly individuals. Further, a study by Cai et al. assessed the relationship between vaccination rates and hospitalization rates, finding that a 10% increase in the immunization rate for patients in LTC facilities was associated with a 6.2% reduction in hospitalization rates. These data demonstrate the importance of influenza vaccination in this age group, particularly for those patients receiving LTC, to help reduce morbidity and mortality associated with influenza illness.
Current guidelines recommend an annual influenza vaccine for all adults aged 6 months and older who do not have contraindications. Available standard dose vaccines include the inactivated quadrivalent, the inactivated quadrivalent (cell culture-based), the inactivated trivalent, the adjuvanted inactivated trivalent, the recombinant trivalent, and the live attenuated intranasal quadrivalent vaccine.9

Relevant updates to the influenza guidelines for the 2016-2017 influenza season include a retraction in recommendation for the live attenuated intranasal quadrivalent vaccine due to poor efficacy and a positive recommendation for those with history of egg allergies to receive the influenza vaccine.9

Data have shown that older adults have a diminished immune response to influenza immunization that results in lower antibody levels.10,11 Due to this, vaccines have been developed at higher antigen doses to encourage improved immunogenicity and, ultimately, more effective vaccines in this population. The only available high-dose vaccine in the United States is the inactivated trivalent, Fluzone High-Dose (Sanofi Pasteur, Swiftwater, Pennsylvania). Current Advisory Committee for Immunization Practices (ACIP) recommendations show no preference for a specific vaccine type for this age group.9

Despite the lack of preference in the guidelines, there are data to show that high-dose vaccines may be more effective in the elderly population. One multi-center, randomized, double-blind, active-controlled trial assessed over 30,000 participants to determine whether the high-dose inactivated trivalent vaccine resulted in fewer reports of laboratory-confirmed influenza illness when compared to the standard dose vaccine. The researchers found that the high-dose vaccine resulted in a 24% relative risk increase for protection against laboratory-confirmed influenza illness caused by any viral type. While the researchers did not complete a direct cost-effectiveness analysis, they did note that the clinical benefit demonstrated in this study could have public health benefits, specifically reducing the rates of hospitalization, secondary complications, and nonroutine medical visits.12 Another study by Diaz Granados et al. found that the high-dose influenza vaccine resulted in significantly fewer serious adverse events, such as pneumonia, hospitalization, and death, when compared to the standard-dose influenza vaccine.13 There are also data to show that the high-dose formulation may be more cost-effective in the elderly population.14,15

The FDA recently approved a new vaccine for use in adults 65 years and older. Fluad (Seqirus, Holly Springs, North Carolina), is an inactivated, MF59-adjuvanted, trivalent influenza vaccine.9 The vaccine contains an adjuvant, an oil called squalene, which potentiates an immune response by drawing immune cells to the injection site and enhancing their uptake of antigen.16,17 Fluad is the first adjuvanted influenza vaccine in the United States and is available for the 2016-2017 flu season.9 A few studies have been completed that compare Fluad to common influenza vaccines, such as the unadjuvanted trivalent inactivated influenza vaccine, conventional subunit, and intradermal. All of these studies demonstrated superior immunogenicity with Fluad compared to the other vaccines in the elderly age group, with all vaccines demonstrating similar safety profiles.18-20 A study by Van Buynder et al. included a patient population where half of the patients were in LTC facilities. The researchers found that, compared to the conventional subunit influenza vaccine, Fluad provided a statistically significant improvement in protection from influenza for patients in LTC facilities.20 Unfortunately, there is currently no research comparing this vaccine to the high-dose vaccine, which is also approved in this age group.9
Shingles

Shingles, also known as herpes zoster, is caused by reactivation of varicella zoster virus, which is the cause of chickenpox.21,22 Approximately one-third of Americans will contract herpes zoster, with an estimated one million cases annually in the United States. Increasing age is considered a major risk factor for shingles.22 Shingles infection typically presents as a painful, blistering rash that is characterized as itchy and tingling. Treatment usually consists of antiviral medications, including valacyclovir, famciclovir, and acyclovir, for seven to ten days of therapy. Acute pain can be managed using acetaminophen, nonsteroidal anti-inflammatory drugs, tramadol, and opioids.23 Common secondary complications from shingles can include post-herpetic neuralgia, scarring or hyperpigmentation of the skin, and bacterial superinfections.21

According to the ACIP guidelines, age is the most important risk factor for development of shingles zoster, due to probable immunosenescence and loss of immunity. For this reason, one dose of Zostavax is recommended for adults 60 years of age and older who do not have contraindications for the prevention of herpes zoster and its complications.1,24 While the FDA has approved the use of Zostavax in adults aged 50 years and older, a 2014 ACIP update maintained its current age recommendation of ≥60 years due to limited vaccine supply and lack of long-term efficacy and safety in adults under 60. Vaccine efficacy can only be confirmed through five years after immunization. At this time, ACIP does not recommend that individuals receive the vaccine before age 60 due to the potential loss of protection during later years.25

There are no data evaluating the benefits, efficacy, or safety of herpes zoster vaccination in the LTC population. Obstacles for herpes zoster immunization in LTC patients include a lack of research, insurance barriers, and the need to determine the ideal candidates for the vaccine, since the efficacy of the vaccine wanes over time. Some practitioners suggest that patients aged 70 to 79 years who do not have a limited life expectancy should be considered for immunization, while the risks may outweigh the benefits for patients 80 years and older with limited life expectancy.26 According to the Morbidity and Mortality Weekly Report, only 20.1% of eligible individuals received the herpes zoster vaccine in 2012. Current rates of shingles vaccination in LTC facilities are not known.27

Pneumococcal

PCV13 (Prevnar 13) and PPSV23 (Pneumovax 23) are used for the prevention of invasive disease, such as pneumonia, meningitis, and bacteremia, which is caused by Streptococcus pneumoniae. PCV13 and PPSV23 provide protection against 13 and 23 S. pneumoniae serotypes, respectively.28 Pneumococcal disease is very prevalent in the United States, particularly in adults 65 years and older. Pneumonia, meningitis, and bacteremia due to S. pneumoniae cause the death of approximately 18,000 elderly American adults each year.29 Research has demonstrated that vaccination may help to decrease hospitalization and death rates in persons >65 years old.30 Treatment varies depending on the type of pneumococcal infection, but may include antibiotics, corticosteroids, and symptom management.31,32

Updated 2014 ACIP guidelines recommend that adults aged 65 years and older receive both PCV13 and the PPSV23.28 This change is due to significant cases of pneumonia due to PCV13 serotypes in older persons, which may be prevented by providing PCV13 immunization to the population of adults ≥65 years of age.33,34
The timing and order of pneumococcal vaccination is dependent upon the patient’s history. If the individual is naïve to any pneumococcal vaccine, then upon turning 65 years or older, he or she should receive PCV13, and then receive PPSV23 one year later. For those who received PPSV23 before age 65, they should also receive PCV13 at 65 years or older (at least one year after receiving PPSV23), and then receive PPSV23 at least one year later (at least five years after last PPSV23). Persons who have received PPSV23 at age 65 or older, but have not received PCV13, should wait at least twelve months after receiving PPSV23 to receive PCV13.\(^\text{28}\)

There is little research assessing the benefits of pneumococcal vaccination in LTC patients. An article by Bardenheier et al. raises the importance of pneumococcal and influenza vaccination in LTC facilities, as LTC residence is a risk factor for both preventable diseases. From over 200 LTC facilities, the authors found the pneumococcal vaccination rate to be around 35%, suggesting a need for ways to improve pneumococcal immunization in this patient population.\(^\text{35}\) Several studies have evaluated strategies to increase immunization rates in LTC patients, including standing orders, chart stickers, and written protocols. These methods should be utilized in LTC facilities to help improve pneumococcal vaccination rates.\(^\text{36,37,38}\)

**Tetanus, Diphtheria, and Pertussis (Tdap)**

Tetanus (lockjaw), diphtheria, and pertussis are extremely rare in the United States.\(^\text{39}\) While there are only a few cases of tetanus reported every year, the incidence is highest among persons ≥65 years.\(^\text{40}\) There have only been a few cases of diphtheria reported in the United States since 2002.\(^\text{41,42}\) However, in the United States, it is thought that up to 22,000 cases of pertussis occur annually in elderly adults.\(^\text{43,44}\) According to the CDC, immunization has helped to reduce tetanus and diphtheria by approximately 99% and pertussis by about 80%, emphasizing that these diseases are preventable and vaccination should be encouraged for all eligible individuals.\(^\text{39}\)

In February 2012, ACIP adapted its guidelines to recommend Tdap vaccination for all adults 65 years and older if they have not previously been vaccinated. It is also essential for all individuals who are in close contact with a baby younger than twelve months to protect the infant from pertussis as adults with mild pertussis may spread their infection to unvaccinated infants.\(^\text{39,45}\) There are two Tdap vaccines available in the United States: Boostrix and Adacel. Boostrix is the only one with a FDA-labeled indication for use in this older subset of the population and should be used when possible. Despite this, ACIP concluded that either vaccine would likely provide immunity for these older patients.\(^\text{1,46}\) Currently, the guidelines recommend that adults aged 19 years and older receive one dose of Tdap; however, the potential for revaccination needs are being evaluated for future guidelines. Tdap vaccination may replace a Td booster that is recommended every ten years.\(^\text{47}\)

There are currently no data on the use and benefits of Tdap vaccination in LTC facilities. However, research has evaluated immunogenicity of Tdap vaccines in the elderly population. Weston et al. discuss two randomized clinical trials that support the use of Tdap in this age group by demonstrating immune response to Tdap as well as a similar safety profile to the tetanus-diphtheria (Td) vaccine.\(^\text{48}\) Despite the lack of evidence specific to the LTC population, it would be appropriate to vaccinate all eligible persons for Tdap based on current recommendations.\(^\text{1,46}\)
Older adults, including individuals in LTC facilities, should be immunized to limit the spread and secondary complications of vaccine-preventable diseases. ACIP’s vaccine recommendations for older adults are summarized in the table below.

**Table. ACIP vaccine recommendations for older adults**

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Current ACIP Recommendation</th>
</tr>
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<tbody>
<tr>
<td>Influenza</td>
<td>Annual vaccination for all adults aged 6 months and older who do not have contraindications</td>
</tr>
<tr>
<td>Herpes zoster</td>
<td>One-dose vaccination for all adults aged 60 years and older who do not have contraindications</td>
</tr>
<tr>
<td>Pneumococcal</td>
<td>Pneumococcal-naïve patients: PCV13 in individuals ≥65 years followed by PPSV23 one year later</td>
</tr>
<tr>
<td></td>
<td>Patients aged ≥65 years who have received PPSV23: PCV13 at least one year after PPSV23</td>
</tr>
<tr>
<td></td>
<td>Patients aged ≥65 years who have received PPSV23 before age 65 years: PCV13 at least one year after PPSV23</td>
</tr>
<tr>
<td>Tdap</td>
<td>One-dose vaccination for all individuals ≥19 years; Also recommended for individuals in close contact with infants under 12 months of age, including individuals ≥65 years</td>
</tr>
</tbody>
</table>

**References**


47. FDA Approval of Expanded Age Indication for a Tetanus Toxoid, Reduced Diphtheria Toxoid and Acellular Pertussis Vaccine. MMWR Morb Mortal Wkly Rep. 2011;60(37):1279-80.