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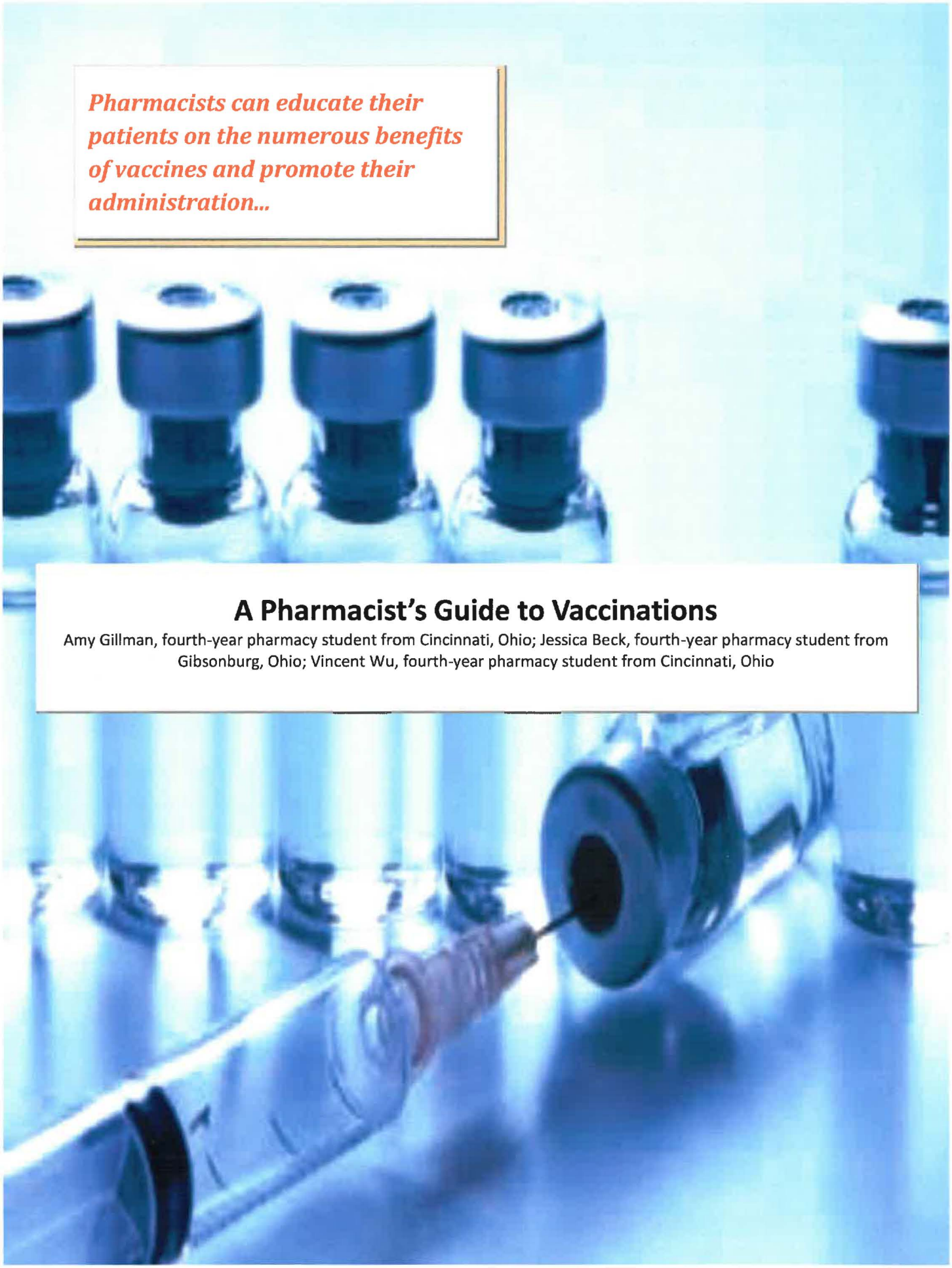

A Pharmacist's Guide to Vaccinations

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Introduction

Pharmacists play a crucial role in maximizing public health by being an accessible resource for patients of all populations. Pharmacists can educate their patients on the numerous benefits of vaccines and promote their administration, especially within high-risk populations. Most pharmacies today offer clinic hours where patients can receive their annual influenza vaccine; many also offer additional options such as the shingles vaccine. With vaccinations becoming an easy trip to the local pharmacy, one major barrier for immunizations has been eliminated, further opening the door toward maximum disease prevention. Every year, hospitals are ridden with patients suffering from preventable diseases and, while it seems unfathomable in our present-day society, people still die from diseases like influenza every winter. It is the pharmacists' role to educate on the simplicity and necessity of basic vaccinations. The vaccinations discussed in this article are a vital element in preventing disease states that can include a range of symptoms and complications which can vary from the inconvenience of keeping one away from their daily responsibilities for a short period of time to a potential precursor to cancer. There are five vaccinations in particular which target common transmittable disease states: human papillomavirus (HPV); diphtheria, tetanus, and pertussis; hepatitis B; herpes zoster virus (shingles); and influenza. The objective of this article is to provide pharmacists with the necessary information to properly educate, advise, and encourage their patients about common vaccinations that could have a significant effect on positively altering their long-term health and quality of life.

Human Papillomavirus (HPV) Vaccine

The HPV vaccine is a recombinant subunit vaccine administered to prevent the subtypes of HPV that are known to commonly cause cervical cancer and genital warts.[1] There are currently two HPV vaccines available: Gardasil®, a quadrivalent vaccine containing viral types 6, 11, 16 and 18, and Cervarix®, a bivalent vaccine containing types 6 and 18. Both vaccines are given intramuscularly (IM) as a three-dose series; the second dose to be given one to two months after the first and the third dose to be given six months after the first dose.[2] Females age 9 to 26 years are recommended to receive either of the vaccines to protect against cervical cancer. Gardasil® has also been proven safe and effective for males age 9 to 26 years for the prevention of genital warts. The CDC recommends that males 22 through 26 years of age whose immune systems are weakened, who have sex with men, or who test positive for the human immunodeficiency virus (HIV), should receive this vaccination. The quadrivalent vaccine is also recommended for *all* boys at age 11 or 12 and catch-up vaccinations for males age 13 through 21 years.[3] Because sexually active patients are thought to benefit most from the vaccine, and a patient can be infected with HPV the first time they have sexual contact with a partner, it is important to get all three doses before being exposed to the virus to ensure protection.[1]

The HPV vaccine is contraindicated in patients who are allergic to yeast or any component of the vaccine and should not be given to a patient who is ill at the time a dose is planned. Neither formulation of the vaccine is recommended to be administered to pregnant women. Gardasil® can, however, be administered to nursing mothers.[2] Side effects of the vaccine include pain, redness and swelling at the injection site. Mild to moderate fever and headache have also been reported. While many private health plans are providing coverage for the HPV vaccine, the level of coverage can vary. Those patients who are uninsured or whose insurance does not pay for the vaccine may qualify for assistance programs such as Vaccines for Children (VFC) or patient assistance programs through the companies that supply the vaccines.[1]

Diphtheria, Tetanus and Pertussis Vaccines

The four combination vaccines associated with the prevention of diphtheria, tetanus and pertussis are DTaP, Tdap, DT and Td. DT and Td contain both the diphtheria toxoid and the tetanus toxoid, while DTaP and Tdap contain an additional dose of killed, acellular pertussis.[2] All four vaccines are administered IM, however there are different recommendations as to when they should be administered.[1]

DTaP and DT are given to children younger than 7 years of age. These children should receive five doses of DTaP: at ages 15 to 18 months, 2 years, 4 years, and 6 years, and any time between 4 and 6 years. DT should be used as a substitute for children who cannot tolerate the pertussis vaccine. DTaP and DT are contraindicated in anyone who is 7 years of age or older, is allergic to any component of the vaccine and has a moderate to severe illness on the day the vaccine is scheduled. Side effects of DTaP and DT include redness and swelling at the injection site, fever and seizures.[1]

Tdap and Td are given to adults and children 7 years of age and older. Td is given as a booster shot every 10 years to unvaccinated and previously vaccinated adults. Patients presenting with a major wound or exposure

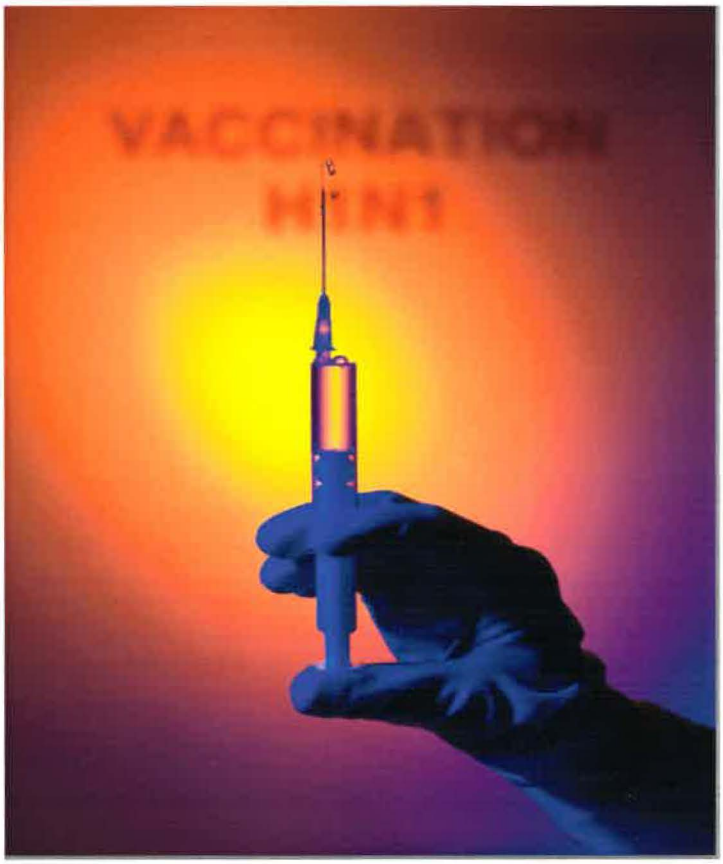
to tetanus more than five years after their last injection should also be revaccinated.[2] A single dose of Tdap should be given in place of Td booster in anyone 11 to 64 years of age, and in children 7 to 10 years old who are underimmunized or did not receive the full recommended series of DTaP before age 7 years. Adults 65 years of age and older should also receive one dose of Tdap if they are likely to come into contact with an infant younger than 12 months.[4] Tdap and Td are contraindicated in anyone with an allergy to any component of the vaccine and those individuals suffering from a moderate to severe illness on the day the vaccine is scheduled.[1] The Tdap vaccine is now recommended for women in the third or late second trimester (20th week or more) of their pregnancy.[3]

PharmaJet® is the newest technology in influenza vaccinations; it is a needle-free injection system that uses a spring-powered energy source to administer the vaccination without actually puncturing the skin.

Side effects of Tdap and Td include redness and swelling at the injection site, body aches and fever.[2] Most private health plans are providing coverage for all four of the diphtheria, tetanus and pertussis vaccines. Again, those patients who are uninsured may qualify for assistance programs such as VFC or discounted vaccines at their local health department.[1]

Hepatitis B Vaccine

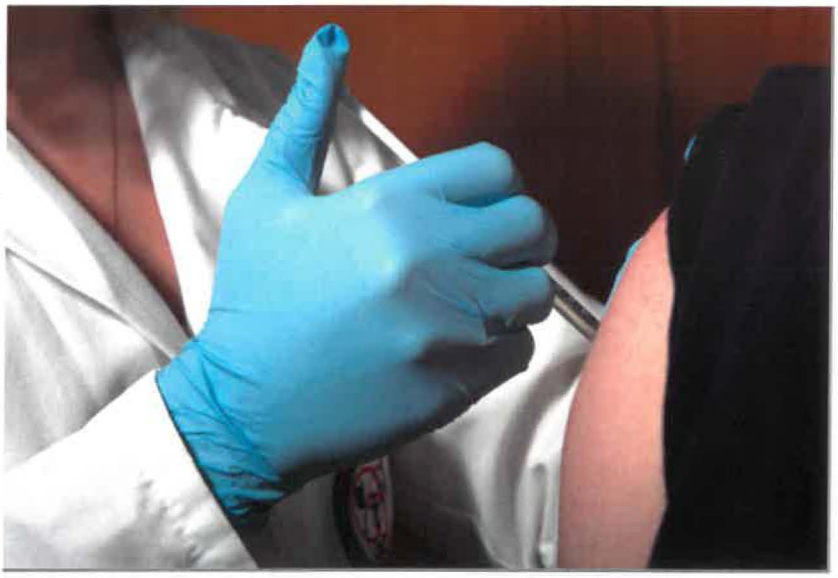
The Hepatitis B vaccine is produced by yeast and contains a viral envelope protein, hepatitis B surface antigen (HBsAg). It is indicated for use in patients who are health care workers and those with chronic liver diseases as well as end-stage renal disease, MSM, patients with multiple sexual partners, or HIV-infected patients without immunity. Changes in the Centers for Disease Control and Prevention (CDC) guidelines for 2012 recommend that adults recently diagnosed with diabetes who are younger than 60 years old should receive the Hepatitis B vaccine as soon as possible.[3] However, it should be given to any adult who desires the vaccine. Post-vaccination serologic testing should be done on patients who are considered to be at high risk, such as health care workers. If the patient does not respond according to serum levels, the patient should be revaccinated.[2] The vaccine is given in three doses: at intervals of 0, 1, and 6 to 12 months.[1] If the series is not completed, it is not a requirement that it be restarted. However, it is recommended that the patient contact his/her medical provider about the situation.[5] The vaccine is administered IM and should be used with caution if the patient has yeast allergies.[2] The vaccine itself is safe to administer to pregnant women and has had almost no adverse effects reported in over 100 million administrations. Booster shots are not recommended for healthy patients but can be used in hemodialysis patients or patients with a weakened immune system. This vaccine may also be taken in conjunction with other vaccines.[5]



Influenza Vaccine

There are two forms of the vaccination available to target this unpredictable and highly contagious respiratory illness. Infection with influenza is caused by one of thousands of strains of this virus that infects the nose, throat and lungs. Each year, the U.S. Food and Drug Administration (FDA) selects which viruses to target for that particular year according to the recommendations from the World Health Organization (WHO). The 2011-2012 vaccination for the Northern Hemisphere targets these three viruses: an A/California/7/2009 (H1N1)-like virus, an A/Perth/16/2009 (H3N2)-like virus, and a B/Brisbane/60/2008-like virus (Influenza B).[1]

What many Americans think of as the traditional "flu shot" is a trivalent inactivated vaccine (TIV) and can be one of three subcategories: a regular IM flu shot indicated for all ages over 6 months (Fluzone®), a high dose IM shot indicated for patients over 65 years (Fluzone® High-Dose)[1] [higher dose is not preferred[2]] and an intradermal shot indicated for patients ages 18 to 64 (Fluzone®-Intradermal).[1] These vaccinations are acceptable for administration to pregnant women and result in minimal side effects, with the most common being irritation at the injection site, a low-grade fever and/or muscle aches (generally lasting 1 to 2 days).[2]

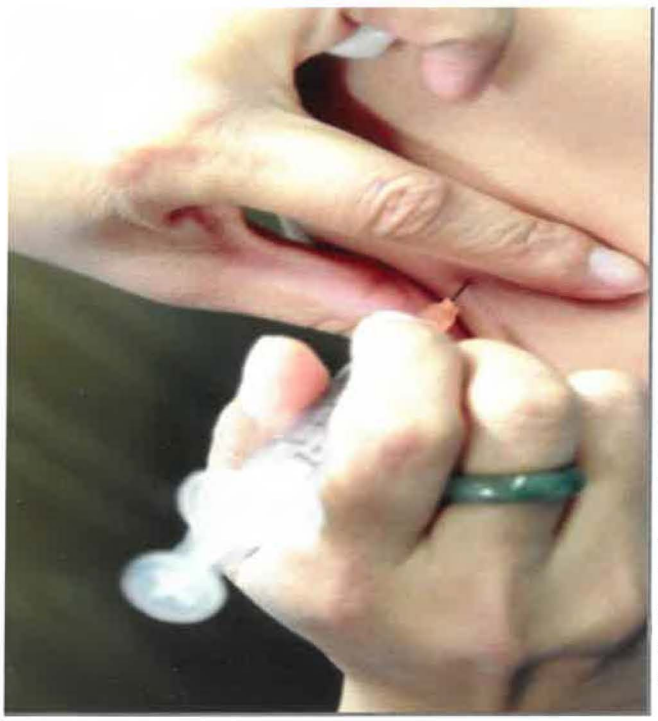


The other available form is a live attenuated influenza vaccine (LAIV) administered via the intranasal route (Flumist®). This is indicated for non-pregnant, healthy adults 49 years and younger and can cause some minor adverse reactions, most commonly nasal congestion, headache and/or cough.[2] This form is an excellent alternative for patients who are uncomfortable with needles. While no studies specifically focusing on influenza have been done for an adult population, one large study of children age 15 to 85 months concluded a 92 percent decrease in chance of influenza infection versus placebo with the LAIV vaccine.[1]

Following administration of either vaccine, it takes approximately two weeks for the proper antibodies to develop and infer protection from the influenza virus.[1] Neither vaccination is recommended for patients with a history of Guillain-Barré Syndrome.[1] While in the past, patients with chicken egg allergies have refrained from receiving the vaccine, the CDC's Advisory Committee on Immunization Practices (ACIP) has made a recommendation based upon several thorough studies stating that people who have experienced hypersensitivity reactions which manifested as only hives following egg consumption can receive TIV intramuscularly as long as it is administered by a health care professional familiar with the manifestations of egg allergies who can observe the patient for 30 minutes post-administration.[1]

PharmaJet® is the newest technology in influenza vaccinations; it is a needle-free injection system that uses a spring-powered energy source to administer the vaccination without actually puncturing the skin.[6] However, the FDA released a statement on October 26, 2011, clarifying that inactivated influenza vaccines labeled for IM injection are only labeled for administration using a sterile needle and syringe.[7] Their statement explained that the necessary safety and effectiveness information has not been submitted to the FDA and therefore there is no definitive information to support approval of this injection system. Currently, Measles, Mumps, Rubella (MMR) is the only vaccination approved and specifically labeled for administration via a jet injector.[7]

The ACIP recommends a yearly flu vaccination for everyone six months of age and older, but especially for seniors over 65, pregnant women, and those with health conditions like diabetes, asthma or heart disease.[3] These groups are at high risk for serious flu-related complications. Children ages 6 months through 8 years are recommended to receive two doses of the flu vaccine four or more weeks apart (unless they received the vaccination last season).[1] The first dose will "prime" the immune system and the second dose 28 days or more later will provide the true immune protection.[1]



Zostavax®

Zostavax® is a live attenuated virus vaccine administered as a one-time subcutaneous dose for use in adults over the age of 60. It is not recommended for use in immunocompromised, gelatin sensitive or pregnant patients. The main goal of Zostavax® is to prevent shingles, a disease that is more likely to be seen in older patients who have lost their immune system efficiency. The vaccine has been tested in about 20,000 people aged 60 years old and older. The most common side effects that were observed were redness, soreness, swelling or itching localized at the injection site and headache.[2] Patients should space this vaccine at least four weeks apart from the pneumococcal vaccination to ensure they receive the maximum efficacy from both vaccinations.[8] Any patients using acyclovir, famciclovir, or valacyclovir should cease taking their medication for at least 24 hours before getting Zostavax®.[2] While the usage of the vaccine is recommended for those above 60, it is FDA approved for use in those over 50 if deemed medically needed. The vaccine itself is not covered by Medicare Part B. Private insurances and Medicaid may cover the vaccine.[8] Currently there are no programs available to help patients purchase Zostavax® in the event of no coverage.

Vaccine	Indications	Route	Frequency	Contraindications	Adverse Reactions
HPV	Males and females aged 9-26 years (Gardasil®) Females aged 9-26 years (Cervarix®)	IM	3 doses; 0, 1-2, and 6 months	Allergy to yeast or vaccine component, pregnancy	Injection site pain, redness, swelling fever, headache
Diphtheria, Tetanus, Pertussis					
• DTaP and DT	Children < 7 years	IM	5 doses; 15-18 months, 2, 4, 4-6, 6 years	≥ 7 years, allergy to vaccine component, illness	Injection site redness, swelling fever, seizure
• Tdap	Adults and children ≥ 7 years, < 65 years	IM	Once in place of Td booster	Allergy to vaccine component, illness	Injection site redness, swelling fever, body aches
• Td	Adults and children ≥ 7 years	IM	Booster every 10 years	Allergy to vaccine component, illness	Injection site redness, swelling fever, body aches
Hepatitis B	Health care workers, chronic liver disease, end-stage renal disease, MSM, multiple sexual partners, or HIV-infected without immunity	IM	3 doses; 0, 1, and 6-12 months	Yeast allergy	Injection site swelling, warmth, soreness, nodule formation
Influenza					
• Trivalent Inactivated (TIV)	Adults and children > 6 months	IM	Once at the beginning of every flu season	Allergy to vaccine component, history of Guillain-Barré Syndrome, severe egg allergy	Injection site irritation, low grade fever, body aches (lasting 1-2 days)
• Live Attenuated (LAIV)	Children > 2 years, non-pregnant and healthy adults < 49 years	Intra-nasal	Once at the beginning of every flu season	Allergy to vaccine component, pregnancy, history of Guillain-Barré Syndrome, egg allergy	Nasal congestion, headache, cough
Zostavax®	Adults > 60 years	SC	Once	Immunocompro-mised, gelatin allergy, pregnancy	Injection site soreness, swelling, itching, headache

Pneumococcal Vaccine

The U.S. Food and Drug Administration (FDA) recently approved of Prevnar 13, a pneumococcal vaccine, for use in adults age 50 years and older. Although CDC recommends that those age 65 and older and those age 19 through 64 with certain health conditions get another pneumococcal vaccine called Pneumovax, CDC has not issued any formal recommendation concerning Prevnar 13.[3]

Additionally, Prevnar 13 is approved for use in children 6 weeks through 5 years of age (prior to the sixth birthday) for active immunization. Prevnar 13 is also indicated for the prevention of otitis media caused by streptococcus pneumoniae serotypes 4, 6B, 9V, 14, 18C, 19F, and 23F. No otitis media efficacy data are available for serotypes 1, 3, 5, 6A, 7F, and 19A.[9]

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Conclusion

Pharmacy is a dynamic profession continuously adapting to meet the needs of our present day society. By utilizing the convenience and accessibility of pharmacists, more patients in more populations can be immunized and protected from preventable disease states. It is crucial to educate all patients on the long term health benefits of a simple vaccination and how it can improve their quality of life. HPV, DTaP, hepatitis B, herpes zoster and influenza vaccines are a great foundation to maximizing public health, and expanding one's knowledge to other vaccinations can only Improve the care for patients overall.

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