Upon completion of this activity, the pharmacist should be able to:
1. Identify the appropriate injections, vaccine series timeline, risks to assess, and patient education required for a patient traveling overseas within the next month.
2. Discuss patient populations considered at high risk for diseases preventable by the vaccines for viral influenza and Streptococcus pneumoniae and the changes to recommendations for these populations in the 2010–2011 season.
3. Prepare the pharmacy, through community advertising, collaboration, and patient outreach, for initiation of a vaccination clinic located near an independent-living retirement center.
4. Access the necessary documentation to provide updated counseling services and record keeping and to ensure the most recent recommendations and safety concerns about vaccines are met in the following categories: travel, public health, and preventable re-emerging diseases.
5. Identify adverse effects and contraindications of vaccines in general and specifically according to each vaccine product in the context of patient education and outreach.

INTRODUCTION
From 1796, when the first smallpox vaccine was developed in England, to the early 1990s, vaccinations were primarily under the authority of physicians. As the 20th century gave way to the 21st, nurses, physician assistants, and pharmacists have become involved in the promotion and administration of vaccines and vaccine clinics in the United States. This move slowly opened the door to nationwide flu vaccinations in the community pharmacy setting and administration of additional types of vaccines by the pharmacist.

As early as 1994, when Washington was the first state to give community pharmacists the authority to vaccinate the public, pharmacists have directly contributed to the public’s well being during the annual flu season. During the 2009 flu season’s H1N1 outbreak, people received flu shots in record numbers—particularly from their pharmacists. In the 2010–2011 season, the Centers for Disease and Control (CDC) have recommended that all persons, not just those in particular age ranges or risk categories, be vaccinated, and this public health duty will primarily be performed by the community pharmacist. In addition, the Healthy People 2010 public health statement identifies the goal of increasing vaccinations in target populations overall by increasing patient demand for and access to them. It is the community pharmacist’s public health duty to strive to fulfill these recommendations. Pharmacist immunizers can use the flu season’s traffic to increase sales and store profiles, but they should also consider expanding vaccination clinic op-
Year-round clinics promote business while providing a continual public health service. To establish a continuous clinic, pharmacists must assess their patient base needs, staffing and certification requirements, screening and storage techniques, and product availability.

According to a survey reported by the Journal of Pharmacy Practice in 2010, 79 percent of pharmacists believe that the ability to administer vaccines will advance pharmacy as a profession, with effects observed even in medication therapy management and other collaborative efforts with health professionals. Patients in community clinics also appear extremely satisfied by the idea of pharmacy-based and pharmacist-administered vaccines. Greater than 90 percent of patients in a community Veterans Affairs vaccine clinic were satisfied with their vaccine provision, and the satisfaction was directly related to the ease of pharmacy accessibility.

By 2009, after Maine legislation approved influenza vaccine administration by pharmacists, all 50 states allowed pharmacists to vaccinate the public in some capacity. Initially, the primary types of immunizations administered were flu and pneumonia vaccines. However, adult vaccination options are vastly extensive. Travelers, elderly patients, college students, health professionals, and people with immune system problems all require special vaccinations pharmacists can provide. Diseases now preventable by vaccines include human papillomavirus (HPV), herpes zoster (shingles), meningooccal disease, hepatitis A and B viruses, and diphtheria.

**ESTABLISHED SEASONAL VACCINES**

**Influenza Vaccinations**

**Overview**

In the United States, the annual flu season starts around August and continues throughout the winter and early spring seasons. Early vaccination provides the best protection, but immunization at any point throughout the flu season is beneficial. On average, the flu virus can cause approximately 30,000 deaths annually in the United States. This causes a large public health concern and pharmacist-patient education opportunity.

Flu vaccination provides short-term protection against different viral strains according to their hypothesized prevalence for the year. Injected formulations are made of inactivated virus and may contain preservatives when packaged in multi-dose vials. Injections are given into the muscle of the upper arm. The nasal spray formulation acts directly in the sinuses, which is where the flu virus is most likely to enter the body. It is available in a single-dose formulation and consists of preservative-free, live virus that has been weakened, or attenuated. Both the injection and nasal formulations provide maximum protection after approximately two weeks and benefits last for one year. Both the spray and the injection should be stored in a refrigerated setting of 2 degrees to 8 degrees Celsius (36 degrees to 48 degrees Fahrenheit) until they are ready for use. The nasal spray may be warmed slightly in the palm of your hand before administration to minimize patient discomfort.

Flu vaccines are newly designed each year to protect against particular strains of influenza. The vaccines for the 2010–2011 season include a combination of an A strain, B strain, and H1N1–like strain. Unlike availability concerns of the 2009–2010 pandemic and prior seasons, the Live, attenuated influenza vaccine (LAIV) given nasally and the standard, inactivated injectable form are readily available in the 2010 flu season for all appropriate age ranges, unlike availability concerns of the 2009–2010 pandemic and prior seasons. The pharmacist response during the 2009 flu pandemic greatly increased vaccine access and helped prevent public health crises. This established the pharmacist’s role as a trusted health professional with extensive knowledge about this protective service.

**2010–2011 Season Updates**

For the 2010–2011 season, the CDC announced for the first time the recommendation of universal flu vaccination in the United States for everyone older than 6 months of age. Unlike in prior seasons, in which high-risk individuals received first-available injections, this season’s goal is to provide shots or nasal spray to people of all ages. This includes the previous normal-risk age category of 19 to 49 year old and all disease or risk categories. People with chronic diseases, particularly chronic lung diseases, people older than 50, and immunocompro-
mised individuals are still encouraged more strenuously to receive vaccinations as early as possible in the season. Patients can better avoid severe symptoms or complications, such as asthma flare-ups. Although the flu virus symptoms of headache, cough, and fever are mild in many individuals, anyone may experience complications or more severe symptoms of the flu. Also, the virus may be spread to those who are at a higher risk of complication.

Public health observations during the 2009–2010 H1N1 pandemic tracked trends in risks associated with flu illness and identified new populations considered at risk for complication and death. Pregnant women experienced five times more deaths than anticipated when compared with nonpregnant women in the 2009–2010 season and are now considered a priority group for vaccination. Also new for the 2011 season, people who are morbidly obese are considered to be at high risk for flu complications. Morbid obesity is defined by the CDC as a body mass index of 40 kg/m2 or greater, and complications include more serious lung infections and breathing problems. Due to poor immune response during the 2009–2010 H1N1 pandemic, Native Americans are considered to also be at a higher risk of flu complications in the 21st century.

Flu clinics have expanded in the community to become almost commonplace and are expected to spread in 2010–2011 to much of the United States. However, challenges remain for the pharmacist, who must not become complacent about providing this public health service. First, availability and storage preparation can change quickly on the basis of demand and manufacturing numbers; pharmacists must stay up-to-date on product availability throughout the season to operate a clinic stocked appropriately for their patient population.

Second, screening patients before a vaccination remains crucial to this professional public health service. When time is short, however, screening may be pushed onto the non-professional staff or limited to a brief checkbox. Specific patient populations should not receive the flu vaccine in a community setting or at all. A brief discussion with the patient, even just at a single walk-in visit, before administering a vaccine can ensure patient safety and reduce liability risk. People at unknown risk, or those who appear healthy but have underlying risk conditions, may be identified during screening with the pharmacist. Patients with a documented or suspected egg allergy should not receive a flu shot. Adults older than 49 and those with immune system problems, including HIV, should not receive the live nasal formulation. Although a patient-performed checklist may identify some of these concerns, a quick, pharmacist-led review of the patient’s medications and conditions or a direct discussion about potential concerns is best. The pharmacist can identify unknown risk factors and recognize patients who require referral to a primary care provider or allergy specialist.

Third, patient education barriers to flu vaccines remain rampant despite the H1N1 pandemic. Pharmacists are the most accessible health professionals, which increases patient trust and familiarity in the profession. The pharmacist’s challenge is to improve patient knowledge about the true risks and benefits of the shot and the disease while clearly explaining the responsibility of the public to receive the flu vaccine, even in healthy individuals.

**Pneumococcal Vaccinations**

**Overview**

Pneumococcal polysaccharide vaccine (PPSV), aimed against 23 infection-causing serotypes of *Streptococcus pneumoniae* bacteria, is recommended for all adults age 65 and older. It prevents infections, such as lung infection, pneumonia, and serious blood or bone infections that can have serious and life-threatening breathing complications. In 2009, 5,000 deaths were attributed to preventable infection with *S. pneumoniae*. PPSV is an inactive vaccine given in a single, 0.5-mL injection; the vaccine has relatively few side effects of its own. The primary side effects include local redness and soreness; low-grade fever (less than 100 degrees F) is possible during the first 24 hours after vaccination. Protection is fully effective at two to three weeks after the injection. PPSV provides active immunity, which means that its effect is more long-lasting than the year-long flu vaccine; protection provided by PPSV lasts five years and potentially much longer.

Despite its proven efficacy, especially in older populations at risk of serious lung problems, the rate of vaccina-
tion with PPSV is low, only 20 percent. Pharmacists are key to increasing awareness of this important vaccine during the winter season and throughout the year. Administration is intramuscularly into the upper arm, as with the influenza shot, and storage requirements are similar as well, at 2 degrees to 8 degrees C (35 degrees to 46 degrees F). In addition, patients can be screened similarly to flu screening methods. The 2009 recommendations by the CDC identified at-risk individuals who are still healthy (such as young elderly with chronic diseases) as people most likely to benefit from full vaccine protection. Those at risk for complicated infection are people age 65 and any who are younger than 65 and have heart, lung, or liver disease; diabetes; HIV or cancer; or a history of organ transplantation. In addition, people who are being treated with long-term oral corticosteroids or radiation therapy are considered at risk for disease complications. PPSV is contraindicated in any person with a history of Guillain-Barre syndrome (GBS) due to the risk of additional nerve problems.

2010–2011 Season Updates
New 2010 guidelines for the one-dose PPSV recommend vaccination of smokers, people with asthma, and all people age 65 or older. Additionally, vaccination is strongly suggested for people who are 50 to 64 years of age and who smoke. Native American adults younger than 65, although traditionally included on the list of high-risk patients, are no longer considered to have greater risk status unless they have concomitant health conditions in a high-risk category. People living in group homes or other institutionalized settings should be up to date with this vaccination to reduce the risk of infection outbreaks. PPSV should be administered every five years for people younger than 65 to ensure protection. Revaccination is also recommended if the last vaccination date is unknown because the repeated dose is only associated with a small increase in adverse events when given within two years of the prior dose. After age 65, a single revaccination is typically sufficient protection.

ESTABLISHING YEAR-ROUND, POPULATION-SPECIFIC CLINICS
Overview
Pharmacists have long been advocates for and facilitators of vaccinations for public health. By 2000, 26 states allowed pharmacists to directly immunize, and all 50 states now have regulations allowing pharmacists to immunize against myriad preventable diseases at the close of the first decade of the 21st century. The majority of pharmacists believe that immunization in the pharmacy advances the profession as well as provides a public health service. However, all pharmacists, when surveyed, expressed concerns about sufficient time as the largest barrier to vaccination clinics. Most of these pharmacists provided only seasonal flu and pneumonia vaccines.

Nontraditional settings such as pharmacies are better than clinics or physician’s offices. Medically underserved adult populations are less likely to attend a scheduled doctor visit than they are to walk into a community pharmacy or other public venue that does not require a costly appointment. The primary benefit of a nontraditional, pharmacy setting is the convenient access provided by the retail nature. This is particularly true for people with limited mobility or lack of transportation. Pharmacy vaccine clinics can generally reduce cost to the patient as well. If the vaccinated person has insurance, only nominal co-pays are required for many vaccines. Even if the patient is uninsured, the cost is lower than an office visit payment and vaccine administration reimbursement by the physician.

Building Business
As the most accessible health professional, pharmacists can screen patients who come through their pharmacies for prescription services to increase vaccination rates and also increase store traffic and product sales to people initially presenting for vaccination purposes. To set up a year-round clinic that serves the area population and the pharmacy business needs, the pharmacist must conduct advance planning and time management. Proper clinic preparation can develop an established and respected service and partnership.

Partnerships in the community are important to establishing a vaccine clinic and increasing patient traffic in the store. Results from the Task Force on Community Preventive Services in June 2009 identified the three best ways to implement
continual vaccination business in the community: increase demand, improve accessibility, and reduce missed opportunities.

Increase Demand
By promoting staff outreach to targeted patients, regular and new customers in need of vaccine services can be identified. Using media partnerships and direct education to patients with prescriptions at the pharmacy window and media partnerships will increase awareness of the vaccine availability, safety of the pharmacy setting, and usefulness of vaccination. Advertising vaccine rates, especially if they are lower than the national average, will promote a good business model and will demonstrate the knowledgeable resource available from the pharmacist.

Multiple methods to increase demand have failed upon examination in the literature, however. These include offering incentives, such as coupons upon vaccination, providing multiple copies of paper records for every health professional and patient involved, displaying in-clinic patient education, and using partnerships for community advertisement. The combination of these simple methods, though, may be more successful when implemented as part of a business-building effort. Requirements by schools or employment locales do succeed in increasing demand consistently, and a recall system by which the pharmacy staff reminds patients of their vaccination needs, updates, or boosters is effective at retaining existing patients. Standing orders from a partnering physician were highly recommended to improve demand as well. Such a partnership additionally increases patient awareness and education.

Easy Access
Improving ease of access to vaccines directly impacts disease prevention rates. As the most accessible health professional providing vaccination services, pharmacies are surrounded by patients in need of this public health service. However, patients are not often aware of their vaccine needs or of the pharmacist’s ability to provide vaccinations beyond the flu vaccine. By educating patients about the types, times, and frequency of vaccines, pharmacists can further simplify vaccine access for many patients.

Fewer Missed Opportunities
Reducing missed opportunities is crucial—especially in such an accessible setting—to increasing vaccination rates. As patients pass through the pharmacy prescription services or over-the-counter (OTC) store aisles, each new prescription or OTC request is an opportunity to inquire about the need for a seasonal or yearly required adult vaccine. A quick assessment of age and diseases being treated can identify common vaccine options, such as herpes zoster. A deeper counseling discussion about lifestyle and personal health care may unearth more complex vaccine needs for travelers, students, or caregivers of high-risk individuals. Even a simple reminder, whether in person or on a business card, about the range of available vaccines may improve vaccination rates and build continued awareness and business. Similarly, reminder calls to existing patients who need multiple doses of a vaccine regimen will increase adherence and also improve public health protection and pharmacy business. Postcards, phone calls, or even e-mail reminders to patients who received vaccines in previous years or for other diseases greatly reduces missed opportunities within the existing patient base. Simple outreach efforts can quickly build local patient support and can more slowly develop long-term pharmacist-patient relationships.

Another approach to reducing missed opportunities focuses on the partnerships among health professionals involved in patient care. Collaboration with primary care physicians to increase the number of standing orders for special populations minimizes missed patients and ensures open, two-way communication between the pharmacist and physician’s office. Because the pharmacist is an important communication liaison between the physician and the patient, open discussion and collaboration are beneficial to all parties. Proper documentation of vaccine administration should include the date, method, lot number, and (if applicable) series number of the vaccine. The treating physician should receive a copy of this record after each vaccination is completed. This knowledge-sharing lowers the risk of duplicate vaccine administration and the likelihood of untreated side effects or unanswered ques-
tions of the patient. It also enhances respect from patients and between caregivers.

Patient counseling is a key responsibility of the pharmacist. Giving patients a copy of the immunization records, along with educational materials highlighting the usefulness and safety of their vaccine and of vaccines in general, provides consistency, enhances trust of the pharmacist and public health treatment, and is necessary to improve health. Vaccine information statements (VISs) from the CDC provide updated, professional information about each disease, individual or combination vaccine product, and adverse effects of the diseases and vaccines. VISs are one reliable source of patient educational materials to have on hand for vaccination clinics.

Planning and Set-Up Recommendations
When a year-round clinic is established, pharmacists should have on hand items suggested by the American Medical Association during a clinic. These items include the CDC toolkit of adult vaccine information, patient-friendly educational materials, and a link to VIS forms. The pharmacist’s own vaccination should be completed beforehand as well, if necessary. Although health professionals should receive flu shots because they are working with the public, only 36 percent of pharmacist immunizers actually get the shot each year. News reports early in the 2010–2011 season suggests that this percentage is increasing in health professionals, particularly physicians, after the public experienced the 2009 H1N1 outbreak. Vaccination by the health professional before administering vaccines not only protects the professional and the public but it also encourages patients about the importance and safety of these protective vaccines.

Preparations before starting a clinic must fulfill collaboration requirements. These include legally processing the vaccines as prescription orders, fulfilling emergency services provision, upholding an advertising model, ensuring appropriate space and stock, and meeting paperwork and documentation requirements in the pharmacy and for patients and involved health professionals.

Collaboration with a Physician
Health professional collaboration can include a prescription agreement so that the prescription and the product are ready when the patient arrives, or it can include a standing order for patients of the physician to receive their vaccinations through the pharmacy, with notification sent to the doctor after vaccine administration. Collaboration with a physician’s office to provide a flu clinic setting with nursing support increases vaccination rates as well. Outreach to other local health care workers can increase business as well by increasing word of mouth and referrals regarding the pharmacy as a safe and fast place to receive protective vaccines.

Emergency Services Preparation
In case of adverse reactions, the pharmacist immunizer must have first aid supplies on hand during vaccine administration, and the immunizer or another health professional on staff during any vaccination must be certified in first aid and CPR. These precautions may or may not be required by state law, but current certification is prudent in any pharmacy vaccination clinic. Finally, having emergency room services nearby, and having an outlined emergency plan posted during vaccination times, ensures rapid and safe response in case of severe vaccine reaction, such as anaphylaxis.

Business Support and Paperwork
Outreach to local businesses for their support provides advertising opportunities. Leaving fliers, signs, and business cards at the area business offices helps to build clientele. In addition, the pharmacy immunization clinic will run more smoothly and be viewed more professionally when appropriate paperwork is used, prepared, and on hand for any vaccination opportunity. State organizations and government resources, such as the CDC, provide free orderable and downloadable documentation for recordkeeping logs, physician communication, vaccine records for patients, and general vaccine safety information. Posting the logs visibly in the pharmacy near the vaccines and making a binder of handouts for each vaccine type keeps the pharmacy work space orderly. Saving administration logs electronically or on paper in a separate file system also ensures legal and professional documentation that is easily accessible for state examiners.
Identification of Patient Base and Product Stock
Most important to establishing a growing and stable vaccination clinic is the identification of the appropriate patient base and vaccines to stock. Selecting only a handful of vaccines specific to the local demographic or desired outreach population leads to maximum efficiency and minimum monetary loss through unused vaccine stock.

Basic Maintenance Criteria
Once these business criteria are met, a year-round vaccine clinic can follow standards identified by the National Vaccine Advisory Committee, which help immunizers maintain a clinic. The criteria can be displayed as a checklist reminder of each specific aspect of the above business model. First, keep patient literature onsite. Second, adhere to storage temperatures and recording history on each patient. Fourth, screen for contraindications. Fifth, assess for adverse events and plan for their treatment. Finally, make records for or communicate directly with the patient’s primary care physician.

Considerations and Concerns
Certification
Licensure or certification to give vaccines in a community setting varies according to state health laws, and even the types of vaccines available for legal administration by a pharmacist differ for each state. A multitude of certification programs, training classes, and continuing education programs exist to help prepare pharmacists for establishing a vaccine program. Program topics range from broad overviews of immunity mechanisms (such as active versus passive immunity) to detailed directions about where, how, and when to administer certain types of injections or sprays. Training classes may be self study followed by examinations, or may be in classroom settings that demonstrate proper technique for administration. Some free education and certification sites are sponsored on the Internet by the CDC and by pharmacy organizations. Common educational goals of any program include identification of immunity mechanisms that contribute to knowledgeable patient counseling, vaccine advocacy discussions to help improve public opinion about vaccines, injection and cleansing techniques, identification of immediate or delayed side effects and counseling points, screening for contraindications in advance of administration; and featured examples of communication methods with primary care providers.

Adverse Events
In the event of an adverse reaction, at least one member of the staff on duty, during a clinic or during pharmacy hours when vaccines can be administered, should have first aid and CPR certifications. Certifications should be maintained by continuing education and certificate renewal. In addition, first aid and CPR directives should be posted in a noticeable location, and manuals should be stored nearby for immediate use when necessary. Rescue medications, including prescribed inhaled beta agonists and adrenaline injections, along with their instruction manuals, must be on hand with approval for use in emergency situations. A clearly laid-out protocol to follow in the event of a serious anaphylactic reaction helps the pharmacist contact emergency medical services calmly, helps the patient remain as stable as possible, and ensures that the rest of the pharmacy runs efficiently and without panic.

Contraindications
Certain high-risk individuals should not receive vaccinations in an uncontrolled, public setting but should be referred to a primary care physician or specialist for management of disease prevention. Although some types of patients, such as those who are asplenic or who have sickle cell anemia, will often be unable to receive vaccines in the community setting, some risk populations and contraindications vary from year to year or when CDC guidelines are updated on the basis of current research findings. For example, people with uncontrolled asthma may receive a pneumococcal vaccine but should be referred to an asthma specialist for disease control. When providing community vaccination services, the pharmacist is responsible for identifying people with contraindications to vaccines and for counseling them on the necessary steps in place of community vaccination. For the most updated list of contraindications, pharmacists can regularly visit the CDC Contraindications Guide.
Staffing and Time
According to the 2010 survey of pharmacists published by the Journal of Pharmacy Practice, the primary barrier identified by immunizers and nonimmunizers alike is lack of time. Although patients surveyed in approximately the same time period have not expressed concerns about receiving too little time with the pharmacist or experiencing a rushed sensation during vaccination clinics, pharmacists are worried. They are concerned about having the time required to complete everyday pharmacy duties in addition to quality counseling and administration time with the vaccinated patients. A topic for future study is to identify whether patients who approach the pharmacy for prescription services during times of higher vaccination rates or during specified vaccination clinics feel that they are rushed, ignored, or otherwise disadvantaged because of lack of time on behalf of the pharmacist who is attending to vaccinated patients instead. A clearer picture of the service needs from the view of the patients both at the prescription window and at the vaccine clinic will identify appropriate staffing needs and rush periods that require attention on a daily or seasonal basis.

Timing
Whether pharmacists are developing clinic days or deciding to provide vaccines on a walk-in, as-needed basis, time concerns plague community pharmacists. Often, pharmacy staff members are working at high speed and volume with not enough support. Addition of time-consuming vaccine screening, administration, and counseling complicates an already busy schedule. Almost all of these time concerns can be minimized by streamlining delivery. If all paperwork is kept together and the storage logs are continuously up to date, the pharmacist can be ready at any time to provide counseling and injections for walk-in patients or can be ready to prepare an all-day, semi-private vaccination area without impacting the time they need beforehand to complete regular pharmacy counter duties. The certification of technicians to perform prescription processing services and the use of pharmacy students in the vaccination clinic—whether for preparation and supervised counseling or for administration when legal by state regulations—also streamline vaccine delivery.

Storage Requirements
Each type of vaccine requires its own storage specifications. Many require refrigeration immediately and for the duration of storage; others can be kept at room temperature temporarily for varying times of days or months. In already crowded pharmacy workspaces with inflexible storage and refrigerators filled with insulin and other injectables, finding a balance among enough stock to meet vaccine demand, small enough vaccine orders to allow clear working areas in the pharmacy, and clearly labeled and available log records is challenging. However, as vaccine clinics for seasonal or year-round administration are developed, ensuring adequate stock is crucial to maintaining public demand and trust.

Collaboration and Care Fragmentation Concerns
Pharmacists who worry about infringement on physician territory can market themselves as collaborators who can reduce the physician workload. It is the responsibility of the pharmacist as the vaccine administrator to provide the physician’s office with as much detail as possible for the patient’s health record, to avoid undocumented care.

Fragmented care can be an enormous disruption to patient health and is a particular barrier to vaccination in the community setting. Risks of administering vaccines in a setting disconnected to patients’ primary health care providers include repeat vaccine administration and lack of adverse event reporting or treatment. An additional concern is that people without direct physician health care access, who are likely to receive vaccination from the pharmacist instead, are also the most likely to have high risk of poor overall health and concomitant risk factors. They are also likely to need more recall to become consistent, returning patients in the pharmacy. As the patient population coming to the community pharmacy setting grows, this concern will be less prominent but will require dedicated screening to identify the higher-need patients.

Liability
Whether interested in performing ongoing vaccinations on an as-needed basis or during pre-
determined clinic hours, pharmacists must stay current on laws and regulations of their state. By administering vaccines only during specified clinics, pharmacists can more easily ensure that adequate staffing is available and can have documentation forms, checklists, recording logs, and screening forms prepared. Keeping track of a clearly planned system in this manner can reduce errors and, thus, liability risk.

Safety Screening
Patients are acutely aware of potential vaccine side effects, even those unproven by medical studies, so they are often suspicious about receiving vaccines at all. Pharmacists can use the opportunity of a safety screening check to assuage patient fears or concerns and to demonstrate their knowledge about who should not receive vaccines for safety or side effect reasons.

Screening techniques can be as simple as asking about a vaccine at the counter after a new diagnosis is given, new cold symptoms develop, or new travel items are purchased. For pharmacists who administer vaccines on an as-needed basis when patients arrive at the pharmacy window, completion of a screening worksheet and a discussion with the patient according to HALO—the mnemonic of health status, age, lifestyle, and occupation—will cover any areas of concern. Health status questions identify chronic conditions not recalled at first or not deemed relevant by the patient, such as mild asthma, and age will determine the need for vaccines to prevent herpes zoster or HPV. Lifestyle discussions can identify a need for travel vaccines, concerns about HIV and its impact on vaccination needs, if sexual orientation is discussed, or vaccine needs for a patient who is a caregiver of infants or elderly family. Occupation questions can lead to identification of unvaccinated health care workers, students, or those in the military.

VACCINES FOR SPECIAL POPULATIONS
Overview
Unfortunately, vaccines are not made or used equally throughout the population. Instead, particular vaccines benefit different populations according to age and disease risks. Each vaccine has its own set of indications, storage requirements, administration methods, efficacy onset and duration, side effects, and contraindications. A review of available community pharmacy vaccines according to patient population can help pharmacists determine the particular clinic needs and goals. After appropriate vaccines are identified, detailed storage logs, patient education materials, and professional references should be obtained from trusted resources to completely prepare for the opening of a vaccination clinic.

Vaccines in the Elderly
Herpes Zoster
Varicella zoster, a type of herpes virus, is the cause of shingles in adults and is related to chickenpox in children. The most common symptoms are burning and sensitive skin followed by oozing blisters, which commonly trace a particular nerve path in the body. Shingles rash may appear anywhere on the body, including the face. Until the blisters become crusted, the disease is contagious to anyone who has never experienced chickenpox or shingles. The entire disease course may last for a month, and symptoms are more severe with increasing age; however, development of the preservative-free herpes zoster vaccine (more widely known as Zostavax, by Merck, in the United States) can protect adults from the viral infection and reduce the risk of transmission to children who have not yet experienced chickenpox or shingles. The vaccine is necessary only once and is administered in a single, 0.65-mL dose under the skin of the upper arm. Before use, the vial of unreconstituted powder should be stored in a freezer at 5 degrees F; the diluent may be stored in the refrigerator or at room temperature. After the vial is mixed, the room temperature vaccine must be administered within 30 minutes and may not be refrozen.

Because Zostavax is a live, attenuated vaccine product, it should not be given at the same time and arm location as other live vaccines. In addition, it should not be given at the same time as Pneumovax, because Zostavax becomes less effective. Side effects from the herpes zoster vaccine are generally mild and related to injection. Redness, pain, swelling, and itch are the most common side effects experienced. People with immune system problems,
such as those with long-term corticosteroid use, leukemia or lymphoma, or HIV, should not receive Zostavax, nor should people allergic to neomycin or gelatin or people who are pregnant.

Although the herpes zoster vaccine is often covered by Medicare, awareness of this is low in both patient and professional populations. Physicians perceive numerous barriers to vaccination in the office, such as difficulties in billing, storage requirements, or the short time frame required for transportation of the prepared injection from the pharmacy to the physician’s office. Because of the poor awareness and concern about difficult billing or administration, use and recommendation of the vaccine has been insufficient even in recent years. However, community outreach by pharmacists who provide immunization services is changing those reputations and increasing the protection of the public against herpes zoster. For example, one community-developed Zostavax clinic was initiated by pharmacist collaboration with a local physician group. Pharmacists obtained prescriptions for the physicians’ patients ahead of the advertised shingles community clinic date. The prescriptions were processed, vaccines were ordered and stored, and Medicare was billed at the pharmacy. Patients waiting for their vaccine provided copayment during the clinic. Pharmacists screened the patients in a private setting, and nurses provided the injection afterward. Documentation included the dose, lot number, and patient screening and side effect details; all paperwork was faxed to the prescribing physician after the clinic so that records at both health sites were complete. This model of health professional collaboration is a vital example of how advance planning and discussion can increase awareness of shingles prevention in all people involved and simultaneously protect the public.

College Students

HPV

In October 2009, when new adult immunization schedules were released for the first time since 2002, recommendations included the first ever vaccination against human papillomavirus (HPV). HPV, which is spread sexually, is the most commonly diagnosed sexually transmitted disease; 6 million more adults are diagnosed with HPV each year, on average. No symptoms are associated with HPV infection. Although there are at least 40 strains of HPV, only some are known to cause cancers in men or women. Vaccination against HPV2 and HPV4 are suggested for women up to and through 26 years of age. Recent research has shown benefits of vaccinating men against HPV as well, with a reduction in some types of oral cancers associated with the virus. However, clear guidelines for vaccination in men have not yet been developed.

State laws about vaccination for HPV in the community setting vary, so pharmacists interested in providing this service in their vaccination clinic should review the most updated versions of their state regulations before implementing HPV vaccine administration.

The most likely HPV vaccine to be used by the pharmacist is Gardasil, which is recommended for both adult men and adult women. The vaccine is given in three 0.5-mL doses into the upper arm muscle: a baseline injection followed by a booster at one to two months and another booster at six months after the initial dose. Full protection is only achieved after all three doses are administered. The mild side effects associated with HPV vaccination are not unusual; arm pain, fever, redness at the injection site, and headache have been reported. The HPV vaccine is contraindicated for people who are pregnant or who are allergic to yeast. Nursing women and immunocompromised individuals may receive HPV vaccination.

Meningococcal Disease

Bacterial meningitis, which results from Neisseria meningitidis, can affect the nervous and cardiac systems and cause serious disease and complications. Of the four bacterial serotypes (A, C, Y, and W), only A and C are primary sources of infection. Bacterial meningitis, characterized by sudden fever and stiffness, headache, and a rash, is easily spread in populations that live in close quarters; particular examples of these population groups are military recruits in basic training, young adults in boarding school or college dormitories, and institutionalized individuals at group home settings. Any caregivers of these groups who live or spend the majority of their hours in the same quarters are also considered
at risk of developing or transmitting this bacterial infection. In addition, \textit{N. meningitidis} is endemic to certain areas of Africa, particularly sub-Saharan Africa during the December-to-June dry season. Travelers to Saudi Arabia are required to receive vaccination before entering the country for Hajj, a fall pilgrimage. Because of the large influx of people at this time, the occurrence of meningococcal disease increases greatly and is easily spread worldwide when pilgrims return to their own homes.

Two vaccinations against meningococcus are available: a conjugated version (MCV4) for adults age 55 or younger, and a polysaccharide version (MPSV) for those older than 56. People in the highest priority group for receiving meningococcal vaccination are those at risk for myocardial infarction and adults who are immunosuppressed (such as people infected with HIV or who are asplenic). Although the vaccine contains inactivated bacteria, it should be administered to these and any adult populations only when the person being vaccinated is not ill. Vaccination is often not recommended if the patient has a history of nerve disorders, including Guillain-Barre syndrome (GBS).

Both types of meningococcal vaccines are stored as powders that require reconstitution. Although the powder may be maintained at room temperature for up to three months, recommended storage is under refrigeration, at 2 degrees to 8 degrees C (35 degrees to 46 degrees F). Frozen vaccine should not be used.

Vaccination is given subcutaneously in the upper arm and may be given at the same time as a pneumococcal vaccine. Side effects are mild and primarily consist of redness at the injection site, which may last up to two days. Although both the conjugate and the polysaccharide versions are single-injection vaccines, their protective effect is not life long; immunization should be repeated within three to five years if the patient is still considered at risk of infection. Thus, younger patients who receive the conjugate must later receive the polysaccharide for protection after they turn 56.

\textbf{Travelers}

Some areas of the world, in which diseases are not prevented with vaccination, still experience widespread contagious diseases such as yellow fever, hepatitis, and more. For travelers from the United States to those areas, vaccination in advance of the travel is important not only to protect the traveler from acquiring a potentially serious illness, but also to prevent the traveler from bringing the active disease back into the United States upon his or her return. In a 2010 study in the \textit{Journal of the American Pharmacy Association}, only 85 percent of patients were accepting of a travel vaccine clinic in the pharmacy. This rate was primarily that low not because of poor administration, trust, or availability in the pharmacy, but because the traveling patient did not believe that he or she was at risk of acquiring a disease overseas. Providing travel vaccines can be fulfilling for the pharmacist both professionally and from a business standpoint because of the great importance of counseling for these patients.

In addition to counseling about the types of vaccines and their potential protective and adverse effects, the pharmacist as a public health professional can provide patients the service of expanded knowledge about the vaccines, diseases, and risks even upon return of a healthy traveler. A clinic setting gives pharmacists the opportunity to discuss ways to prevent situations likely to expose travelers to disease, treatments or methods to reduce side effects of the vaccine, and timing of and adherence to multi-dose vaccine regimens to ensure full protection before leaving the country. In addition, a clinic setting provides pharmacists the time to work with patients who have difficult health conditions that prevent them from receiving the necessary vaccines. Pharmacists have the opportunity to educate these patient groups about safe treatment options if they develop illness overseas and about the best methods to avoid bringing any pathogens back into the country and into their own homes when they return.

\textbf{Yellow Fever}

Flaviviridae virus, transmitted by mosquitoes, is the cause of yellow fever. The disease is most prevalent in Africa and in central and northern parts of South America. Early symptoms of the virus resemble those of the flu, but jaundice-like conditions are possible as well. Infection may progress to organ failure in severe occurrences. Risk of developing yellow fever during travel can be reduced with protec-
tive measures against mosquito bites; covering skin with clothing and/or repellent spray and sleeping under mosquito netting are two useful methods. However, extremely effective prevention is available by receiving immunization before travel begins.

The yellow fever vaccine contains live, attenuated virus. It is cultured in egg and is stored as a powder that should be reconstituted without preservatives in order to maintain live virus. Storage in a freezer is required at 0 degrees to 5 degrees C (32 degrees to 41 degrees F). Its administration should be separated from that of other live viruses by four weeks instead of given together in one visit.

The vaccine is administered in one injection subcutaneously in the upper arm. After the powder is reconstituted, the vaccine must be given within one hour. Vaccination can cause mild side effects on the day of vaccination, such as headache, fever, and soreness at the injection site; side effects appear worse in people age 65 or older. Efficacy is reached at seven to 10 days after immunization. The vaccine may be administered again after 10 years if necessary; however, some evidence shows that protection may remain from the initial injection beyond 10 years and possibly for life.

Some people should not receive yellow fever vaccine because of the possibility for low-grade infection associated with live virus. People with immunodeficiency problems such as sickle cell anemia or HIV, people who have been treated with corticosteroids for two weeks or longer, and people with cancer should be counseled by the pharmacist about other protection methods and referred to their physician’s offices before travel. Also, people with allergies to egg, chicken, or gelatin should not receive yellow fever vaccine in a community setting. Chance of an anaphylaxis is rare, at a rate of 1 in 250,000 occurrences, but a risk does exist. If a patient with egg allergy requires vaccination against yellow fever, he or she may be referred to an allergist. Under specialist supervision, the vaccine may be administered according to desensitization procedures, in which tiny amounts of vaccine are injected multiple times during a longer period of time until the entire dose has been injected.

**Hepatitis A and B Viruses**

Hepatitis A virus, a re-emerging infection in the United States in 2010, is endemic to numerous overpopulated areas worldwide, which makes it a particular risk for travelers. Infection with hepatitis A, which is transferred via contact with stool of an infected person, is a common risk in Africa, some parts of Asia, Eastern Europe, the Middle East, and Central and South America. In addition to people who travel for work, military, or recreational purposes, people who are involved with food preparation, homosexual men, intravenous drug users, and caregivers of individuals or in group institutions are at risk of hepatitis A infection. Initially, infection is associated with no symptoms in adults. Within two to five weeks, loss of appetite, headache, and general weakness develop and are followed by jaundice. Most symptoms resolve without treatment within two months, although intense itching may persist for up to eight months. Rarely, chronic liver disease and even liver failure leading to death can develop. People older than age 50 years and people with existing liver disease before hepatitis A infection are most at risk for these complications. Once infection resolves, a person has lifelong immunity from repeat hepatitis A infection. Inactivated, lysed, whole-virus vaccination provides similar active (persistent) immunity with minimal adverse effects. Local pain and redness, as well as mild achiness, are most often reported and are more short-lived than possible symptoms of actual disease infection. Vaccination is a two-dose series, and the vaccine should be stored unfrozen at 2 degrees to 8 degrees C (35 degrees to 46 degrees F). The 50 U/mL vaccine is given intramuscularly in the upper arm (deltoid) muscle to anyone at risk and older than 2 years. Protection begins within 15 to 30 days, and the initial dose is required at least four weeks before travel starts to ensure full protection. To provide lifelong protection, a booster at six months should be given.

Similar to hepatitis A infection, hepatitis B is endemic to highly populated areas worldwide, such as China, Africa, and the Central and South Americas also have high infection rates. The highly infectious hepatitis B virus is transmitted among people in the United States through bodily fluids during sex, use of shared needles, or medical procedures. Acute infection causes effects like jaundice, weakness, and abdominal pain for up
to six to 12 months; chronic and life-threatening disease may also develop. In fact, more than 350 million adult people worldwide are infected with chronic hepatitis B infection. Cirrhosis and liver cancer are primary causes of death in this population. The inactivated hepatitis B vaccine, available since 1982, is effective prevention of the disease and is a standard vaccine as a three- or four-dose series for infants and children in the United States. Protection from the vaccine in childhood is long-lasting and potentially life-long, but studies in the 21st century show reduced immune protection in adults older than 40 after undergoing a hepatitis B vaccination series. Because risk associated with repeat vaccination are low, any adult considered at higher risk of infection may receive the 20 mcg/mL dose followed by 20 mcg/mL boosters at one and six months. The primary adult risk groups are people who have undergone transplantation, people with end-stage renal disease or on hemodialysis, people with chronic liver disease or HIV, and health care workers. Travelers, homosexual men, and intravenous drug users are at-risk populations as well. People undergoing dialysis should receive extra boosters because of the poorer immune response associated with this procedure. For all adults and administration schedules, the hepatitis B vaccine is effective one to two months after the last dose is given. Because some brands of the vaccine are developed in active yeast cultures, people allergic to wheat may need to avoid hepatitis B vaccine or be vaccinated according to desensitization protocols with an allergy specialist. Intramuscular administration in the upper arm is associated with fewer side effects than subcutaneous administration. The most frequent side effects are fever greater than 100 degrees F and injection site reactions such as pain, soreness, and itch.

Re-Emerging Diseases
Pertussis (Whooping Cough)
One of the re-emerging communicable, but preventable, diseases of the 21st century is pertussis. It is more commonly known as whooping cough because of the high-pitched sound made by sufferers as they breathe and spasm during coughing fits. Pertussis is very easily spread, and protection is especially important in young children, who may die as a result of breathing complications from the disease. The infection is caused by *Bordella pertussis*, and it experiences an increase in occurrences approximately every five years. However, outbreaks in the past 15 years have been more severe and have been associated with greater rates of complication and death. These serious disease prevention setbacks are likely the result of a parenting trend to forego pertussis vaccination in young children because of concerns about the vaccine’s side effects. In 1997, nearly 50 percent of documented pertussis cases occurred in teens or adults who were not vaccinated for protection from whooping cough. In these older populations, whooping cough is less life threatening directly. However, the cough and fatigue associated with the infection can last for weeks to months—much longer than the symptoms of diseases that have more socially accepted vaccinations, like influenza. More importantly, infection in unvaccinated adults places young children, who have not been vaccinated, at a greatly increased risk of death if they acquire this contagious disease.

Pertussis vaccinations for children and adults alike are combined with tetanus and diphtheria vaccines. Protection against pertussis with vaccination is not life-long and requires booster vaccinations for full disease prevention. In 2005, inactivated vaccine boosters containing acellular pertussis, tetanus, and diphtheria protection (Tdap) were developed specifically for adolescents and adults. Any adult through age 64 should receive a booster of Tdap, particularly people around young infants, pregnant women, and health care workers. As of October 2010, adults age 65 or older who are likely to be in contact with infants, or who simply desire pertussis protection, should receive the Tdap booster as well. The most frequent side effects of Tdap are local injection-site reactions from intramuscular administration to the upper arm, such as swelling, redness, and body aches. More severe shock-like reactions are rare but possible and include high fever and convulsions. Even if these occur in children who receive the pediatric vaccine, the adult booster may still be administered during pertussis outbreaks. The Tdap vaccine for adults is typically a one-time booster for pertussis protection. This is because a separate booster to protect against tetanus and diphtheria (Td) on a more frequent basis is recommended in adults.
who have already received Tdap. Although repeating Td or Tdap frequently, such as when immunization history is unknown, is generally safe, greater rates of injection site reactions are possible due to the larger amount of tetanus toxoid in the body with each additional vaccination.

**Tetanus**

Bacterial infections from *Clostridium tetani*, commonly known as tetanus infection or lockjaw, are characterized by muscle spasms and fever within the first three to 21 days after infection through an open wound. Without treatment, the disease can progress to cause difficulty breathing and even death. Although wound cleaning helps prevent some bacterial infection, tetanus disease has been significantly reduced by the use of tetanus toxoid vaccinations in children and booster vaccinations in young adults. However, the single and combined vaccine products all contain inactivated bacteria and are only effective for 10 years. Because of this short duration and because tetanus infection does not provide continued immunity from a repeat infection, adults should also receive tetanus boosters every 10 years to maintain lifelong protection.

Tetanus vaccination is especially recommended for people exposed to settings likely to contain rusted metals or other materials that could cause unclean wounds. Particular target groups are military personnel, farm and construction workers, and firefighters. In addition, travelers should have up-to-date boosters to avoid the need for accessible tetanus antitoxin during overseas trips. Any adult who is seen in a physician’s office or urgent care setting without a known history of booster within the past 5 to 10 years can receive a tetanus booster. Because of the increased rate of pertussis infection in adults, the preferred product now for initial tetanus adult booster vaccination is a combined tetanus toxoid, diphtheria, and pertussis booster (Tdap). The tetanus and diphtheria toxoid (Td) vaccine booster may be used as necessary thereafter to prevent an impending infection. Infection starts slowly with a low-grade (less than 100 degrees F) fever and headache. Within days, heat, pain, and swelling occur at the wound site. Nodules near the wound that disappear and reappear are possible as well.

Initial vaccination of a three-dose injection set is typically performed in children with pediatric formulations (TDaP or DT [note the different capitalization to discriminate between pediatric and adult products]).

### Table 1. Vaccines for Special Populations

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Special Population Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Elderly</td>
</tr>
<tr>
<td>HPV</td>
<td></td>
</tr>
<tr>
<td>Meningococcal</td>
<td>X</td>
</tr>
<tr>
<td>Herpes zoster</td>
<td>X</td>
</tr>
<tr>
<td>Pneumococcal</td>
<td>X</td>
</tr>
<tr>
<td>Hepatitis A and B</td>
<td>X</td>
</tr>
<tr>
<td>Tetanus</td>
<td>X</td>
</tr>
</tbody>
</table>

**NOTE:** Empty cells do not indicate ineligibility for these vaccines, simply that they are not the primary goal populations for these vaccines.

### Table 2. Vaccine Recommendations for Immunocompromised Individuals

<table>
<thead>
<tr>
<th>Immunocompromised status recommendation</th>
<th>Vaccine</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pneumococcal</td>
</tr>
<tr>
<td>Administer the vaccine</td>
<td>X</td>
</tr>
<tr>
<td>Avoid the vaccine</td>
<td>X</td>
</tr>
</tbody>
</table>

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or Td is a single, 0.5-mL dose. Immunity is full after the third dose of the initial vaccination and thereafter, provided the patient continues to receive timely boosters. Each booster is administered intramuscularly in the upper arm. The vaccine should be stored under refrigeration at 2 degrees to 8 degrees C (35

## CASE STUDIES

1. In April, a relatively new patient arrives in your pharmacy during a specified travel clinic time and requests vaccines necessary for travel to South America for a four-week stay. She leaves for her vacation in three weeks. While she completes the standard vaccination questionnaire and health checklist prepared by your pharmacy, you review her medication profile on the computer. She is being treated by an allergy and asthma clinic physician and has prescriptions on file for rescue inhaled albuterol, a maintenance inhaled corticosteroid, and a fluoroquinolone antibiotic filled in March. Because she has only been with your pharmacy for two months, you are unsure how long she has been treated with these medications by this doctor and what vaccines she has received in the past. However, her primary care physician has a collaborative practice agreement with you and has sent her to your pharmacy for her travel vaccine needs. Her screening questionnaire identifies her as 32 years old and married; she has a 2-year-old child, and she works in an office setting with healthy adults. What safety questions should you ask before giving her vaccinations? What vaccines does she need and when? What side effects should you discuss with her before she leaves the pharmacy? What follow-up advice or requirements should you impart?

**Answer:** Before administering any vaccines, confirm that your patient has not received long-term (more than two weeks continuously) oral corticosteroid therapy recently. If she has no record of receiving hepatitis or tetanus vaccines as an adolescent or adult, suggest the following vaccines: Meningococcal vaccine is indicated because of her travel to Africa during the dry season; she should receive the conjugated version and her lack of egg allergy should be confirmed. Tetanus toxoid combined with diphtheria and pertussis (Tdap) is indicated to prevent the need for tetanus antitoxin overseas and to provide immunity against whooping cough post childhood. Hepatitis A and B vaccines should be administered before travel and should be started at this pharmacy visit to ensure the maximum time period till effectiveness before her travel date. Finally, yellow fever vaccine should be given before travel; although this is a live, attenuated vaccine, it is the only live one of the recommended travel vaccines and may be given safely with the others.

Side effects to watch include breathing problems related to a triggered asthma attack in addition to typical injection site and other mild reactions associated with each of these vaccines, particularly with the tetanus injection if she has received this in the past.

Counsel your patient to return for boosters of hepatitis A at one to two months, hepatitis B at one and six months, and tetanus (Td) at five years or sooner if she experiences an unclean wound. Counsel that full protection of hepatitis B will not be in effect when she leaves for her trip, so advise her on methods to avoid acquiring hepatitis during the first week of her trip (thorough cleansing, drinking safe and clean water). Finally, counsel your patient about mosquito bite prevention for added protection against yellow fever even after her vaccination.

2. A regular customer approaches you in your pharmacy about receiving his seasonal flu vaccine from you this fall. You are aware of his HIV-positive status because he obtains his antiretroviral medications from you, and he appears adherent on the basis of his filled prescription history. After he completes his vaccine screening questionnaire, which identifies him as 44 years old, you meet with him privately to discuss his vaccine options. According to the health paperwork he provided, his most recent CD4 count is greater than 400, and he has no other active chronic diseases. Describe what clinical issues should be identified before he gets a flu vaccine and what other vaccines would be useful for his protection.

**Answer:** Your patient should not receive the live, attenuated influenza vaccine, because it contains live virus and he is potentially immunocompromised, even with an acceptable CD4 count. He appears able to receive the inactivated flu vaccine today at your pharmacy and should be counseled about the usual possible side effects. In addition, you should recommend the following vaccines for this patient if he is not up to date: 1. Pneumococcal vaccine is indicated because of your patient’s immunocompromised status, unless he has received this vaccine in the past five years. It is safe to give this at the same time as the flu vaccine. 2. Hepatitis A and B vaccines are warranted as well, if he is HIV positive as a result of homosexual disease transmission and has no record of having received either vaccine, or experienced acute hepatitis infection, in the past. If the patient is interested, and if a collaborative partnership exists with his physician, you may take this opportunity to schedule appointments for the initial doses of each vaccine and fax documentation to his doctor for standing orders and follow-up.
degrees to 46 degrees F) until it is administered. Local side effects from Tdap or Td are the most common and include swelling and redness, although body ache is possible as well. Reactions may increase with each additional booster if given more often than the required 10-year schedule. Pregnant women may receive Tdap or Td, and the vaccines are considered safe for nearly every adult. People with nerve disorders may experience disease flare-ups or an initial disease trigger if they receive either vaccine. Education about the safety, benefits, and schedules of these boosters is an essential role of the pharmacist for public health protection.

**CONCLUSION**
In just a few decades, pharmacists have progressed from vaccine educators to clinic hosts and now to vaccine administrators themselves. With this progression comes great public health responsibility and a potential for expanded patient care services in the community pharmacy setting. Vaccination opportunities in the community pharmacy continue to change, and pharmacists who adapt to provide excellent patient care can drive their business in new directions. By providing knowledgeable vaccine services, pharmacists can remain trusted health professionals and improve public health at the same time. Preparing the pharmacy with clinical resources and patient materials, and preparing staff for outreach, are business cornerstones for developing a smoothly run year-round vaccine clinic.

Questions that remain about the evolution of pharmacy in the coming years include the possibility of national accreditation, consistent laws and quality improvement, and the possibility of developing medication therapy management programs as a spin-off of vaccination clinics. Pharmacists have voiced concerns about health professional relationships, so that expectations of each other may need to be adjusted in order to allow pharmacist progression into patient care as a benefit to public health, pharmacy business, and physician office availability.

Nicole Van Hoey, PharmD, is a drug information consultant and medical writer/editor (for professional and lay audiences) with government contractors, medical associations, medical publishing houses, and health websites.

**CONTINUING EDUCATION QUIZ**
Select the correct answer.

1. The annual influenza vaccine takes ____ weeks for maximum protective effect.
   a. One  
   b. Two  
   c. Three  
   d. Four  

2. In 2010, a 50-year-old healthy woman could receive the live, attenuated nasal flu vaccine in a pharmacy clinic.
   a. True  
   b. False  

3. A 58-year-old man with a history of smoking should receive which of the following vaccines?
   a. Herpes zoster (shingles) and pneumococcal vaccines at once  
   b. Herpes zoster vaccine only  
   c. Pneumococcal vaccine only  
   d. Herpes zoster vaccine and pneumococcal vaccine at two separate times  

4. Tetanus vaccination options for adults include which of the following?
   a. Td and TDaP  
   b. Td and DT  
   c. Td and Tdap  
   d. All of the above  

5. Zostavax is stored at ____ degrees F and must be given within ____ minutes of mixing.
   a. 2 to 8 and 60  
   b. 5 and 30  
   c. 35 to 46 and 30  
   d. 35 to 46 and 60  

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6. Methods to build up a vaccination business include the following:
   a. Increase demand
   b. Increase paperwork logs
   c. Increase staff
   d. All of the above

7. The number one barrier viewed by pharmacists to establishing a vaccine clinic is ____.
   a. Liability
   b. Time
   c. Staffing
   d. Cost

8. HALO is used for the following:
   a. Safety screening
   b. Adverse event identification
   c. Vaccine choice
   d. Two of the above

9. Which vaccines discussed here are live attenuated viruses?
   a. Meningococcal
   b. Yellow fever
   c. Herpes zoster
   d. Two of the above

10. Which vaccines discussed here require refrigeration (2 to 8 degrees C)?
    a. LAIV
    b. Meningococcal
    c. Herpes zoster
    d. Two of the above

11. Which group was added as a new risk group for flu complications after the 2010 pandemic?
    a. Nursing women
    b. People with body mass index greater than 30 kg/m2
    c. Pregnant women
    d. Asian Americans

12. Which vaccine should not be given with herpes zoster vaccine because it lowers the herpes zoster vaccine effectiveness?
    a. Yellow fever
    b. Meningococcal
    c. Pneumococcal
    d. Hepatitis B

13. People allergic to gelatin or neomycin should not receive which vaccine?
    a. Zostavax
    b. DTaP
    c. Meningococcal
    d. Td

14. Fever associated with the hepatitis B vaccine may reach greater than ____ degrees F, unlike low-grade fevers associated with other vaccines.
    a. 104
    b. 102
    c. 101
    d. 100

15. Yellow fever vaccine protects against infection for at least ____ years
    a. 2
    b. 5
    c. 10
    d. 20

16. Assuming risk factors continue to exist, college students need meningococcal vaccines how often to ensure protection against bacterial meningitis?
    a. Once for life
    b. Every two years
    c. Twice
    d. Every three to five years

17. Which of the following is a contraindication for the yellow fever vaccine?
    a. Egg allergy
    b. Yeast allergy
    c. Neomycin allergy
    d. Wheat allergy
18. Complications of hepatitis A infection include which of these?
   a. Cirrhosis  
   b. Chronic liver disease  
   c. Trouble breathing  
   d. Two of the above  

19. Meningococcal outbreaks are likely in which populations?
   a. College dormitory students  
   b. Children ages 2 to 4 years old  
   c. Elderly home owners  
   d. Two of the above  

20. Vaccination against shingles should be repeated how often in adults older than 65 years?
   a. once  
   b. Every year  
   c. Every five years  
   d. Never  

Pharmacy Immunization Overview: Considerations for Establishing a Year-Round Vaccine Clinic
March 1, 2011 (expires March 1, 2014) • Activity Type: Application-based

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Last 4 digits of SSN    MM-DD of birth
Name
Pharmacy name
Address
City       State   ZIP
Phone number (store or home)  
Store e-mail (if avail.)     Date quiz taken

Quiz: Shade in your choice

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10. [ ] [ ] [ ] [ ] [ ] 20. [ ] [ ] [ ] [ ] [ ]

Quiz: Circle your choice

26. Is this program used to meet your mandatory C.E. requirements?  
a. yes  b. no

27. Type of pharmacist:  
a. owner  b. manager  c. employee

28. Age group:  
a. 21–30  b. 31–40  c. 41–50  d. 51–60  e. Over 60

29. Did this article achieve its stated objectives?  
a. yes  b. no

30. How much of this program can you apply in practice?  
a. all  b. some  c. very little  d. none

How long did it take you to complete both the reading and the quiz? ______ minutes

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