

ASHP Guidelines on the Pharmacist's Role in Immunization

Purpose

Pharmacists can play an important role in disease prevention by advocating and administering immunizations. Such activities are consistent with the preventive aspects of pharmaceutical care and have been part of pharmacy practice for over a century.^{1,2} These guidelines address the pharmacist's role in promoting and conducting proper immunization of patients in all organized health care settings. The pharmacist's role in promoting disease prevention through participation in community efforts is also discussed.

Background

Each year, an average of 90,000 Americans die of vaccine-preventable infections such as influenza, pneumococcal disease, and hepatitis B.^{3,5} Most of these people visited health care providers in the year preceding their deaths but were not vaccinated.^{6–11} Influenza and pneumonia, considered together, are the fifth leading cause of death for Americans 65 years of age or older.¹² Although vaccination rates for U.S. children at the time they enter school exceed 95%, nearly 25% do not complete their primary series by the age of two years.¹³ Most American adults are inadequately vaccinated, particularly against pneumococcal disease, influenza, hepatitis B, tetanus, and diphtheria.⁶ Tens of millions of Americans remain susceptible to potentially deadly infections despite the availability of effective vaccines.

This long-standing failure to adequately immunize the U.S. population helped prompt the inclusion of immunization as a leading health indicator for Healthy People 2010.¹⁴ The renewed focus on immunization and the potential for increased vaccination needs in response to threats of bioterrorism should stimulate pharmacists, as well as other health care providers, to reassess what they and their institutions can do to improve immunization rates in their communities. Pharmacists can contribute to this effort by administering immunizations where scope of practice allows and by promoting immunization in other ways.

Immunization Administration

As health care providers, pharmacists can administer vaccines or host other health care professionals who can administer vaccines. Pharmacists must understand the legal and professional mechanisms by which authorization to administer vaccines is granted, as well as the additional responsibilities and considerations that accompany this expanded role. The feasibility of vaccine administration by pharmacists within a particular practice site or health care system can be determined by analyzing the issues of legal authority, training, and program structure.

Legal Authority. The pharmacist's authority to administer vaccines is determined by each state's laws and regulations governing pharmacy practice. At least 36 states permit vaccine administration by pharmacists as part of the scope of pharmacy practice.¹⁵ The American College of Physicians–American Society of Internal Medicine supports pharmacists as sources

of immunization information, hosts of immunization sites, and immunizers.¹⁶ Vaccine administration may occur pursuant to individual prescription orders or through standing orders or protocols. The Centers for Disease Control and Prevention (CDC) Advisory Committee on Immunization Practices recommends the use of standing orders to improve adult immunization rates.¹⁷ Its recommendations encourage pharmacists, among other providers, to establish standing-order programs in long-term-care facilities, home health care agencies, hospitals, clinics, workplaces, and managed care organizations. The Centers for Medicare and Medicaid Services (CMS) no longer requires a physician order for influenza or pneumococcal immunizations administered in participating hospitals, long-term-care facilities, or home health care agencies.¹⁸ Development of state-specific protocols or standing-order programs can be facilitated through partnerships with state pharmacy associations, boards of pharmacy, and health departments.

Training. Although legal authority to administer vaccines may be granted through pharmacy practice acts, pharmacists must achieve competency in all aspects of vaccine administration. A comprehensive training program should address the following:

1. The epidemiology of and patient populations at risk for vaccine-preventable diseases,
2. Public health goals for immunization (e.g., local, regional, state, and federal goals),
3. Vaccine safety (e.g., risk–benefit analysis),
4. Screening for contraindications and precautions of vaccination in each patient,
5. Vaccine stability and transportation and storage requirements,
6. Immunologic drug interactions,
7. Vaccine dosing (including interpreting recommended immunization schedules and patient immunization records and determining proper dosing intervals and the feasibility of simultaneous administration of multiple vaccines),
8. Proper dose preparation and injection technique,
9. Signs and symptoms of adverse reactions to vaccines, adverse reaction reporting, and emergency procedures, such as basic and advanced cardiac life support (BCLS and ACLS),
10. Documentation,
11. Reporting to the primary care provider or local health department, and
12. Billing.

Live and videotaped programming is available through some state and national pharmacy associations and offered in many college of pharmacy curricula. Information regarding immunizations can change rapidly. To maintain competency, pharmacists must have access to current immunization references (e.g., CDC's National Immunization Program publications, including the "Pink Book"¹⁹) and continuing-education programs to stay abreast of evolving guidelines and recommendations.

Program Structure. A vaccine administration program requires a solid infrastructure of appropriately trained staff, physical space, and written policies and procedures to ensure appropriate vaccine storage and handling, patient screening and education, and documentation. The structure of a vaccine administration program must also provide for storage and disposal of injection supplies, disposal of and prevention of exposure to biological hazards as dictated by the Occupational Safety and Health Administration (OSHA), and emergency procedures (e.g., BCLS and ACLS). Pharmacists should be fully immunized to protect their health and the health of their patients.²⁰

Reimbursement. Immunization has repeatedly been shown to be cost-effective^{21–24}; it may be the most cost-effective practice in medicine. However, third-party reimbursement policies often do not provide coverage for recommended vaccines despite this evidence. A major exception is Medicare Part B, which not only covers immunization services for its participants but also recognizes and compensates pharmacists as mass immunization providers. Enrollment as a Medicare provider is required to bill for covered services. Provider status can be obtained through local Medicare offices, which also process CMS claims for reimbursement (CMS-1500 claims). The CMS Web site (www.cms.hhs.gov) is a useful source for billing information. Pharmacists should continue to closely monitor other immunization reimbursement policies and advocate third-party coverage for immunizations as a cost-effective preventive measure. For patients without insurance coverage, requesting out-of-pocket payments from the patient remains a viable option for pharmacists to obtain compensation for their immunization services.

Immunization Promotion

Pharmacists who do not administer vaccines can promote immunization through six types of activities: (1) history and screening, (2) patient counseling, (3) documentation, (4) formulary management, (5) administrative measures, and (6) public education.^{25,26} These promotional activities can also be integrated into or accompany a pharmacy-based immunization program.

History and Screening. Pharmacists can promote proper immunization by identifying patients in need of immunization. Tasks that support this objective include gathering immunization histories, encouraging use of vaccine profiles, issuing vaccination records to patients,^{27–34} preventing immunologic drug interactions,^{35,36} and screening patients for immunization needs.^{28–33,37–39}

Immunization screening should be a component of all clinical routines, regardless of the practice setting. All health care institutions should implement consistent, systematic monitoring systems and quality indicators to ensure that all patients are assessed for immunization adequacy before they leave the facility. The health care provider designated to identify patient immunization needs should have the authority, knowledge, and responsibility to provide or arrange for the immunization service.⁴⁰ Clinics that provide treatment for a large number of patients at high risk for contracting vaccine-preventable diseases (e.g., diabetic, asthmatic, heart disease, and geriatric clinics) have a particular obligation to employ immunization screening and ensure appropriate vaccine use.

Screening for immunization needs may be organized in several ways; prototype screening forms are available.^{39,41}

Pharmacists should seek out leadership roles in some or all of the following forms of immunization screening.

Occurrence screening. With this type of screening, vaccine needs are identified at the time of particular events, such as hospital or nursing home admission or discharge, ambulatory care or emergency room visits, mid-decade birthdays (e.g., years 25, 35, and 45),^{42,43} and any contact with a health care delivery system for patients under 8 years or over 50 years of age.

Diagnosis screening. This screening reviews the vaccine needs of patients with conditions that increase their risk of preventable infections. Diagnoses such as diabetes, asthma, heart disease, acute myocardial infarction, congestive heart failure, chronic obstructive pulmonary disease, hemophilia, thalassemia, most types of cancer, sickle cell anemia, chronic alcoholism, cirrhosis, human immunodeficiency virus infection, and certain other disorders should prompt specific attention to the patient's vaccine needs.^{12,33,42} The immunization rate for patients diagnosed with community-acquired pneumonia is considered a marker for quality by some accrediting bodies. Incorporating assessment of vaccination status into an institution's critical pathways has been shown to improve vaccination rates.⁴⁴

Procedure screening. Immunization needs are assessed on the basis of medical or surgical procedures using this type of screening. These procedures include splenectomy, heart or lung surgery, organ transplantation, antineoplastic therapy, radiation therapy, immunosuppression of other types, dialysis, and prescription of certain medications used to treat conditions that increase patients' risk of preventable infections.^{45,46} When designing and implementing automated prescription databases, pharmacy managers should consider specifications that allow retrieval of lists of patients receiving drugs that suggest the need for immunization.^{33,37}

Periodic mass screening. This type of screening is a comprehensive assessment of immunization adequacy in selected populations at a given time. Such screening may be conducted, for example, during autumn influenza programs or outbreaks of certain vaccine-preventable illnesses (e.g., measles and meningococcal disease).^{29,32,33} Schools and other institutions can perform mass screening when registering new students or residents. Mass screening may also be appropriate in areas where no comprehensive immunization program has been conducted recently. This type of screening helps improve vaccine coverage rates at a given time, but long-term benefits are much greater when such intermittent programs are combined with ongoing comprehensive screening efforts. Several states, including South Dakota, New Jersey, and Oklahoma, have enacted laws requiring that influenza and pneumococcal vaccines be offered annually to residents of nursing homes.

Occupational screening. This screening method focuses on the immunization needs of health care personnel whose responsibilities place them at risk of exposure to certain vaccine-preventable diseases or bring them into contact with high-risk patients (i.e., patients with those conditions listed in the *Diagnosis screening* section above). Health care providers who have contact with these patients should receive an annual influenza vaccination. Health care employers frequently provide immunization screening and vaccination of employees as part of employee health programs. OSHA requires that health care employers provide hepatitis B vaccination at no cost, on a voluntary basis, to all employees at risk for occupational exposure to blood borne pathogens.⁴⁷ Depending on their risk of exposure, it may be advisable for

members of the pharmacy staff to receive hepatitis B vaccination.

Screening for contraindications and precautions. After candidates for immunization have been identified, they should be screened for contraindications and precautions. A CDC-reviewed contraindication screening questionnaire is available.⁴⁸

Patient Counseling. Patients in need of immunization should be advised of their infection risk and encouraged to accept the immunizations they need. Patient concerns about vaccine safety and efficacy should be discussed and addressed.^{49,50} Health care providers can influence patients' attitudes regarding immunization.^{51,52} Physicians should be informed of their patients' need for vaccination if standing orders or collaborative practice agreements are not in place. Patients who need immunizations should be vaccinated during the current health care contact unless valid contraindications exist. Delaying vaccination until a future appointment increases the risk that the patient will not be vaccinated.

Advising patients of their need for immunization can take several forms. In the ambulatory care setting, individualized or form letters can be mailed to patients, patients can be called by telephone, or an insert can be included with prescriptions informing patients of their infection risk and the availability and efficacy of vaccines.^{30,33,53–55} Adhesive reminder labels can also be affixed to prescription containers for drugs used to treat conditions that may indicate the need for vaccination against influenza and pneumococcal disease (e.g., digoxin, warfarin, theophylline, and insulin³³); these labels would be analogous to labels currently in widespread use (e.g., “Shake well” and “Take with food or milk”). Such labels might read, “You may need flu or pneumonia vaccine: Ask your doctor or pharmacist.” Chart notes, consultations, messages to patients, one-on-one conversations, and similar means can be used to communicate with inpatients and institutional patients.^{28,31,56}

Federal law requires that health care providers who administer diphtheria, tetanus, pertussis, measles, mumps, rubella, varicella, polio, *Haemophilus influenzae* type B, hepatitis B, and pneumococcal conjugate vaccines give the most recent version of the CDC-developed Vaccine Information Statement (VIS) to the adult or the parent or legal guardian of the child to be vaccinated.⁵⁷ VISs are available in many languages from state or local health departments or the CDC.⁵⁸ VISs are also available for other commonly used vaccines, such as influenza, pneumococcal polysaccharide, hepatitis A, meningococcal, and anthrax vaccines. Pharmacists should also ensure that informed consent is obtained in a manner that complies with state laws.²⁰

Documentation. The National Childhood Vaccine Injury Act of 1986 (NCVIA) requires all health care providers who administer vaccines to maintain permanent vaccination records and to report occurrences of certain adverse events specified in the act.^{57,59} The recipient's permanent medical record (or the equivalent) must state the date the vaccine was administered, the vaccine's manufacturer and lot number, and the name, address, and title of the person administering the vaccine. Pharmacists in organized health care settings may encourage compliance with this requirement by providing reminder notices each time doses of vaccines are dispensed.⁶⁰ Automated databases that allow for long-term storage of patient immunization information may provide an

efficient method for maintaining and retrieving immunization records.³⁹ Efforts to develop electronic vaccination registries, especially for children, are under way by states collaborating with CDC.⁶¹

NCVIA also mandates that selected adverse effects noted after any inoculation be reported to the Vaccine Adverse Event Reporting System (www.vaers.org).^{57,59,62} Because pharmacists have experience with adverse-drug-reaction reporting, they can take the lead in developing and implementing a program to meet this requirement, even if they are not responsible for administering the vaccine.

Patients should maintain personal immunization records that document all immunization experiences and function as a backup if the clinicians' immunization records are lost. Several personal immunization record forms are available. Public Health Service Form 731 (International Certificate of Vaccination), colloquially called the “yellow shot record,” is used to document vaccines indicated for international travel but can also serve as a patient's personal record of vaccinations. The Immunization Action Coalition distributes a standard adult immunization record card developed in collaboration with CDC.⁶³ In addition, each state and the District of Columbia prints its own uniform immunization record form for pediatric immunizations, which may also be a suitable personal patient record. It has been recommended that adults carry personal immunization records in their wallets.⁴⁶

Formulary Management. Formulary systems in organized health care settings should include vaccines, toxoids, and immune globulins available for use in preventing diseases in patients and staff. Decisions by the pharmacy and therapeutics committee (or its equivalent) on immunologic drug choices require consideration of relevant immunologic pharmacology, immunopharmacology, and disease epidemiology. Because of their expertise and training, pharmacists are well equipped to provide information and recommendations on which these decisions may be based.

It is the pharmacist's responsibility to develop and maintain product specifications to aid in the purchase of drugs under the formulary system.^{64,65} The pharmacist should establish and maintain standards to ensure the quality, proper storage, and proper use of all pharmaceuticals dispensed. Pharmacists must choose between single dose or multidose containers of vaccines on the basis of efficiency, safety, economic, and regulatory considerations. Pharmacists in institutions should develop guidelines on the routine stocking of immunologic drugs in certain high-use patient care areas.

Proper transportation and storage are an important consideration for immunologic drugs, including vaccines, because many require storage at refrigerated or frozen temperatures. Pharmacists have an important responsibility to maintain the “cold chain” in the handling of these drugs. Detailed references on this topic have been published.^{66–73} Storage considerations include the conditions in all areas in which immunologic drugs are kept, as well as a method for ensuring that immunologic drugs received by the pharmacy have been transported under suitable conditions.

It is important that methods be established for detecting and properly disposing of outdated and partially administered immunologic agents. Live viral (e.g., varicella, yellow fever, and smallpox) and live bacterial (e.g., bacille Calmette-Guérin) vaccines should be disposed of in the same manner as other infectious biohazardous waste.

Administrative Measures. Pharmacists on key committees (e.g., infection control and risk management) in organized health care settings can promote adequate immunization delivery among staff and patients by encouraging the development of sound organizational policies on immunization. Health care organizations should develop policies and protocols that address the following:

1. Hepatitis B preexposure prophylaxis for health care workers at risk for exposure to blood products and other contaminated items,^{45,74–76}
2. Hepatitis B postexposure (e.g., needle stick) prophylaxis for previously unvaccinated patients, health care personnel, and personnel who have been vaccinated but do not have a previously documented serologic response,^{45,74–76}
3. Rabies preexposure and postexposure prophylaxis,⁷⁷
4. Wound management guidelines designed to prevent tetanus and diphtheria,^{78,79}
5. Valid contraindications to vaccination to ensure patient safety and minimize inappropriate exclusions from vaccination,^{78,80,81}
6. Requirements for employee immunization against measles, rubella, influenza, and other diseases,^{42,82}
7. Tuberculosis screening of patients and staff,^{83,84}
8. Immunization of persons at high risk (e.g., patients with diabetes, asthma, heart disease, and pregnant or immunocompromised patients). Current authoritative guidelines on this subject should be consulted,^{42,46,58,85,86} and
9. Emergency measures in the event of vaccine-related adverse reactions. Such measures should address the availability of epinephrine and other emergency drugs, as well as BCLS and ACLS.

Public Education. Pharmacists have ample opportunities to advance the public health through immunization advocacy. Pharmacists can facilitate disease prevention strategies, because many potential victims of influenza and pneumococcal disease visit pharmacies and are seen by pharmacists daily. Pharmacists can lead local activities in observance of National Adult Immunization Week each October.³⁷ Working with local public health departments, state or national immunization coalitions, and other groups (e.g., state or local parent—teacher, diabetes, heart, lung, or retired persons' associations), pharmacists can promote vaccination among high-risk populations. Newsletters, posters, brochures, and seminars may be used to explain the risk of preventable infections to pharmacy staff, other health care personnel, and patients. Excellent resources are available from the Immunization Action Coalition and the National Coalition for Adult Immunization.

References

1. Hepler CD, Strand LM. Opportunities and responsibilities in pharmaceutical care. *Am J Hosp Pharm.* 1990; 47:533–43.
2. Grabenstein JD. Pharmacists and immunization: increasing involvement over a century. *Pharm Hist.* 1999; 41:137–52.
3. Prevention and control of influenza: recommendations of the Advisory Committee on Immunization Practices. *MMWR Recomm Rep.* 2002; 51(RR-3):1–31.
4. Prevention of pneumococcal disease: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Recomm Rep.* 1997; 46(RR-8):1–24.
5. Thompson WW, Shay DK, Weintraub E, et al. Mortality associated with influenza and respiratory syncytial virus in the United States. *JAMA.* 2003; 289:179–86.
6. Williams WW, Hickson MA, Kane MA, et al. Immunization policies and vaccine coverage among adults. The risk for missed opportunities. *Ann Intern Med.* 1988; 108:616–25.
7. Fedson DS, Harward MP, Reid RA, et al. Hospital-based pneumococcal immunization. Epidemiologic rationale from the Shenandoah study. *JAMA.* 1990; 264:1117–22.
8. Fedson DS. Influenza and pneumococcal immunization strategies for physicians. *Chest.* 1987; 91:436–43.
9. Fedson DS. Improving the use of pneumococcal vaccine through a strategy of hospital-based immunization: a review of its rationale and implications. *J Am Geriatr Soc.* 1985; 33:142–50.
10. Magnussen CR, Valenti WM, Mushlin AI. Pneumococcal vaccine strategy. Feasibility of a vaccination program directed at hospitalized and ambulatory patients. *Arch Intern Med.* 1984; 144:1755–7.
11. Vondracek TG, Pham TP, Huycke MM. A hospital-based pharmacy intervention program for pneumococcal vaccination. *Arch Intern Med.* 1998; 158:1543–7.
12. Bratzler DW, Houck PM, Jiang H, et al. Failure to vaccinate Medicare inpatients: a missed opportunity. *Arch Intern Med.* 2002; 162:2349–56.
13. Barker L, Luman E, Zhao Z, et al. National, state, and urban area vaccination coverage levels among children aged 19–35 months—United States, 2001. *MMWR Morb Mortal Wkly Rep.* 2002; 51(30):664–6.
14. Office of Disease Prevention and Health Promotion. Healthy people 2010. www.healthypeople.gov (accessed 2003 Mar 12).
15. American Pharmaceutical Association. States where pharmacists can immunize. www.aphanet.org/pharm-care/immunofact.html (accessed 2003 Mar 6).
16. Keely JL. Pharmacist scope of practice. *Ann Intern Med.* 2002; 136:79–85.
17. Use of standing orders programs to increase adult vaccination rates: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Recomm Rep.* 2000; 49(RR01):15–26.
18. 42 C.F.R. §482–4.
19. Centers for Disease Control and Prevention. Epidemiology and prevention of vaccine-preventable diseases. 7th ed. Atlanta: U.S. Department of Health and Human Services; 2003.
20. Grabenstein JD. High expectations: standards and guidelines for immunization delivery. *Hosp Pharm.* 2000; 35:841–51.
21. Sisk JE, Moskowitz AJ, Whang W, et al. Cost-effectiveness of vaccination against pneumococcal bacteremia among elderly people. *JAMA.* 1997; 278:1333–9.
22. Van den Oever R, de Graeve D, Hepp B, et al. Pharmacoeconomics of immunisation: a review. *Pharmacoeconomics.* 1993; 3:286–308.
23. Nichol KL, Lind A, Margolis KL, et al. The effectiveness of vaccination against influenza in healthy, working adults. *N Engl J Med.* 1995; 333:889–93.
24. Nichol KL, Margolis KL, Wuorenma J, et al. The efficacy and cost-effectiveness of vaccination against influ-

- enza among elderly persons living in the community. *N Engl J Med*. 1994; 331:778–84.
25. Grabenstein JD. Immunizations: what's a health-system pharmacy to do? Part 1. *Hosp Pharm*. 1998; 33:742,745–50,753.
 26. Grabenstein JD. Immunizations: what's a health-system pharmacy to do? Part 2. *Hosp Pharm*. 1998; 33:870–2,876–80.
 27. Huff PS, Hak SH, Caiola SM. Immunizations for international travel as a pharmaceutical service. *Am J Hosp Pharm*. 1982; 39:90–3.
 28. Spruill WJ, Cooper JW, Taylor WJR. Pharmacist-coordinated pneumonia and influenza vaccination program. *Am J Hosp Pharm*. 1982; 39:1904–6.
 29. Grabenstein JD, Smith LJ, Carter DW, et al. Comprehensive immunization delivery in conjunction with influenza vaccination. *Arch Intern Med*. 1986; 146:1189–92.
 30. Williams DM, Daugherty LJ, Aycock DG, et al. Effectiveness of improved targeting efforts for influenza immunization in an ambulatory-care setting. *Hosp Pharm*. 1987; 22:462–4.
 31. Morton MR, Spruill WJ, Cooper JW. Pharmacist impact on pneumococcal vaccination rates in long-term-care facilities. *Am J Hosp Pharm*. 1988; 45:73. Letter.
 32. Grabenstein JD, Smith LJ, Watson RR, et al. Immunization outreach using individual need assessments of adults at an Army hospital. *Public Health Rep*. 1990; 105:311–6.
 33. Grabenstein JD, Hayton BD. Pharmacoepidemiologic program for identifying patients in need of vaccination. *Am J Hosp Pharm*. 1990; 47:1774–81.
 34. Grabenstein JD. Get it in writing: documenting immunizations. *Hosp Pharm*. 1991; 26:901–4.
 35. Grabenstein JD. Drug interactions involving immunologic agents. Part I. Vaccine–vaccine, vaccine–immunoglobulin, and vaccine–drug interactions. *DICP*. 1990; 24:67–81.
 36. Grabenstein JD. Drug interactions involving immunologic agents. Part II. Immunodiagnostic and other immunologic drug interactions. *DICP*. 1990; 24:186–93.
 37. Grabenstein JD. Pneumococcal pneumonia: don't wait, vaccinate. *Hosp Pharm*. 1990; 25:866–9.
 38. Grabenstein JD, Casto DT. Recommending vaccines to your patients' individual needs. *Am Pharm*. 1991; NS31:58–67.
 39. Grabenstein JD. Immunization delivery: a complete guide. St. Louis: Facts and Comparisons; 1997.
 40. Fedson DS, Houck P, Bratzler D. Hospital-based influenza and pneumococcal vaccination: Sutton's law applied to prevention. *Infect Control Hosp Epidemiol*. 2000; 21:692–9.
 41. Immunization Action Coalition. Do I need any vaccinations today? www.immunize.org/catg.d/4036need.htm (accessed 2003 Mar 12).
 42. Guide for adult immunization. 3rd ed. Philadelphia: American College of Physicians; 1994.
 43. Slobodkin D, Zielske PG, Kitlas JL, et al. Demonstration of the feasibility of emergency department immunization against influenza and pneumococcus. *Ann Emerg Med*. 1998; 32:537–43.
 44. Robke JT, Woods M, Heitz S. Pharmacist impact on pneumococcal vaccination rates through incorporation of immunization assessment into critical pathways in an acute care setting. *Hosp Pharm*. 2002; 37:1050–4.
 45. Hepatitis B virus: a comprehensive strategy for eliminating transmission in the United States through universal childhood vaccination. Recommendations of the Immunization Practices Advisory Committee (ACIP). *MMWR Recomm Rep*. 1991; 40 (RR-13):1–25.
 46. Canadian National Advisory Committee on Immunization. Canadian immunization guide. 5th ed. Ottawa, Ont.: Ministry of National Health and Welfare; 1998.
 47. 29 C.F.R. §1910.1030.
 48. Immunization Action Coalition. Screening questionnaire for adult immunization. www.immunize.org/catg.d/p4065scr.pdf (accessed 2003 Mar 12).
 49. Grabenstein JD, Wilson JP. Are vaccines safe? Risk contamination applied to vaccination. *Hosp Pharm*. 1999; 34:713–4,717–8,721–3,727–9.
 50. Kirk JK, Grabenstein JD. Interviewing and counseling patients about immunizations. *Hosp Pharm*. 1991; 26:1006–10.
 51. Nichol KL, MacDonald R, Hauge M. Factors associated with influenza and pneumococcal vaccination behavior among high-risk adults. *J Gen Intern Med*. 1996; 11:673–7.
 52. Gene J, Espinola A, Cabezas C, et al. Do knowledge and attitudes about influenza and its immunization affect the likelihood of obtaining immunization? *Fam Pract Res J*. 1992; 12:61–73.
 53. Grabenstein JD, Hartzema AG, Guess HA, et al. Community pharmacists as immunization advocates: a clinical pharmacoepidemiologic experiment. *Int J Pharm Pract*. 1993; 2:5–10.
 54. Grabenstein JD, Guess HA, Hartzema AG. People vaccinated by pharmacists: Descriptive epidemiology. *J Am Pharm Assoc*. 2001; 41:46–52.
 55. Grabenstein JD, Guess HA, Hartzema AG, et al. Effect of vaccination by community pharmacists among adult prescription recipients. *Med Care*. 2001; 39:340–8.
 56. Casto DT. Prevention, management, and control of influenza: roles for the pharmacist. *Am J Med*. 1987; 82(suppl 6A):64–7.
 57. Health Services & Resources Administration. Vaccine injury table. *Fed Regist*. 1997; 62:7685–90.
 58. Centers for Disease Control and Prevention. Vaccine Information Statements. www.cdc.gov/nip/publications/vis (accessed 2003 Mar 27).
 59. Update on adult immunization. Recommendations of the Immunization Practices Advisory Committee (ACIP). *MMWR Recomm Rep*. 1991; 40(RR-12): 1–94.
 60. Grabenstein JD. Compensation for vaccine injury: balancing society's need and personal risk. *Hosp Pharm*. 1995; 30:831–2,834–6.
 61. Grabenstein JD. Vaccination records must be available to be used. *J Am Pharm Assoc*. 2000; 40:113.
 62. Kapit RM, Grabenstein JD. Adverse events after immunization: reports and results. *Hosp Pharm*. 1995; 30:1031–2,1035–6,1038,1041.
 63. Immunization Action Coalition. Adult immunization record card. www.immunize.org/adultizcards/index.htm (accessed 2003 Mar 12).
 64. American Society of Hospital Pharmacists. ASHP technical assistance bulletin on hospital drug distribution and control. *Am J Hosp Pharm*. 1980; 37:1097–103.
 65. ASHP statement on the pharmacist's responsibility for distribution and control of drug products. In:

- Deffenbaugh JH, ed. Best practices for health-system pharmacy. Positions and guidance documents of ASHP. 2002–2003 ed. Bethesda, MD: American Society of Health-System Pharmacists; 2002:91.
66. Grabenstein JD. Immunofacts: vaccines and immunologic drugs. 28th ed. St Louis: Facts and Comparisons; 2002.
 67. Centers for Disease Control and Prevention. Vaccine management: recommendations for handling and storage of selected biologicals. www.cdc.gov/nip/publications/vac_mgt_book.htm (accessed 2003 Mar 27).
 68. Casto DT, Brunell PA. Safe handling of vaccines. *Pediatrics*. 1990; 87:108–12.
 69. Ross MB. Additional stability guidelines for routinely refrigerated drug products. *Am J Hosp Pharm*. 1988; 45:1498–9. Letter.
 70. Sterchele JA. Update on stability guidelines for routinely refrigerated drug products. *Am J Hosp Pharm*. 1987; 44:2698, 2701. Letter.
 71. Miller LG, Loomis JH Jr. Advice of manufacturers about effects of temperature on biologicals. *Am J Hosp Pharm*. 1985; 42:843–8.
 72. Vogenberg FR, Souney PF. Stability guidelines for routinely refrigerated drug products. *Am J Hosp Pharm*. 1983; 40:101–2.
 73. Wolfert RR, Cox RM. Room temperature stability of drug products labeled for refrigerated storage. *Am J Hosp Pharm*. 1975; 32:585–7.
 74. Update: recommendations to prevent hepatitis B virus transmission—United States. *MMWR Morb Mortal Wkly Rep*. 1995; 44:574–5.
 75. Update: recommendations to prevent hepatitis B virus transmission—United States. *MMWR Morb Mortal Wkly Rep*. 1999; 48:33–4.
 76. Prevention of hepatitis A through active or passive immunization: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Recomm Rep*. 1999; 48(RR-12):1–37.
 77. Human rabies prevention—United States, 1999. Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Recomm Rep*. 1999; 48(RR-1):1–21.
 78. Diphtheria, tetanus, and pertussis: recommendations for vaccine use and other preventive measures. Recommendations of the Immunization Practices Advisory Committee (ACIP). *MMWR Recomm Rep*. 1991; 40(RR-10):1–28.
 79. Grabenstein JD. Stop buying tetanus toxoid (with one exception). *Hosp Pharm*. 1990; 25:361–2.
 80. Pertussis vaccination: use of acellular pertussis vaccines among infants and young children. Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Recomm Rep*. 1997; 46(RR-7):1–25.
 81. American Academy of Pediatrics Committee on Infectious Diseases. The relationship between pertussis vaccine and brain damage: reassessment. *Pediatrics*. 1991; 88:397–400.
 82. Immunization of health-care workers: recommendations of the Advisory Committee on Immunization Practices (ACIP) and the Hospital Infection Control Practices Advisory Committee (HICPAC). *MMWR Recomm Rep*. 1997; 46(RR-18):1–42.
 83. Screening for tuberculosis and tuberculosis infection in high-risk populations: recommendations of the Advisory Council for the Elimination of Tuberculosis. *MMWR Recomm Rep*. 1995; 44(RR-11):19–34.
 84. Anergy skin testing and tuberculosis [corrected] preventive therapy for HIV-infected persons: revised recommendations. *MMWR Recomm Rep*. 1997; 46(RR-15):1–10.
 85. Health information for international travel, 2001–02. Washington, DC: Government Printing Office; 2001.
 86. American College of Obstetricians and Gynecologists committee opinion. Immunization during pregnancy. *Obstet Gynecol*. 2003; 101:207–12.

These guidelines were reviewed in 2008 by the Council on Pharmacy Practice and by the Board of Directors and were found to still be appropriate.

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