

MARYLAND HEALTHCARE WORKERS IMMUNIZATION INITIATIVE



2009-2010

TOOLKIT

Maryland Healthcare Workers Immunization Initiative

Dear Partner in Prevention:

We are delighted to have you as a partner in the 2009 *Maryland Healthcare Workers Immunization Initiative*, a collaborative effort between the Maryland Department of Health and Mental Hygiene (DHMH), Maryland Partnership for Prevention, and health care facilities and professional associations across Maryland.

Since its inception five years ago, the initiative has been recognized nationally as a leader in the effort to raise immunization rates among healthcare workers. This year, we officially expand our campaign to address all vaccinations recommended for health professionals. It is our hope that this toolkit and other initiative resources will facilitate a successful campaign in your facility.

Among the resources in the 2009 *Maryland Supplement to Campaigns to Increase Influenza Vaccinations Among Healthcare Workers* are:

- “Resources and Strategies” for improving health care worker influenza vaccinations
- Morbidity and Mortality Weekly Report, *Influenza Vaccination of Health-Care Personnel*.
- Template Policy Statement: Policy for Influenza Immunization of Health Care Workers
- CDC Netconference slides, “Health Care Personnel--What Immunizations are Advised?”
- Maryland nursing home law regarding health care worker influenza vaccinations
- Standing Orders for Administering Influenza Vaccine to Adults
- Infection Control Requirement for Offering Influenza Vaccination to Staff
- Campaign Strategies for Vaccinating Health Care Workers
- Vaccine Administration Record and Consent Form for Influenza Vaccine
- Sample Declination Form
- Vaccine Information Statements (VIS) for injectable and intranasal influenza vaccine

Please use this toolkit to enhance your facility’s efforts to increase influenza and other vaccinations among health care workers. To become a Registered Partner of the Maryland Healthcare Workers Influenza Initiative, complete and submit the online Registered Partners Survey that can be accessed through http://edcp.org/html/hcw_initiative.cfm.

We appreciate your commitment to raising immunization rates among Maryland’s health professionals and look forward to working with you. Should you require additional information about this initiative, call Robin Decker at 410-767-6679 or Tiffany Tate at 410-902-4677.

Sincerely,

2009 *Maryland Healthcare Workers Influenza Initiative Planning Committee*

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2009 - 2010 Maryland Healthcare Workers Immunization Initiative

What is the Maryland Healthcare Workers Immunization Initiative?

A statewide campaign that aims to raise vaccination rates among healthcare professionals.

Who should participate?

Facilities, organizations, and community providers of health care with an interest in increasing immunization rates among their employees and wish to protect their staff and clients from the flu and other vaccine-preventable diseases. This may include, but is not limited to:

- Hospitals
- Local health departments
- Skilled nursing facilities
- Private physicians' offices
- Home health agencies
- Colleges and Universities
- Adult day care services
- Continuing care retirement communities
- Any provider of health care services and or staff who serve persons at risk from complications of influenza.

Why should I participate in this initiative?

The Maryland Healthcare Workers Immunization Initiative will **provide resources to support vaccination programs for all staff who work in health care settings.**

What types of resources will be provided through this initiative?

Participants in the Maryland Healthcare Workers Immunization Initiative will have access to resources to assist in efforts to increase immunization rates among healthcare personnel. *Registered Partners* will be eligible to apply for grants to help fund their facility's influenza vaccination campaign and may receive no-cost vaccine to protect their staff against other vaccine-preventable diseases.

How do I become a *Registered Partner* of the initiative?

1. **Complete and submit the online Registration Survey.** To access the survey, click on the survey link at http://edcp.org/html/hcw_initiative.cfm.
2. Use the **Maryland Supplement to Campaigns to Increase Vaccinations Rates Among Healthcare Workers** that will be mailed to you in hardcopy following completion of your survey.
3. **Report** your facility's employee influenza vaccination rate at the end of the 2009-2010 Flu Prevention Season.

Who do I call for more information?

- Robin Decker at the DHMH Center for Immunization - 410-767-6679
- Maryland Partnership for Prevention - 410-902-4677

Maryland Healthcare Workers Immunization Initiative

Resources and Strategies

The list directs you to highlights of documents that may be helpful in developing campaigns to promote vaccinations among health care workers. These documents can be obtained at www.edcp.org or at the websites specified.

Improving Influenza Vaccination Rates in Health Care Workers

(24-page document; available at <http://www.nfid.org/pdf/publications/hcwmonograph.pdf>)

- | | |
|---------------|--|
| ✘ Page 8 | Introduction to <i>Call to Action</i> |
| ✘ Page 9 | Keys to Improving Health Care Worker Vaccination Rates |
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MassMed Employee Flu Immunization Campaign Kit

(Link available through http://edcp.org/html/hcw_initiative.cfm)

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| ✘ Page 18 | Influenza Campaign Poster |
| ✘ Page 23 | "Why People Don't Get Vaccinated" |
| ✘ Page 26 | Tips for Planning a Kick-Off Event |
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Influence® Health Care Workers Materials

(Available at www.vaccinanager.com)

- ✘ FREE, customizable collection of disease educational materials developed to encourage influenza immunization. To gain access the first time, you will be asked to create a user name and password.

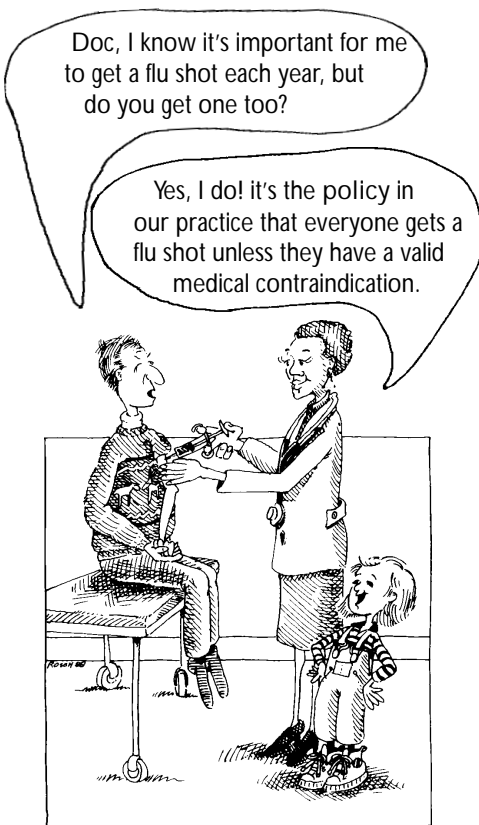
Other Resources

- ✘ National Influenza Summit Resources: <http://www.cdc.gov/flu/nivw/toolkit.htm> & <http://www.preventinfluenza.org/>

Other Resources (cont.)

- ✘ Influenza Vaccination of Health-Care Personnel: Recommendations of the Healthcare Infection Control Practices Advisory Committee (HICPAC) and the Advisory Committee on Immunization Practices (ACIP):
<http://www.cdc.gov/MMWR/preview/mmwrhtml/rr5502a1.htm>; February 24, 2006.
- ✘ 2007 Prevention and Control of Influenza: Recommendations of the Advisory Commission on Immunization Practices:
<http://www.cdc.gov/mmwr/PDF/rr/rr5606.pdf>; July 13, 2007
- ✘ MMWR Article: Interventions to Increase Influenza Vaccination Among Health Care Workers: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5408a2.htm>; March 4, 2005.
- ✘ Immunization Action Coalition: www.immunize.org
- ✘ CDC Live Attenuated Influenza Vaccine Recommendations:
<http://www.cdc.gov/flu/professionals/acip/index.htm>.
- ✘ CDC Flu Information for Health Care Professionals:
<http://www.cdc.gov/flu/professionals/>
- ✘ CDC Updated Infection Control Measures for the Prevention and Control of Influenza in Health-Care Facilities:
<http://www.cdc.gov/flu/professionals/infectioncontrol/healthcarefacilities.htm>
- ✘ CDC Updated Infection Control Measures for Preventing and Controlling Influenza Transmission in Long Term Care Facilities:
<http://www.cdc.gov/flu/professionals/infectioncontrol/longtermcare.htm>
- ✘ United States Department of Veterans Affairs VA Influenza Vaccination Toolkit:
http://www.prevention.va.gov/docs/vainfluenzamanual_0809.pdf
- ✘ Immunization of Health Care Workers: Recommendations of the Advisory Committee on Immunization Practices (ACIP) and the Hospital Infection Control Practices Advisory Committee (HICPAC) Found in MMWR, Recommendations and Reports, December 26, 1997, 46(RR-18); 1-42. <http://www.cdc.gov/mmwr/PDF/rr/rr4618.pdf>
- ✘ Guideline for Infection Control in Health Care Personnel:
<http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/InfectControl98.pdf>
- ✘ Infection Control Measures for Preventing and Controlling Influenza Transmission in Long-Term Care Facilities:
<http://www.cdc.gov/flu/professionals/infectioncontrol/longtermcare.htm>
- ✘ Pandemic Influenza Preparedness and Response Guidance for Healthcare Workers and Healthcare Employers: http://www.osha.gov/Publications/OSHA_pandemic_health.pdf

Health professionals can spread disease. Make sure you're vaccinated!



Thank you, readers!
We receive tremendous support from you.
Thank you to CDC!
CDC provides invaluable technical support as well as two federal grants.
Thank you for your educational grants to all the following:

- American Pharmaceutical Association
- Aventis Pasteur
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- GlaxoSmithKline
- Medical Arts Press
- Merck & Co.
- Nabi
- Wyeth Lederle Vaccines

IAC receives funding from a variety of sources, both public and private, and maintains strict editorial independence.

Dear Colleagues,

If you're like most people who work in medicine, your patients' well-being is of primary concern to you. Yet every year more than 200,000 MDs and RNs needlessly expose their patients to the influenza virus. Are you one of them?

According to CDC, only 34% of MDs and RNs get vaccinated annually against influenza. This means that over 2.3 million MDs and RNs are unvaccinated and at risk not only for contracting influenza but also for passing it on to others. On average, 20,000 people die annually in the U.S. from influenza or its complications. Some of these cases are unwittingly passed from health professionals to their patients.

Why are so many of us unvaccinated? According to surveys, here are some reasons:

1. I don't get sick and I never get influenza.
About 10–25% of people get influenza each year, and health professionals are not exempt. Many of us develop only mild symptoms of the disease, so we often don't get a florid influenza syndrome. But even with minimal symptoms, we can still transmit the full-blown illness to our patients. Health professionals are notorious for going to work even when sick. With mild illness—scratchy throats, muscle aches—we talk with patients, check blood pressures, examine throats. We breathe the air. We infect others with respiratory viruses.
2. I'm not in a risk group.
If you are a healthy person under the age of 50, you might not be in an influenza risk group, but as a health professional, you put other people at risk. Unvaccinated health care workers put hundreds of others at risk for influenza. Our patients can get infected, need to be hospitalized, and even die from influenza. The only acceptable reason for your not being vaccinated is a valid medical contraindication. By not getting vaccinated against influenza, you endanger the lives of others.
3. I forget to get vaccinated or don't have time.
No time? Plan ahead to make the time next fall. Make influenza vaccination a priority for all the employees in your practice or hospital. Establish a system so that everyone is vaccinated against influenza free of charge every year and no one forgets.
4. I'm concerned about vaccine side effects.
The most common side effect from influenza vaccine is arm soreness. Two recent studies demonstrated that influenza vaccine caused no significant difference in systemic side effects (fever, headache, fatigue, myalgias) when compared to placebo injection. (Margolis, KL et al., JAMA. 1990; 264: 1339–1141. Nichol, KL et al., Arch Intern Med. 1996;156:1546–1550.)

All clinics, hospitals, and long-term care facilities should require that their employees receive influenza vaccine and provide it free of charge. While the investment may seem high, in the long run, it often offers a cost savings to society and it saves lives. If your facility doesn't have a system in place to vaccinate all staff members, now is the time to start planning.

Make sure you get vaccinated every year and that all staff members in your facility do too. Make it a requirement. Once a year. It's so simple. And it's lifesaving. After all, isn't this what medicine is all about?

Deborah L. Wexler, MD
Executive Director

Immunization Action Coalition

VACCINATE ADULTS!

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Healthcare Personnel Vaccination Recommendations

Vaccine	Recommendations in brief
Hepatitis B	Give 3-dose series (dose #1 now, #2 in 1 month, #3 approximately 5 months after #2). Give IM. Obtain anti-HBs serologic testing 1–2 months after dose #3.
Influenza	Give 1 dose of TIV or LAIV annually. Give TIV intramuscularly or LAIV intranasally.
MMR	For healthcare personnel (HCP) born in 1957 or later without serologic evidence of immunity or prior vaccination, give 2 doses of MMR, 4 weeks apart. For HCP born prior to 1957, see below. Give SC.
Varicella (chickenpox)	For HCP who have no serologic proof of immunity, prior vaccination, or history of varicella disease, give 2 doses of varicella vaccine, 4 weeks apart. Give SC.
Tetanus, diphtheria, pertussis	Give all HCP a Td booster dose every 10 years, following the completion of the primary 3-dose series. Give a 1-time dose of Tdap to all HCP younger than age 65 years with direct patient contact. Give IM.
Meningococcal	Give 1 dose to microbiologists who are routinely exposed to isolates of <i>N. meningitidis</i> .

Hepatitis A, typhoid, and polio vaccines are not routinely recommended for HCP who may have on-the-job exposure to fecal material.

Hepatitis B

Healthcare personnel (HCP) who perform tasks that may involve exposure to blood or body fluids should receive a 3-dose series of hepatitis B vaccine at 0-, 1-, and 6-month intervals. Test for hepatitis B surface antibody (anti-HBs) to document immunity 1–2 months after dose #3.

- If anti-HBs is at least 10 mIU/mL (positive), the patient is immune. No further serologic testing or vaccination is recommended.
- If anti-HBs is less than 10 mIU/mL (negative), the patient is unprotected from hepatitis B virus (HBV) infection; revaccinate with a 3-dose series. Retest anti-HBs 1–2 months after dose #3.
 - If anti-HBs is positive, the patient is immune. No further testing or vaccination is recommended.
 - If anti-HBs is negative following 6 doses of vaccine, the patient is a non-responder.

For non-responders: HCP who are non-responders should be considered susceptible to HBV and should be counseled regarding precautions to prevent HBV infection and the need to obtain HBIG prophylaxis for any known or probable parenteral exposure to hepatitis B surface antigen (HBsAg)-positive blood.¹ It is also possible that non-responders are persons who are HBsAg positive. Testing should be considered. HCP found to be HBsAg positive should be counseled and medically evaluated.

Note: Anti-HBs testing is not recommended routinely for previously vaccinated HCP who were not tested 1–2 months after their original vaccine series. These HCP should be tested for anti-HBs when they have an exposure to blood or body fluids. If found to be anti-HBs negative, the HCP should be treated as if susceptible.¹

Influenza

Trivalent (Inactivated) Influenza Vaccine (TIV): May give to any HCP.
Live, Attenuated Influenza Vaccine (LAIV): May give to any non-pregnant healthy HCP age 49 years and younger.

1. All HCP should receive annual influenza vaccine. Groups that should be targeted include all personnel (including volunteers) in hospitals, outpatient, and home-health settings who have any patient contact.
2. TIV is preferred over LAIV for HCP who are in close contact with severely immunosuppressed persons (e.g., stem cell transplant patients) when patients require a protective environment.

Measles, Mumps, Rubella (MMR)

HCP who work in medical facilities should be immune to measles, mumps, and rubella.

- HCP born in 1957 or later can be considered immune to measles, mumps, or rubella only if they have documentation of (a) physician-diagnosed

measles or mumps disease; or (b) laboratory evidence of measles, mumps, or rubella immunity (HCP who have an “indeterminate” or “equivocal” level of immunity upon testing should be considered nonimmune); or (c) appropriate vaccination against measles, mumps, and rubella (i.e., administration on or after the first birthday of two doses of live measles and mumps vaccines separated by 28 days or more, and at least one dose of live rubella vaccine).

- Although birth before 1957 generally is considered acceptable evidence of measles, mumps, and rubella immunity, healthcare facilities should consider recommending a dose of MMR vaccine (two doses during a mumps outbreak) to unvaccinated HCP born before 1957 who are in either of the following categories: (a) do not have a history of physician-diagnosed measles and mumps disease or laboratory evidence of measles and mumps immunity and (b) do not have laboratory evidence of rubella immunity.

Varicella

It is recommended that all HCP be immune to varicella. Evidence of immunity in HCP includes documentation of 2 doses of varicella vaccine given at least 28 days apart, history of varicella or herpes zoster based on physician diagnosis, laboratory evidence of immunity, or laboratory confirmation of disease.

Tetanus/Diphtheria/Pertussis (Td/Tdap)

All adults who have completed a primary series of a tetanus/diphtheria-containing product (DTP, DTaP, DT, Td) should receive Td boosters every 10 years. As soon as feasible, HCP younger than age 65 years with direct patient contact should be given a 1-time dose of Tdap, with priority given to those having contact with infants younger than age 12 months.

Meningococcal

Vaccination is recommended for microbiologists who are routinely exposed to isolates of *N. meningitidis*. Use of MCV4 is preferred for persons younger than age 56 years; give IM. If MCV4 is unavailable, MPSV is an acceptable alternative for HCP younger than age 56 years. Use of MPSV is recommended for HCP older than age 55; give SC.

References

1. See Table 3 in “Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis,” *MMWR*, June 29, 2001, Vol. 50, RR-11.

For additional specific ACIP recommendations, refer to the official ACIP statements published in *MMWR*. To obtain copies, visit CDC’s website at www.cdc.gov/vaccines/pubs/ACIP-list.htm; or visit the Immunization Action Coalition (IAC) website at www.immunize.org/acip.

Adapted with thanks from the Michigan Department of Community Health

First do no harm

Protect patients by making sure all staff receive yearly influenza vaccine!

Healthcare employers are not only strongly encouraged to increase their employees' influenza immunization rates, in some instances, their organization's accreditation depends on it! The Centers for Disease Control and Prevention (CDC) published recommendations for healthcare settings, and the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) has established influenza infection control standards.

Big changes have taken place in influenza vaccination of healthcare personnel (HCP): The responsibility for increasing the rates of HCP influenza vaccination is rapidly shifting from the employee to the employer.

What's happened?

At CDC: In February 2006, CDC published "Influenza Vaccination of Health-Care Personnel." These recommendations "apply to HCP in acute care hospitals, nursing homes, skilled nursing facilities, physician offices, urgent care centers, and outpatient clinics, and to persons who provide home healthcare and emergency medical services." They were issued jointly by HICPAC (the Healthcare Infection Control Practices Advisory Committee) and ACIP (the Advisory Committee on Immunization Practices). The summary box in the right column presents an overview, including the recommendation that employers vaccinate employees at the work site at no cost. To obtain a copy of the complete recommendations, go to: www.cdc.gov/mmwr/PDF/rr/rr5502.pdf.

At JCAHO: In January 2007, a new infection control standard of JCAHO (the Joint Commission on Accreditation of Healthcare Organizations) became effective that requires accredited organiza-

tions to offer influenza vaccinations to staff, volunteers, and licensed independent practitioners who have close patient contact. The standard is an accreditation requirement for the Critical Access Hospital, Hospital and Long Term Care accreditation programs. To access the standard, go to www.jcrinc.com/12889 (for critical access hospitals), www.jcrinc.com/12862 (for hospitals), or www.jcrinc.com/12882 (for long-term care).

Why is it happening?

The short answer is because HCP influenza vaccination rates remain appallingly low, and unvaccinated HCP are infecting vulnerable patients with influenza. Fewer than 45% of HCP are immunized against influenza each year, even though ACIP has urged annual influenza vaccination for HCP since 1981. Further, influenza transmission has been documented among patients in a variety of clinical settings, and infections have been linked to unvaccinated HCP. Clearly, we are doing our patients harm.

What should your healthcare facility do to comply?

In the box below are practical online resources healthcare organizations will find valuable in creating influenza vaccination programs for employees.

Practical resources for vaccinating HCP against influenza

Centers for Disease Control and Prevention
Read "Influenza Vaccination of Health-Care Personnel": www.cdc.gov/mmwr/PDF/rr/rr5502.pdf
Access CDC's Influenza web page: www.cdc.gov/flu

National Influenza Vaccine Summit (NIVS)
(Co-sponsored by the American Medical Association and CDC). See the NIVS Healthcare Workers home page: www.preventinfluenza.org/profs_workers.asp.

Massachusetts Medical Society
See the "2006 Employee Flu Immunization Campaign Kit": www.massmed.org/flu_kit

Immunization Action Coalition
Get these IAC print materials online:

"Standing Orders for Administering Influenza Vaccine to Adults":
www.immunize.org/catg.d/p3074.pdf

"Screening Questionnaire for Injectable Influenza Vaccination":
www.immunize.org/catg.d/p4066.pdf

"Screening Questionnaire for Intranasal Influenza Vaccination":
www.immunize.org/catg.d/p4067.pdf

"Declination of Influenza Vaccination" form:
www.immunize.org/catg.d/p4068.pdf

Summary of CDC's HICPAC / ACIP Recommendations

The committees that developed and endorsed these recommendations included persons with expertise in infectious diseases, infection control, pediatrics, vaccinology, internal medicine, and public health. The recommendations are as follows:

- **Educate HCP regarding the benefits of influenza vaccination** and the potential health consequences of influenza illness for themselves and their patients, the epidemiology and modes of transmission, diagnosis, treatment, and nonvaccine infection control strategies, in accordance with their level of responsibility in preventing health-care-associated influenza.
- **Offer influenza vaccine annually to all eligible HCP** to protect staff, patients, and family members and to decrease HCP absenteeism. Use of either available vaccine (inactivated [TIV] or live attenuated influenza vaccine [LAIV]) is recommended for eligible persons. During periods when TIV is in short supply, use of LAIV is especially encouraged when feasible for eligible HCP.
- **Provide influenza vaccination to HCP at the work site and at no cost** as one component of employee health programs. Use strategies that have been demonstrated to increase influenza vaccine acceptance, including vaccination clinics, mobile carts, vaccination access during all work shifts, and modeling and support by institutional leaders.
- **Obtain a signed declination from HCP who decline influenza vaccination** for reasons other than medical contraindications.
- **Monitor HCP influenza vaccination coverage and declination** at regular intervals during influenza season and provide feedback of ward-, unit-, and specialty-specific rates to staff and administration.
- **Use the level of HCP influenza vaccination coverage as one measure of a patient-safety quality program.**



Recommendations and Reports

July 31, 2009 / 58(RR08);1-52

Prevention and Control of Seasonal Influenza with Vaccines

Recommendations of the Advisory Committee on Immunization Practices (ACIP), 2009

Please note: An erratum has been published for this article. To view the erratum, please click [here](#).

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Summary

This report updates the 2008 recommendations by CDC's Advisory Committee on Immunization Practices (ACIP) regarding the use of influenza vaccine for the prevention and control of seasonal influenza (CDC. Prevention and control of influenza: recommendations of the Advisory Committee on Immunization Practices [ACIP]. MMWR 2008;57[No. RR-7]). Information on vaccination issues related to the recently identified novel influenza A H1N1 virus will be published later in 2009. The 2009 seasonal influenza recommendations include new and updated information. Highlights of the 2009 recommendations include 1) a recommendation that annual vaccination be administered to all children aged 6 months--18 years for the 2009--10 influenza season; 2) a recommendation that vaccines containing the 2009--10 trivalent vaccine virus strains A/Brisbane/59/2007 (H1N1)-like, A/Brisbane/10/2007 (H3N2)-like, and B/Brisbane/60/2008-like antigens be used; and 3) a notice that recommendations for influenza diagnosis and antiviral use will be published before the start of the 2009--10 influenza season. Vaccination efforts should begin as soon as vaccine is available and continue through the influenza season. Approximately 83% of the United States population is specifically recommended for annual vaccination against seasonal influenza; however, <40% of the U.S. population received the 2008--09 influenza vaccine. These recommendations also include a summary of safety data for U.S. licensed influenza vaccines. These recommendations and other information are available at CDC's influenza website (<http://www.cdc.gov/flu>); any updates or supplements that might be required during the 2009--10 influenza season also can be found at this website. Vaccination and health-care providers should be alert to announcements of recommendation updates and should check the CDC influenza website periodically for additional information.

Introduction

In the United States, annual epidemics of seasonal influenza occur typically during the late fall through early spring. Influenza viruses can cause disease among persons in any age group, but rates of infection are highest among children (1--3). Rates of serious illness and death are highest among persons aged ≥ 65 years, children aged <2 years, and persons of any age who have medical conditions that place them at increased risk for complications from influenza (1,4,5). An annual average of approximately 36,000 deaths during 1990--1999 and 226,000 hospitalizations during 1979--2001 have been associated with influenza epidemics (6,7).

Annual influenza vaccination is the most effective method for preventing influenza virus infection and its complications. Influenza vaccine can be administered to any person aged >6 months who does not have contraindications to vaccination to reduce the likelihood of becoming ill with influenza or of transmitting influenza to others. Trivalent inactivated influenza vaccine (TIV) can be used for any person aged ≥ 6 months, including those with high-risk conditions ([Boxes 1](#) and [2](#)). Live, attenuated influenza vaccine (LAIV) may be used for healthy, nonpregnant persons aged 2--49 years. No preference is indicated for LAIV or TIV when considering vaccination of healthy, nonpregnant persons aged 2--49 years. Because the safety or effectiveness of LAIV has not been established in persons with underlying medical conditions that confer a higher risk for influenza complications, these persons should be vaccinated only with TIV. Influenza viruses undergo frequent antigenic change (i.e., antigenic drift); to gain immunity against viruses in circulation, patients must receive an annual vaccination against the influenza viruses that are predicted on the basis of viral surveillance data. . Although vaccination coverage has increased in recent years for many groups targeted for routine vaccination, coverage remains low among most of these groups, and strategies to improve vaccination coverage, including use of reminder/recall systems and standing orders programs, should be implemented or expanded.

public health clinics. In nonrandomized community-based controlled trials, reductions in ILI-related symptoms and medical visits among household contacts have been demonstrated in communities where vaccination programs among school-aged children were established compared with communities without such vaccination programs (295,314,315). Reducing influenza-related illness among children who are at high risk for influenza complications should continue to be a primary focus of influenza-prevention efforts. Children who should be vaccinated because they are at high risk for influenza complications include all children aged 6--59 months, children with certain medical conditions, children who are contacts of children aged <5 years (60 months) or of persons aged ≥ 50 years, and children who are contacts of persons at high risk for influenza complications because of medical conditions.

All children aged 6 months--8 years who have not received vaccination against influenza previously should receive 2 doses of vaccine the first influenza season that they are vaccinated. The second dose should be administered 4 or more weeks after the initial dose. When only 1 dose is administered to children aged 6 months--8 years during their first year of vaccination, 2 doses should be administered in the following season. However, 2 doses should only be administered in the first season of vaccination, or in the season that immediately follows if only 1 dose is administered in the first season. For example, children aged 6 months--8 years who were vaccinated for the first time with the 2008--09 influenza vaccine but received only 1 dose should receive 2 doses of the 2009--10 influenza vaccine. All other children aged 6 months--8 years who have previously received 1 or more doses of influenza vaccine at any time should receive 1 dose of the 2009--10 influenza vaccine. Children aged 6 months--8 years who received only a single vaccination during a season before 2007--08 should receive 1 dose of the 2009--10 influenza vaccine. If possible, both doses should be administered before onset of influenza season. However, vaccination, including the second dose, is recommended even after influenza virus begins to circulate in a community.

HCP and Other Persons Who Can Transmit Influenza to Those at High Risk

Healthy persons who are infected with influenza virus, including those with subclinical infection, can transmit influenza virus to persons at higher risk for complications from influenza. In addition to HCP, groups that can transmit influenza to high-risk persons and that should be vaccinated include

- employees of assisted living and other residences for persons in groups at high risk;
- persons who provide home care to persons in groups at high risk; and
- household contacts of persons in groups at high risk, including contacts such as children or mothers of newborns.

In addition, because children aged <5 years are at increased risk for influenza-related hospitalization (7,31,39,369,370) compared with older children, vaccination is recommended for their household contacts and out-of-home caregivers. Because influenza vaccines have not been licensed by FDA for use among children aged <6 months, emphasis should be placed on vaccinating contacts of these children.

Healthy HCP and persons aged 2--49 years who are contacts of persons in these groups and who are not contacts of severely immunosuppressed persons (see Close Contacts of Immunocompromised Persons) should receive either LAIV or TIV when indicated or requested. All other persons, including pregnant women, should receive TIV.

All HCP and persons in training for health-care professions should be vaccinated annually against influenza. Persons working in health-care settings who should be vaccinated include physicians, nurses, and other workers in both hospital and outpatient-care settings, medical emergency-response workers (e.g., paramedics and emergency medical technicians), employees of nursing home and long-term-care facilities who have contact with patients or residents, and students in these professions who will have contact with patients (359,360,371).

Facilities that employ HCP should provide vaccine to workers by using approaches that have been demonstrated to be effective in increasing vaccination coverage. Health-care administrators should consider the level of vaccination coverage among HCP to be one measure of a patient safety quality program and consider obtaining signed declinations from personnel who decline influenza vaccination for reasons other than medical contraindications (360,372,373). Influenza vaccination rates among HCP within facilities should be regularly measured and reported, and ward-, unit-, and specialty-specific coverage rates should be provided to staff and administration (360). Studies have demonstrated that organized campaigns can attain higher rates of vaccination among HCP with moderate effort and by using strategies that increase vaccine acceptance (358,360,374).

Efforts to increase vaccination coverage among HCP are supported by various national accrediting and professional organizations and in certain states by statute. The Joint Commission on Accreditation of Health-Care Organizations has approved an infection-control standard that requires accredited organizations to offer influenza vaccinations to staff, including volunteers and licensed independent practitioners with close patient contact. The standard became an accreditation requirement beginning January 1, 2007 (375). In addition, the Infectious Diseases Society of America has recommended mandatory vaccination for HCP, with a provision for declination of vaccination based on religious or medical reasons (376). Some states have regulations regarding vaccination of HCP in long-term-care facilities (377), require that health-care facilities offer influenza vaccination to HCP, or require that HCP either receive influenza vaccination or indicate a religious, medical, or philosophic reason for not being vaccinated (378,379).

Close Contacts of Immunocompromised Persons

Immunocompromised persons are at risk for influenza complications but might have inadequate protection after vaccination. Close contacts of immunocompromised persons, including HCP, should be vaccinated to reduce the risk for influenza transmission. TIV is recommended for vaccinating household members, HCP, and others who have close contact with severely immunosuppressed persons (e.g., patients with hematopoietic stem cell transplants) during those periods in which the immunosuppressed person requires care in a protective environment (typically defined as a specialized patient-care area with a positive airflow relative to the corridor, high-efficiency particulate air filtration, and frequent air changes) (360,380).

LAIV transmission from a recently vaccinated person causing clinically important illness in an immunocompromised contact has not been reported. The rationale for avoiding use of LAIV among HCP or other close contacts of severely immunocompromised patients is the theoretical risk that a live, attenuated vaccine virus could be transmitted to the severely immunosuppressed person. As a precautionary measure, HCP who receive LAIV should avoid providing care for severely immunosuppressed patients requiring a protected environment for 7 days after vaccination. Hospital visitors who have received LAIV should avoid contact with severely immunosuppressed persons in protected environments for 7 days after vaccination but should not be restricted from visiting less severely immunosuppressed patients.

No preference is indicated for TIV use by persons who have close contact with persons with lesser degrees of immunosuppression (e.g., persons with diabetes, persons with asthma who take corticosteroids, persons who have recently received chemotherapy or radiation but who are not being cared for in a protective environment as defined above, or persons infected with HIV) or for TIV use by HCP or other healthy nonpregnant persons aged 2--49 years in close contact with persons in all other groups at high risk.

Pregnant Women

Pregnant women and newborns are at risk for influenza complications, and all women who are pregnant

Acute health-care facilities (e.g., EDs and walk-in clinics) should offer vaccinations throughout the influenza season to persons for whom vaccination is recommended or provide written information regarding why, where, and how to obtain the vaccine. This written information should be available in languages appropriate for the populations served by the facility.

Nursing Homes and Other Long-Term--Care Facilities

Vaccination should be provided routinely to all residents of long-term--care facilities. If possible, all residents should be vaccinated at one time before influenza season. In the majority of seasons, TIV will become available to long-term--care facilities in October or November, and vaccination should commence as soon as vaccine is available. As soon as possible after admission to the facility, the benefits and risks of vaccination should be discussed and education materials provided (397). Signed consent is not required (398). Residents admitted after completion of the vaccination program at the facility should be vaccinated at the time of admission.

Since October 2005, CMS has required nursing homes participating in the Medicare and Medicaid programs to offer all residents influenza and pneumococcal vaccines and to document the results. According to the requirements, each resident is to be vaccinated unless contraindicated medically, the resident or a legal representative refuses vaccination, or the vaccine is not available because of shortage. This information is to be reported as part of the CMS Minimum Data Set, which tracks nursing home health parameters (395,399).

Acute-Care Hospitals

Hospitals should serve as a key setting for identifying persons at increased risk for influenza complications. Unvaccinated persons of all ages (including children) with high-risk conditions and persons aged 6 months--18 years or ≥ 50 years who are hospitalized at any time during the period when vaccine is available should be offered and strongly encouraged to receive influenza vaccine before they are discharged. Standing orders to offer influenza vaccination to all hospitalized persons should be considered.

Visiting Nurses and Others Providing Home Care to Persons at High Risk

Nursing-care plans should identify patients for whom vaccination is recommended, and vaccine should be administered in the home if necessary as soon as influenza vaccine is available and throughout the influenza season. Caregivers and other persons in the household (including children) should be referred for vaccination.

Other Facilities Providing Services to Persons Aged ≥ 50 Years

Facilities providing services to persons aged ≥ 50 years (e.g., assisted living housing, retirement communities, and recreation centers) should offer unvaccinated residents, attendees, and staff annual on-site vaccination before the start of the influenza season. Continuing to offer vaccination throughout the fall and winter months is appropriate. Efforts to vaccinate newly admitted patients or new employees also should be continued, both to prevent illness and to avoid having these persons serve as a source of new influenza infections. Staff education should emphasize the benefits for self, staff and patients of protection from influenza through vaccination.

Health-Care Personnel

Health-care facilities should offer influenza vaccinations to all HCP, including night, weekend, and temporary staff. Particular emphasis should be placed on providing vaccinations to workers who provide

direct care for persons at high risk for influenza complications. Efforts should be made to educate HCP regarding the benefits of vaccination and the potential health consequences of influenza illness for their patients, themselves, and their family members. All HCP should be provided convenient access to influenza vaccine at the work site, free of charge, as part of employee health programs (360,374,375).

Future Directions for Research and Recommendations Related to Influenza Vaccine

Although available influenza vaccines are effective and safe, additional research is needed to improve prevention efforts. Most mortality from influenza occurs among persons aged ≥ 65 years (6), and more immunogenic influenza vaccines are needed for this age group and other groups at high risk for mortality. Additional research also is needed to understand potential biases in estimating the benefits of vaccination among older adults in reducing hospitalizations and deaths (82,175,400). Additional studies of the relative cost-effectiveness and cost utility of influenza vaccination among children and adults, especially those aged < 65 years, are needed and should be designed to account for year-to-year variations in influenza attack rates, illness severity, hospitalization costs and rates, and vaccine effectiveness when evaluating the long-term costs and benefits of annual vaccination (401). Additional data on indirect effects of vaccination also are needed to quantify the benefits of influenza vaccination of HCP in protecting their patients (308) and the benefits of vaccinating children to reduce influenza complications among those at risk. Because expansions in ACIP recommendations for vaccination will lead to more persons being vaccinated, much larger research networks are needed that can identify and assess the causality of very rare events that occur after vaccination, including GBS. Ongoing studies of safety in pediatric populations with expanded recommendations are needed and are underway. These research networks also could provide a platform for effectiveness and safety studies in the event of a pandemic. A recent study showed that influenza vaccines contain structures that can induce anti-GM1 antibodies after inoculation into mice (402). Further research on potential biologic or genetic risk factors for GBS in humans also is needed (397). In addition, a better understanding is needed of how to motivate persons at risk to seek annual influenza vaccination.

ACIP continues to review new vaccination strategies to protect against influenza, including the possibility of expanding routine influenza vaccination recommendations toward universal vaccination or other approaches that will help reduce or prevent the transmission of influenza and reduce the burden of severe disease (403--408). The 2009 ACIP expansion of annual vaccination recommendations to include all children aged 6 months--18 years will require a substantial increase in resources for epidemiologic research to develop long-term studies capable of assessing the possible effects on community-level transmission. Additional planning to improve surveillance systems capable of monitoring effectiveness, safety and vaccine coverage, and further development of implementation strategies will also be necessary. In addition, as noted by the National Vaccine Advisory Committee, strengthening the U.S. influenza vaccination system will require improving vaccine financing and demand and implementing systems to help better understand the burden of influenza in the United States (409). Vaccination programs capable of delivering annual influenza vaccination to a broad range of the population could potentially serve as a resilient and sustainable platform for delivering vaccines and monitoring outcomes for other urgently required public health interventions (e.g., vaccines for pandemic influenza or medications to prevent or treat illnesses caused by acts of terrorism).

Seasonal Influenza Vaccine and Influenza Viruses of Animal Origin

Human infection with novel or nonhuman influenza A virus strains, including influenza A viruses of animal origin, is a nationally notifiable disease (410). Human infections with nonhuman or novel human influenza A virus should be identified quickly and investigated to determine possible sources of exposure, identify additional cases, and evaluate the possibility of human-to-human transmission because transmission patterns could change over time with variations in these influenza A viruses.

Vaccine Adverse Event Reporting System (VAERS)

Adverse events after influenza vaccination should be reported promptly to VAERS at <http://vaers.hhs.gov>, even if the reporter is unsure whether vaccine caused the event. Clinically significant adverse events that follow vaccination should be reported to VAERS at <http://www.vaers.hhs.gov>. Reports may be filed securely online or by telephone at 1-800-822-7967 to request reporting forms or other assistance.

National Vaccine Injury Compensation Program

The National Vaccine Injury Compensation Program (VICP), established by the National Childhood Vaccine Injury Act of 1986, as amended, provides a mechanism through which compensation can be paid on behalf of a person determined to have been injured or to have died as a result of receiving a vaccine covered by VICP. The Vaccine Injury Table lists the vaccines covered by VICP and the injuries and conditions (including death) for which compensation might be paid. If the injury or condition is not on the Table, or does not occur within the specified time period on the Table, persons must prove that the vaccine caused the injury or condition.

For a person to be eligible for compensation, the general filing deadlines for injuries require claims to be filed within 3 years after the first symptom of the vaccine injury; for a death, claims must be filed within 2 years of the vaccine-related death and not more than 4 years after the start of the first symptom of the vaccine-related injury from which the death occurred. When a new vaccine is covered by VICP or when a new injury/condition is added to the Table, claims that do not meet the general filing deadlines must be filed within 2 years from the date the vaccine or injury/condition is added to the Table for injuries or deaths that occurred up to 8 years before the Table change. Persons of all ages who receive a VICP-covered vaccine might be eligible to file a claim. Both the intranasal (LAIV) and injectable (TIV) trivalent influenza vaccines are covered under VICP. Additional information about VICP is available at <http://www.hrsa.gov/vaccinecompensation> or by calling 1-800-338-2382.

Additional Information Regarding Influenza Virus Infection Control Among Specific Populations

Each year, ACIP provides general, annually updated information regarding control and prevention of influenza. Other reports related to controlling and preventing influenza among specific populations (e.g., immunocompromised persons, HCP, hospital patients, pregnant women, children, and travelers) also are available in the following publications:

- [CDC. General recommendations on immunization: recommendations of the Advisory Committee on Immunization Practices \(ACIP\) and the American Academy of Family Physicians \(AAFP\). MMWR 2006;55\(No. RR-15\).](#)
- [CDC. Influenza vaccination of health-care personnel: recommendations of the Healthcare Infection Control Practices Advisory Committee \(HICPAC\) and the Advisory Committee on Immunization Practices \(ACIP\). MMWR 2006;55\(No. RR-2\).](#)
- [CDC. Recommended immunization schedules for persons aged 0--18 years---United States, 2009. MMWR 2009;57:Q1--4.](#)
- [CDC. Recommended adult immunization schedule---United States, 2009. MMWR 2009;57:Q1--4.](#)
- [CDC. Guidelines for preventing health-care--associated pneumonia, 2003: recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee. MMWR 2003;53\(No. RR-3\).](#)
- CDC. Respiratory hygiene/cough etiquette in health-care settings. Atlanta, GA: US Department of Health and Human Services, CDC; 2003. Available at <http://www.cdc.gov/flu/professionals/infectioncontrol/resphygiene.htm>.

- CDC. Prevention and control of vaccine-preventable diseases in long-term-care facilities. Atlanta, GA: US Department of Health and Human Services, CDC; 2006. Available at http://www.cdc.gov/flu/professionals/infection_control/longtermcare.htm.
- CDC. Vaccine safety. Atlanta, GA: US Department of Health and Human Services, CDC; 2009. Available at <http://www.cdc.gov/vaccinesafety/index.htm>.
- American College of Obstetricians and Gynecologists. Influenza vaccination and treatment during pregnancy. ACOG committee opinion no. 305. *Obstet Gynecol* 2004;104:1125--6.
- American Academy of Pediatrics. 2009 red book: report of the Committee on Infectious Diseases. 29th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2009.
- Bodnar UR, Maloney SA, Fielding KL, et al. Preliminary guidelines for the prevention and control of ILI among passengers and crew members on cruise ships. Atlanta, GA: US Department of Health and Human Services, CDC; 1999. Available at <http://www.cdc.gov/travel/files/pre-guidelines-flu-cruise-ships1999.ashx>.
- CDC. Infection control guidance for the prevention and control of influenza in acute-care facilities. Atlanta, GA: US Department of Health and Human Services, CDC; 2007. Available at <http://www.cdc.gov/flu/professionals/infectioncontrol/health-carefacilities.htm>.
- Food and Drug Administration. FDA pandemic influenza preparedness strategic plan. Washington, DC: Food and Drug Administration; 2007. Available at http://www.fda.gov/oc/op/pandemic/strategicplan03_07.html.
- World Health Organization. Recommendations for influenza vaccines. Geneva, Switzerland: World Health Organization; 2007. Available at <http://www.who.int/csr/disease/influenza/vaccinerecommendations/en/index.html>.
- American Heart Association and American College of Cardiology. Influenza vaccination as secondary prevention for cardiovascular disease. *Circulation* 2006;114:1549--53. Available at <http://circ.ahajournals.org/cgi/content/full/114/14/1549>.

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References

1. Monto AS, Kioumeh F. The Tecumseh Study of Respiratory Illness. IX. Occurrence of influenza in the community, 1966--1971. *Am J Epidemiol* 1975;102:553--63.
2. Glezen WP, Couch RB. Interpandemic influenza in the Houston area, 1974--76. *N Engl J Med* 1978;298:587--92.
3. Glezen WP, Greenberg SB, Atmar RL, et al. Impact of respiratory virus infections on persons with chronic underlying conditions. *JAMA* 2000;283:499--505.
4. Barker WH. Excess pneumonia and influenza associated hospitalization during influenza epidemics in the United States, 1970--78. *Am J Public Health* 1986;76:761--5.
5. Barker WH, Mullooly JP. Impact of epidemic type A influenza in a defined adult population. *Am J Epidemiol* 1980;112:798--811.
6. 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.
7. Thompson WW, Shay DK, Weintraub E, et al. Influenza-associated hospitalizations in the United States. *JAMA* 2004;292:1333--40.
8. CDC. CDC issues interim recommendations for the use of influenza antiviral medications in the



2009-10 INFLUENZA PREVENTION & CONTROL RECOMMENDATIONS

Additional Information about Vaccination of Specific Populations

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Children

All children aged 6 months--18 years should be vaccinated against influenza annually. In 2004, ACIP recommended routine vaccination for all children aged 6--23 months, and in 2006, ACIP expanded the recommendation to include all children aged 24--59 months. Recommendations to provide routine influenza vaccination to all children and adolescents aged 6 months--18 years are made on the basis of 1) accumulated evidence that influenza vaccine is effective and safe for children (see *Influenza Vaccine Efficacy, Effectiveness, and Safety*); 2) increased evidence that influenza has substantial adverse impacts among children and their contacts (e.g., school absenteeism, increased antibiotic use, medical care visits, and parental work loss) (see *Health-Care Use, Hospitalizations, and Deaths Attributed to Influenza*); and 3) an expectation that a simplified age-based influenza vaccine recommendation for all children and adolescents will improve vaccine coverage levels among children who already have a risk- or contact-based indication for annual influenza vaccination.

Children typically have the highest attack rates during community outbreaks of influenza and serve as a major source of transmission within communities. If sufficient vaccination coverage among children can be achieved, potential benefits include the indirect effect of reducing influenza among persons who have close contact with children and reducing overall transmission within communities. Achieving and sustaining community-level reductions in influenza will require mobilization of community resources and development of sustainable annual vaccination campaigns to assist health-care providers and vaccination programs in providing influenza vaccination services to children of all ages. In many areas, innovative community-based efforts, which might include mass vaccination programs in school or other community settings, will be needed to supplement vaccination services provided in health-care providers' offices or public health clinics. In nonrandomized community-based controlled trials, reductions in ILI-related symptoms and medical visits among household contacts have been demonstrated in communities where vaccination programs among school-aged children were established compared with communities without such vaccination programs. Reducing influenza-related illness among children who are at high risk for influenza complications should continue to be a primary focus of influenza-prevention efforts. Children who should be vaccinated because they are at high risk for influenza complications include all children aged 6--59 months, children with certain medical conditions, children who are contacts of children aged <5 years (60 months) or of persons aged 50 years and older, and children who are contacts of persons at high risk for influenza complications because of medical conditions.

Reducing influenza-related illness among children who are at high risk for influenza complications should continue to be a

primary focus of influenza-prevention efforts. Children who should be vaccinated because they are at high risk for influenza complications include all children aged 6--59 months, children with certain medical conditions, children who are contacts of children aged <09 i5 years (60 months) or persons aged 50 years and older, and children who are contacts of persons at high risk for influenza complications because of medical conditions. Influenza vaccines are not licensed by FDA for use among children aged <6 months. Because these infants are at higher risk for influenza complications compared with other child age groups, prevention efforts that focus on vaccinating household contacts and out-of-home caregivers to reduce the risk for influenza in these infants is a high priority.

All children aged 6 months--8 years who have not received vaccination against influenza previously should receive 2 doses of vaccine the first influenza season that they are vaccinated. The second dose should be administered 4 or more weeks after the initial dose. When only 1 dose is administered to children aged 6 months--8 years during their first year of vaccination, 2 doses should be administered in the following season. However, 2 doses should only be administered in the first season of vaccination, or in the season that immediately follows if only 1 dose is administered in the first season. For example, children aged 6 months--8 years who were vaccinated for the first time with the 2008--09 influenza vaccine but received only 1 dose should receive 2 doses of the 2009--10 influenza vaccine. All other children aged 6 months--8 years who have previously received 1 or more doses of influenza vaccine at any time should receive 1 dose of the 2009--10 influenza vaccine. Children aged 6 months--8 years who received only a single vaccination during a season before 2007--08 should receive 1 dose of the 2009--10 influenza vaccine. If possible, both doses should be administered before onset of influenza season. However, vaccination, including the second dose, is recommended even after influenza virus begins to circulate in a community.

Health Care Personnel (HCP) and Others Who Can Transmit Influenza to Those at High Risk

Healthy persons who are infected with influenza virus, including those with subclinical infection, can transmit influenza virus to persons at higher risk for complications from influenza. In addition to HCP, groups that can transmit influenza to high-risk persons and that should be vaccinated include

- employees of assisted living and other residences for persons in groups at high risk;
- persons who provide home care to persons in groups at high risk; and
- household contacts of persons in groups at high risk, including contacts such as children or mothers of newborns.

In addition, because children aged <5 years are at increased risk for influenza-related hospitalization compared with older children, vaccination is recommended for their household contacts and out-of-home caregivers. Because influenza vaccines have not been licensed by FDA for use among children aged <6 months, emphasis should be placed on vaccinating contacts of these children.

Healthy HCP and persons aged 2--49 years who are contacts of persons in these groups and who are not contacts of severely immunosuppressed persons (see Close Contacts of Immunocompromised Persons) should receive either LAIV or TIV when indicated or requested. All other persons, including pregnant women, should receive TIV.

All HCP and persons in training for health-care professions should be vaccinated annually against influenza. Persons working in health-care settings who should be vaccinated include physicians, nurses, and other workers in both hospital and outpatient-care settings, medical emergency-response workers (e.g., paramedics and emergency medical technicians), employees of nursing home and long-term--care facilities who have contact with patients or residents, and students in these professions who will have contact with patients.

Facilities that employ HCP should provide vaccine to workers by using approaches that have been demonstrated to be effective in increasing vaccination coverage. Health-care administrators should consider the level of vaccination coverage among HCP to be one measure of a patient safety quality program and consider obtaining signed declinations from

personnel who decline influenza vaccination for reasons other than medical contraindications. Influenza vaccination rates among HCP within facilities should be regularly measured and reported, and ward-, unit-, and specialty-specific coverage rates should be provided to staff and administration. Studies have demonstrated that organized campaigns can attain higher rates of vaccination among HCP with moderate effort and by using strategies that increase vaccine acceptance.

Efforts to increase vaccination coverage among HCP are supported by various national accrediting and professional organizations and in certain states by statute. The Joint Commission on Accreditation of Health-Care Organizations has approved an infection-control standard that requires accredited organizations to offer influenza vaccinations to staff, including volunteers and licensed independent practitioners with close patient contact. The standard became an accreditation requirement beginning January 1, 2007. In addition, the Infectious Diseases Society of America has recommended mandatory vaccination for HCP, with a provision for declination of vaccination based on religious or medical reasons. Some states have regulations regarding vaccination of HCP in long-term-care facilities, require that health-care facilities offer influenza vaccination to HCP, or require that HCP either receive influenza vaccination or indicate a religious, medical, or philosophic reason for not being vaccinated.

Close Contacts of Immunocompromised Persons

Immunocompromised persons are at risk for influenza complications but might have inadequate protection after vaccination. Close contacts of immunocompromised persons, including HCP, should be vaccinated to reduce the risk for influenza transmission. TIV is recommended for vaccinating household members, HCP, and others who have close contact with severely immunosuppressed persons (e.g., patients with hematopoietic stem cell transplants) during those periods in which the immunosuppressed person requires care in a protective environment (typically defined as a specialized patient-care area with a positive airflow relative to the corridor, high-efficiency particulate air filtration, and frequent air changes).

LAIV transmission from a recently vaccinated person causing clinically important illness in an immunocompromised contact has not been reported. The rationale for avoiding use of LAIV among HCP or other close contacts of severely immunocompromised patients is the theoretical risk that a live, attenuated vaccine virus could be transmitted to the severely immunosuppressed person. As a precautionary measure, HCP who receive LAIV should avoid providing care for severely immunosuppressed patients requiring a protected environment for 7 days after vaccination. Hospital visitors who have received LAIV should avoid contact with severely immunosuppressed persons in protected environments for 7 days after vaccination but should not be restricted from visiting less severely immunosuppressed patients.

No preference is indicated for TIV use by persons who have close contact with persons with lesser degrees of immunosuppression (e.g., persons with diabetes, persons with asthma who take corticosteroids, persons who have recently received chemotherapy or radiation but who are not being cared for in a protective environment as defined above, or persons infected with HIV) or for TIV use by HCP or other healthy nonpregnant persons aged 2--49 years in close contact with persons in all other groups at high risk.

Pregnant Women

Pregnant women and newborns are at risk for influenza complications, and all women who are pregnant or will be pregnant during influenza season should be vaccinated. The American College of Obstetricians and Gynecologists and the American Academy of Family Physicians also have recommended routine vaccination of all pregnant women. No preference is indicated for use of TIV that does not contain thimerosal as a preservative (see Vaccine Preservative [Thimerosal] in Multidose Vials of TIV) for any group recommended for vaccination, including pregnant women. LAIV is not licensed for use in pregnant women. However, pregnant women do not need to avoid contact with persons recently vaccinated with LAIV.



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Influenza Vaccination of Health-Care Personnel

Recommendations of the Healthcare Infection Control Practices Advisory Committee (HICPAC) and the Advisory Committee on Immunization Practices (ACIP)



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Influenza Vaccination of Health-Care Personnel

Recommendations of the Healthcare Infection Control Practices Advisory Committee (HICPAC) and the Advisory Committee on Immunization Practices (ACIP)

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Summary

This report summarizes recommendations of the Healthcare Infection Control Practices Advisory Committee (HICPAC) and the Advisory Committee on Immunization Practices (ACIP) concerning influenza vaccination of health-care personnel (HCP) in the United States. These recommendations apply to HCP in acute care hospitals, nursing homes, skilled nursing facilities, physician's offices, urgent care centers, and outpatient clinics, and to persons who provide home health care and emergency medical services. The recommendations are targeted at health-care facility administrators, infection-control professionals, and occupational health professionals responsible for influenza vaccination programs and influenza infection-control programs in their institutions. HICPAC and ACIP recommend that all HCP be vaccinated annually against influenza. Facilities that employ HCP are strongly encouraged to provide vaccine to their staff by using evidence-based approaches that maximize vaccination rates.

Introduction

Influenza transmission and outbreaks in hospitals (1–8) and nursing homes (9–13) are well documented. HCP can acquire influenza from patients or transmit influenza to patients and other staff. Despite the documented benefits of HCP influenza vaccination on patient outcomes (14, 15) and HCP absenteeism (16) and on reducing influenza infection among staff (16, 17), vaccination coverage among HCP remain low (i.e., <50%) (18). Because HCP provide care to patients at high risk for complications of influenza, HCP should be considered a high priority for expanding influenza vaccine use. In addition, older HCP (i.e., aged ≥ 65 years) and those who have underlying chronic medical conditions or who might be pregnant are at increased risk for influenza-related

complications. Achieving and sustaining high vaccination coverage among HCP will protect staff and their patients, and reduce disease burden and health-care costs.

This report summarizes recommendations of the Healthcare Infection Control Practices Advisory Committee (HICPAC) and the Advisory Committee on Immunization Practices (ACIP) concerning influenza vaccination of health-care personnel (HCP)* in the United States. These recommendations are targeted at health-care facility administrators, infection control professionals, and occupational health professionals responsible for influenza vaccination programs and influenza infection control programs in their institutions. HICPAC and ACIP recommend that all HCP be vaccinated annually against influenza. Facilities that employ HCP are strongly encouraged to provide vaccine to their staff by using

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* In this report, the term HCP refers to all paid and unpaid persons working in health-care settings who have the potential for exposure to infectious materials, including body substances, contaminated medical supplies and equipment, contaminated environmental surfaces, or contaminated air. HCP might include (but are not limited to) physicians, nurses, nursing assistants, therapists, technicians, emergency medical service personnel, dental personnel, pharmacists, laboratory personnel, autopsy personnel, students and trainees, contractual staff not employed by the health-care facility, and persons (e.g., clerical, dietary, housekeeping, maintenance, and volunteers) not directly involved in patient care but potentially exposed to infectious agents that can be transmitted to and from HCP. The recommendations in this report apply to HCP in acute care hospitals, nursing homes, skilled nursing facilities, physician's offices, urgent care centers, and outpatient clinics, and to persons who provide home health care and emergency medical services.

evidence-based approaches that maximize vaccination rates. This report supplements ACIP's previous statement regarding use of influenza vaccine and antiviral agents (1), which provides details regarding the epidemiology of influenza transmission in nonhealth-care settings, influenza vaccination of nonhealth-care personnel, composition of influenza vaccines, and use of antiviral medications.

Summary Recommendations

The summary recommendations contained in this report are categorized by using the HICPAC evidence ranking system (Table 1). The recommendations were drafted after review of peer-reviewed scientific articles, and whenever possible are based on well-designed studies; certain recommendations are based on strong theoretic rationale and expert opinion. All recommendations have been approved by HICPAC and ACIP. The committees involved in drafting and reviewing these recommendations included persons with expertise in infectious diseases, infection control, pediatrics, vaccinology, internal medicine, and public health. The recommendations are as follows:

- Educate HCP regarding the benefits of influenza vaccination and the potential health consequences of influenza illness for themselves and their patients, the epidemiology and modes of transmission, diagnosis, treatment, and nonvaccine infection control strategies, in accordance with their level of responsibility in preventing health-care-associated influenza (category IB).
- Offer influenza vaccine annually to all eligible HCP to protect staff, patients, and family members and to decrease HCP absenteeism. Use of either available vaccine (inactivated and live, attenuated influenza vaccine [LAIV]) is recommended for eligible persons. During periods when inactivated vaccine is in short supply, use of LAIV is especially encouraged when feasible for eligible HCP (category IA).
- Provide influenza vaccination to HCP at the work site and at no cost as one component of employee health pro-

grams. Use strategies that have been demonstrated to increase influenza vaccine acceptance, including vaccination clinics, mobile carts, vaccination access during all work shifts, and modeling and support by institutional leaders (category IB).

- Obtain a signed declination from HCP who decline influenza vaccination for reasons other than medical contraindications (category II).
- Monitor HCP influenza vaccination coverage and declination at regular intervals during influenza season and provide feedback of ward-, unit-, and specialty-specific rates to staff and administration (category IB).
- Use the level of HCP influenza vaccination coverage as one measure of a patient safety quality program (category II).

Background

Influenza Among HCP

A limited number of prospective and cross-sectional studies provide estimates of incidence of influenza and influenza-like illness (ILI) among HCP (17,19,20). In one serosurvey of HCP, 23% of HCP had documented serologic evidence of influenza infection after a mild influenza season; however, of these, 59% could not recall having influenza, and 28% could not recall any respiratory infection, suggesting a high proportion of asymptomatic illness (17). In a randomized trial of influenza vaccine among HCP, 13% of placebo recipients subsequently had influenza infection (18). In a cross-sectional survey of house staff, 37% reported ILI during an 8-month period (September–April); 9% reported more than one illness. Length of illness varied (range: 1–10 days; mean: 7 days), as did the number of days of work missed (range: 0–10 days; mean: 0.7 days) (20).

Efficacy and Effectiveness of Influenza Vaccines Among Adults

Trivalent inactivated influenza vaccine prevents influenza illness among approximately 70%–90% of healthy adults aged <65 years when the vaccine and circulating viruses are anti-

TABLE 1. Healthcare Infection Control Practices Advisory Committee categorization scheme for recommendations*

Category IA	Strongly recommended for implementation and strongly supported by well-designed experimental, clinical, or epidemiologic studies.
Category IB	Strongly recommended for implementation and supported by certain experimental, clinical, or epidemiologic studies and a strong theoretic rationale.
Category IC	Required for implementation, as mandated by federal or state regulation or standard.
Category II	Suggested for implementation and supported by suggestive clinical or epidemiologic studies or a theoretic rationale.
No recommendation	Unresolved issue; practices for which insufficient evidence or no consensus regarding efficacy exist.

*Categorized on the basis of existing scientific data, theoretic rationale, applicability, and economic impact.

genically similar (17,21–23). The effectiveness of inactivated influenza vaccine in preventing influenza illness might be lower when vaccine and circulating viruses are not well matched or among adults aged ≥ 65 years and persons with certain chronic conditions (e.g., diabetes, human immunodeficiency virus (HIV), or chronic obstructive pulmonary disease) (24–28). Vaccination of healthy adults also decreases work absenteeism and use of health-care resources, including antibiotics, when the vaccine and circulating viruses are well matched (17,21,23,29–31). In addition, influenza vaccine prevents secondary complications and reduces the risk for influenza-related hospitalization and death among adults aged ≥ 65 years with and without high-risk medical conditions (e.g., heart disease and diabetes) (32–36).

LAIV has demonstrated similar benefits in randomized controlled trials among healthy working adults aged 18–64 years. In one study, vaccination with LAIV reduced severe febrile illnesses 19% and upper respiratory tract illnesses 24%; LAIV use also was associated with fewer days of illness and of work lost, fewer health-care provider visits, and reduced use of prescription antibiotics and over-the-counter medications (37). These results were recorded during a season in which the vaccine and circulating influenza A (H3N2) strains were not well matched. In the same study, LAIV vaccination yielded similar benefits among a subset of healthy adults aged 18–49 years, and antibiotic use in this age group decreased 41%–51% (37). In one study, overall efficacy of LAIV and inactivated influenza vaccine in preventing laboratory-documented influenza was 85% and 71%, respectively (38).

Impact of HCP Vaccination on Influenza in Health-Care Settings

Vaccination of HCP is an important component of influenza prevention programs in the United States (18). Vaccination of HCP reduces transmission of influenza in health-care settings, staff illness and absenteeism, and influenza-related morbidity and mortality among persons at increased risk for severe influenza illness (14–17). Use of antiviral drugs used for chemoprophylaxis or treatment of influenza is an adjunct to (but not a substitute for) vaccination (18).

Transmission of Influenza in Health-Care Settings

Influenza outbreaks in hospitals (4,39) and long-term-care facilities (40) have been associated with low vaccination rates among HCP. In addition, higher vaccination levels among staff have been associated with a lower incidence of nosocomial influenza cases (14,15,39).

In one tertiary care facility in which routine surveillance for influenza was conducted, the relation between staff vaccination coverage and annual incidence of nosocomial influenza was assessed for 12 influenza seasons during 1987–2000. During this period, staff vaccination coverage increased from 4% during 1987–1988 to 67% during 1999–2000 ($p < 0.0001$), and the proportion of laboratory-confirmed cases of influenza that occurred among HCP decreased from 42% during 1990–1993 to 9% during 1997–2000 ($p < 0.0001$). The proportion of nosocomial cases among hospitalized patients decreased 32% to 0 ($p < 0.0001$). After controlling for potential confounders by using logistic regression, a significant and inverse relationship was demonstrated between vaccination rates among HCP and the rate of nosocomial influenza among patients, suggesting that staff vaccination contributed to the observed decline in the number of nosocomial influenza cases (39).

Staff Illness and Absenteeism

During an influenza season, HCP might acquire influenza from infected patients with resulting morbidity and absenteeism. The impact of influenza vaccination on staff illness and absenteeism has been evaluated in two randomized, placebo-controlled, double-blind trials. In one trial, HCP who received vaccine had 28% fewer documented lost work days attributable to respiratory infections (1.0 and 1.4, respectively; $p = 0.02$) and 28% fewer days on which they felt unable to work, whether they were on or off duty (2.5 and 3.5, respectively; $p = 0.02$). Vaccination did not reduce either the number of episodes (1.8 and 2.0, respectively) or the total number of days (13.5 and 14.6, respectively) of respiratory infection (16). In a second trial conducted in two large teaching hospitals for 3 consecutive years that measured serologically confirmed influenza, days of febrile respiratory illness, and days absent from work, HCP who received influenza vaccine had a substantially lower incidence of influenza than controls (1.7% and 13.4%, respectively) with an estimated vaccine efficacy against serologically defined influenza A and influenza B infection of 88% and 89%, respectively. HCP who received influenza vaccine also tended to have fewer total respiratory illnesses (28.7 and 40.6 per 100 persons, respectively; $p = 0.57$) and days of lost work (9.9 and 21.1 per 100 persons, respectively; $p = 0.41$) than did controls (17).

In a cross-sectional survey, similar reductions in staff illness episodes and days of illness were reported (20). Overall, compared with unvaccinated coworkers, vaccinated house staff reported 23% fewer ILIs (42 and 54 per 100 persons, respectively; $p = 0.03$), 27% fewer days of illness (80 and 115 per 100 persons, respectively; $p = 0.02$), and a 59% reduction in illness during vacation time (1.7% and 4.0% of persons,

respectively; $p = 0.08$). The two groups had a similar number of lost work days attributable to ILI (18 and 21 per 100 subjects, respectively; $p = 0.69$). During influenza season, vaccination was associated with reductions of 30% in ILI ($p = 0.05$), 43% in the proportion of house staff reporting illnesses associated with fever and cough ($p = 0.05$), and 63% in illnesses associated with fever and cough ($p = 0.03$). The inability to consistently demonstrate statistically significant decreases in absenteeism among staff who received vaccination is likely attributable to the finding that HCP tend to work despite illness (17,41).

Patient Outcomes

HCP who are clinically or subclinically infected can transmit influenza virus to other persons. Decreasing transmission of influenza from caregivers to persons at high risk might reduce influenza-related deaths among persons at high risk for complications from influenza.

Residents of long-term-care facilities are particularly vulnerable to influenza and influenza-related complications. In 1999, an estimated 1.6 million persons resided in nursing homes in the United States (42). During influenza outbreaks in long-term-care facilities, attack rates among residents have ranged as high as 25%–60%, with case-fatality rates of 10%–20% (13,43–45). When vaccine and epidemic strains are well matched, achieving increased vaccination rates among persons living in closed settings (e.g., nursing homes and other chronic-care facilities) and among staff can reduce the risk for outbreaks by inducing herd immunity (32).

Two randomized controlled trials have evaluated the impact of influenza vaccination of HCP on the outcomes of residents in nursing homes. In one study, staff vaccination was associated with a 43% decrease in incidence of ILI (odds ratio [OR] = 0.6; 95% confidence interval [CI] = 0.3–0.9) and a 44% decrease in overall mortality among facility residents, from 17% to 10% (OR = 0.6; 95% CI = 0.4–0.8) (15). No virologic data were provided in this study. In a second study, 20 long-term-care facilities were randomized to have vaccine routinely offered (intervention facilities) or not offered (control facilities) to their staff (14). Facilities were paired by number of beds and patient vaccination policies. Staff vaccination coverage was higher in intervention facilities than in control facilities (50.9% and 4.9%, respectively). Crude mortality rates were 42% lower among residents in facilities with higher staff vaccination coverage than those in control facilities (13.6% and 22.4%, respectively; OR = 0.6; 95% CI = 0.4–0.8; $p = 0.014$). Incidence of laboratory-confirmed influenza did not differ between the two groups (5.4% and 6.7%, respectively), but postmortem samples from pa-

tients in control facilities were more likely to be positive for influenza by a polymerase chain reaction test than samples from patients in intervention facilities (six [20%] of 30 and none of 17, respectively; $p = 0.055$), suggesting that in this study population, HCP vaccination reduced influenza-related mortality in patients despite not reducing the incidence of non-fatal influenza infection. In neither study was a significant association demonstrated between patient vaccination and mortality. Randomized trials assessing the impact of staff vaccination on patient outcomes in acute care facilities have not been conducted, but low staff vaccination coverage has been correlated with influenza outbreaks in hospitals (4,39).

Cost-Effectiveness of Influenza Vaccine

Cost-effectiveness studies of adults aged <65 years indicate that vaccination can reduce both direct medical costs and indirect costs from work absenteeism (21,23,29,30,46,47), resulting in 13%–44% fewer health-care provider visits, 18%–45% fewer lost workdays, 18%–28% fewer days working with reduced effectiveness, and a 25% decrease in antibiotic use for ILI (21,29,48,49). Among healthy persons aged 18–64 years, vaccination can save an estimated \$60–\$4,000 per illness, depending on the cost of vaccination, the influenza attack rate, and vaccine effectiveness against ILI (23). In another economic analysis, vaccination resulted in an average annual cost savings of \$13.66 per person vaccinated (50); however, other analyses have not demonstrated cost savings (21). Among studies of healthy young adults, >70% of the costs prevented were associated with reductions in lost work productivity.

Vaccination Coverage Levels Among HCP

During 1989–2003, HCP vaccination coverage levels in the United States increased substantially, from 10% to 40%; however, coverage levels have remained relatively constant since 1997 (18). One of the national health objectives for 2010 is to achieve HCP vaccination coverage levels of 60% (objective no. 14-29g) (51). Substantially lower vaccination rates have been reported among HCP who have contact with certain populations at high risk (12,52–54). In addition, HCP vaccination coverage varies by level and years of training, age, occupational group, and facility type (20,55,56).

Barriers to HCP Vaccination

Reported barriers to HCP receipt or acceptance of influenza vaccination include fear of vaccine side effects (particularly ILI symptoms) (20,55,57–61), insufficient time or

inconvenience (20), perceived ineffectiveness of the vaccine (20,55,58,59), medical contraindication (55), perceived low likelihood of contracting influenza (55,60,62), reliance on treatment with homeopathic medications (55,62), avoidance of medications (57), and fear of needles (57,59). Factors facilitating vaccine acceptance include a desire for self-protection (20,58,61), previous receipt of influenza vaccine (57,58,63–65), a desire to protect patients (61), and perceived effectiveness of vaccine (20).

Strategies for Improving HCP Vaccination Rates

Facilities that employ HCP are strongly encouraged to provide vaccine to staff by using evidence-based approaches that maximize vaccination rates. Successful HCP vaccination programs are multifaceted and combine publicity and education to combat fears and misconceptions about influenza and influenza vaccines, use of reminder recall systems, efforts to remove administrative and financial barriers, role modeling, and monitoring and feedback on vaccination coverage (66). In contrast, single-component interventions will likely have minimal effectiveness in achieving desired vaccination coverage levels (66,67).

Education and Campaigns

HCP knowledge, perceptions, and attitudes regarding influenza and influenza vaccination vary (20). Basic knowledge about influenza and influenza vaccination has been associated with vaccine receipt (57,68,69), and participation in structured in-service education or conferences has been associated with improved vaccination rates (62,65). Educational programs should emphasize the benefits of HCP vaccination for staff and patients (70). Organized campaigns that promote and make vaccine accessible can improve vaccination rates among HCP (52,71).

Role Models

Vaccination of senior medical staff or opinion leaders has been associated with higher vaccination acceptance among staff members under their leadership (55,69,72,73). For example, medical students who have contact with infectious disease specialists are more likely to be vaccinated (69).

Improved Access

Removing administrative barriers (e.g., costs) (71) and providing vaccine in locations and at times easily accessible by HCP can substantially improve vaccine acceptance

(40,52,55,72,74,75). In one survey, 33% of HCP reported that they would reject vaccination if they were required to pay for the vaccine (76).

Making vaccine readily accessible at congregate areas (e.g., clinics), during conferences, or by use of mobile carts (40,52,55,72) has been demonstrated to improve vaccination coverage rates. Use of mobile carts has been associated with increased vaccine acceptance during outbreaks and nonoutbreak situations (75,76). In a 3-year prospective study in a 630-bed acute care hospital, a sustained four- to fivefold increase in vaccination rates was associated with using mobile carts to deliver vaccine to staff rather than requiring HCP to visit an employee health center to receive vaccine. Provision of modest incentives also has been associated with improved vaccine acceptance among HCP (77). However, the benefits of vaccine deputies or peer-vaccinators have not been consistently associated with improved HCP vaccination (52).

Measurement and Feedback

HCP influenza vaccination coverage should be regularly measured and reported. Posting of vaccination coverage levels in different areas of the hospital is a component of successful vaccination programs (6). Monitoring vaccination coverage by facility area (e.g., ward or unit) or occupational group allows facilities to identify where vaccination levels are low and interventions should be targeted. In addition, HICPAC has recommended that HCP influenza vaccination coverage be used as a health-care quality measure in those states that mandate public reporting of health-care-associated infections (78).

The independent contribution of signed declination statements to improving HCP vaccination has not been studied. However, obtaining declination statements from HCP who refuse vaccination for reasons other than medical contraindications can assist facilities in identifying personnel who might require targeted education or other interventions to overcome barriers to vaccine acceptance. In addition, collection of such information will allow health-care facilities to determine what proportion of their staff are reached and offered vaccine.

Legislation and Regulation

Legislative and regulatory efforts have favorably affected hepatitis B vaccination rates among HCP (79,80). As of January 2005, a total of 13 states (Alabama, Arkansas, Kentucky, Maine, Maryland, New Hampshire, New York, Oklahoma, Oregon, Pennsylvania, Rhode Island, Texas, and Utah) and the District of Columbia were reported to have enacted regulations regarding influenza vaccination of staff in long-term-care facilities (67,81). However, because only one state

(Pennsylvania) has monitored the impact of its laws on nursing home staff vaccination rates, data are insufficient to assess the overall impact of these legislative efforts on HCP influenza vaccination coverage (CDC, unpublished data, 2005).

Recommendations for Using Inactivated Influenza Vaccine and LAIV Among HCP

All HCP should be vaccinated annually against influenza. Either inactivated influenza vaccine or LAIV can be used to reduce the risk for influenza among HCP (Table 2). LAIV is approved for use only among nonpregnant healthy persons aged 5–49 years. HCP who work with severely immunocompromised patients who require a protected environment should not receive LAIV. Inactivated influenza vaccine is approved for all persons aged >6 months who lack vaccine contraindications, including those with high-risk conditions (see Recommendations for Prioritization of Influenza Vaccine During the 2005–06 Influenza Season). Four influenza vaccines have been approved for use in the United States during the 2005–06 season (Table 3).

Inactivated Influenza Vaccine Recommendations

Dosage and Route

Because immunity declines during the year after vaccination, HCP eligible to receive inactivated influenza vaccine should be administered 1 dose of the current year's vaccine each year (82,83). The intramuscular route is recommended for inactivated influenza vaccine. Adults should be vaccinated in the deltoid muscle, ideally by using a needle of length >1 inch because needles of length <1 inch might not penetrate muscle tissue in certain adults (84).

Persons Who Should Not Be Vaccinated with Inactivated Influenza Vaccine

Inactivated influenza vaccine should not be administered to persons known to have anaphylactic hypersensitivity to eggs or to other components of the influenza vaccine without first consulting a physician (see Side Effects and Adverse Reactions Associated with Vaccination). Prophylactic use of antiviral agents is an option for preventing influenza among such persons. However, persons who have a history of anaphylactic

TABLE 2. Live, attenuated influenza vaccine (LAIV) compared with trivalent inactivated influenza vaccine

Factor	LAIV	Trivalent inactivated influenza vaccine
Route of administration	Intranasal spray	Intramuscular injection
Type of vaccine	Live virus	Killed virus
No. of included virus strains	3 (2 influenza A, 1 influenza B)	Same as LAIV
Vaccine virus strains updated	Annually	Same as LAIV
Frequency of administration	Annually	Same as LAIV
Approved age and risk groups*	Healthy persons aged 5–49 yrs	Persons aged ≥6 mos
Can be administered to family members or close contacts of immunosuppressed persons not requiring a protected environment	Yes	Yes
Can be administered to family members or close contacts of immunosuppressed persons requiring a protected environment (e.g., hematopoietic stemcell transplant recipient)	Inactivated influenza vaccine preferred	Yes
Can be administered to family members or close contacts of persons at high risk but not severely immunosuppressed	Yes	Yes
Can be simultaneously administered with other vaccines	Yes†	Yes§
If not simultaneously administered, can be administered within 4 weeks of another live vaccine	Prudent to space 4 weeks apart	Yes
If not simultaneously administered, can be administered within 4 weeks of an inactivated vaccine	Yes	Yes

* Populations at high risk from complications of influenza infection include persons aged ≥65 years; residents of nursing homes and other chronic-care facilities that house persons with chronic medical conditions; adults and children with chronic disorders of the pulmonary or cardiovascular systems; adults and children with chronic metabolic diseases (including diabetes mellitus), renal dysfunction, hemoglobinopathies, or immunosuppression; children and adolescents receiving long-term aspirin therapy (at risk for Reye syndrome after wild-type influenza infection); pregnant women; and children aged 6–23 months.

† No data are available regarding effect on safety or efficacy.

§ Inactivated influenza vaccine coadministration has been evaluated systematically only among adults with pneumococcal polysaccharide vaccine.

TABLE 3. Influenza vaccine manufacturers and projected supplies for the 2005–06 influenza season

Manufacturer	Vaccine	Formulation	Contains thimerosal as preservative		Age indication	No. of projected doses*
			Yes	No		
Sanofi Pasteur, Inc.	Fluzone ^{®†}	Multidose vial	Yes		≥6 mos	60 million [§]
		Single-dose prefilled 0.5-mL syringe or vial	No		≥36 mos	
		Single-dose prefilled 0.25-mL syringe	No		6–35 mos	
Chiron Corporation	Fluvirin ^{™†}	Multidose vial	Yes		≥4 yrs	18–26 million
		Single-dose prefilled 0.5-mL syringe	No [¶]		≥4 yrs	
GlaxoSmithKline, Inc.	Fluarix ^{™†}	Single-dose prefilled 0.5-mL syringe	No [¶]		≥18 yrs	8 million
MedImmune Vaccines, Inc.	FluMist ^{™**}	Single-dose nasal sprayer	No		Healthy, nonpregnant persons aged 5–49 yrs	3 million

* As of August 2005.

† Trivalent inactivated influenza vaccine.

§ Approximately 6–8 million of the 60 million doses were projected to be distributed in single-dose prefilled syringes or vials.

¶ These preparations contain traces of thimerosal from the production process.

** Live, attenuated influenza vaccine.

hypersensitivity to vaccine components but who are also at high risk for complications from influenza can benefit from vaccine after appropriate allergy evaluation and desensitization (18). Information regarding vaccine components is located in package inserts from each manufacturer. Persons with acute febrile illness typically should not be vaccinated until their symptoms have abated. However, minor illnesses with or without fever do not contraindicate use of influenza vaccine.

LAIV Recommendations

LAIV licensed for use in the United States (FluMist[™] manufactured by MedImmune, Inc., Gaithersburg, Maryland [http://www.medimmune.com]) is a live, trivalent, intranasally administered vaccine that is

- attenuated, producing mild or no signs or symptoms related to influenza virus infection;
- temperature-sensitive, a property that limits the replication of the vaccine viruses at 100.4°–102.2° F (38° C–39° C) and thus restricts LAIV viruses from replicating efficiently in human lower airways; and
- cold-adapted, replicating efficiently at 77° F (25° C), a temperature that is permissive for replication of LAIV viruses but restrictive for replication of different wild-type viruses.

The immunogenicity of the approved LAIV has been assessed in multiple studies (85–91). LAIV virus strains replicate primarily in nasopharyngeal epithelial cells. The protective mechanisms induced by vaccination with LAIV are not completely understood but appear to involve both serum and nasal secretory antibodies. No single laboratory measurement closely correlates with protective immunity induced by LAIV.

Shedding and Transmission of Vaccine Viruses

One concern regarding use of LAIV among HCP has been the potential for transmitting vaccine virus from persons receiving vaccine to nonimmune patients at high risk. Available data indicate that children and adults vaccinated with LAIV can shed vaccine viruses for >2 days after vaccination, although in lower titers than typically occur with shedding of wild-type influenza viruses. Shedding should not be equated with person-to-person transmission of vaccine viruses, although transmission of shed vaccine viruses from vaccinated persons to nonvaccinated persons has been documented in rare instances among children in a day care center (92).

In one study of 20 healthy vaccinated adults aged 18–49 years, the majority of vaccine virus shedding occurred within the first 3 days after vaccination, although in one vaccinated person, viral shedding was detected on day 7 after vaccination (93). No vaccine viruses were shed >10 days after vaccination, and duration or type of symptoms associated with receipt of LAIV did not correlate with duration of shedding of vaccine viruses (93). In another study of 14 healthy adults aged 18–49 years, 50% of vaccinated persons had viral antigen detected by direct immunofluorescence or rapid antigen tests within 7 days of vaccination; the majority of viral shedding was detected on day 2 or 3 (94). Person-to-person transmission of vaccine viruses was not assessed in either of these studies.

One study conducted in a child care center assessed transmissibility of vaccine viruses from 98 vaccinated persons to 99 unvaccinated controls aged 8–36 months; 80% of vaccine recipients shed one or more virus strains (mean duration: 7.6 days). One influenza type B isolate was recovered from a placebo recipient and confirmed to be vaccine-type virus; the

isolate retained the cold-adapted, temperature-sensitive, attenuated phenotype and possessed the same genetic sequence as a virus shed from a vaccine recipient in the same children's play group. The placebo recipient from whom the influenza type B vaccine virus was isolated exhibited symptoms that were similar to those experienced by vaccine recipients. The estimated probability of acquiring vaccine virus after close contact with a single LAIV recipient in this child care population was 0.6%–2.4% (92).

Using LAIV for HCP

LAIV may be used for vaccination of healthy, nonpregnant persons aged 5–49 years, including HCP. When feasible, use of LAIV for vaccination of eligible HCP is especially encouraged during periods of limited supply of inactivated influenza vaccine because use of LAIV for HCP might increase availability of inactivated influenza vaccine for persons at high risk. Use of LAIV also provides an alternative vaccine strategy for HCP who avoid influenza vaccination because of an aversion to intramuscular injections.

Persons Who Should Not Receive LAIV

The following populations should not receive LAIV:

- persons aged <5 years or >50 years;[†]
- persons with asthma, reactive airways disease or other chronic disorders of the pulmonary or cardiovascular systems; persons with other underlying medical conditions, including metabolic diseases such as diabetes, renal dysfunction, and hemoglobinopathies; or persons with known or suspected immunodeficiency diseases or who are receiving immunosuppressive therapies;[†]
- children or adolescents receiving aspirin or other salicylates (because of the association of Reye syndrome with wild-type influenza infection);[†]
- persons with a history of Guillain-Barré syndrome (GBS);
- pregnant women;[†]
- persons who have close contact with severely immunosuppressed persons (e.g., patients with hematopoietic stem cell transplants) during those periods in which the immunosuppressed person requires care in a protective environment; or
- persons with a history of hypersensitivity, including anaphylaxis, to any of the components of LAIV or to eggs.

LAIV Dosage and Administration

Eligible HCP should receive 1 dose of LAIV. LAIV is intended only for intranasal administration and should not be administered by the intramuscular, intradermal, or intra-

venous route. Administration can be accomplished by holding an individual sprayer in the palm of the hand until thawed, with subsequent immediate administration. Alternatively, the vaccine can be thawed in a refrigerator and stored at 35.6° F–46.4° F (2° C–8° C) for ≤60 hours before use. Vaccine should not be refrozen after thawing. LAIV is supplied in a prefilled single-use sprayer containing 0.5 mL of vaccine. Approximately 0.25 mL is sprayed into the first nostril while the recipient is in the upright position. An attached dose-divider clip is removed from the sprayer to administer the second half of the dose into the other nostril. If the vaccine recipient sneezes after administration, the dose should not be repeated.

LAIV may be administered to persons with minor acute illnesses (e.g., diarrhea or mild upper respiratory tract infection, with or without fever). However, if clinical judgment indicates the presence of nasal congestion that might impede delivery of vaccine to the nasopharyngeal mucosa, deferral of administration should be considered until resolution of the illness.

Whether concurrent administration of LAIV with other vaccines affects the safety or efficacy of either LAIV or the simultaneously administered vaccine is unknown. In the absence of specific data indicating interference, adherence to ACIP's general recommendations for vaccination is prudent (95). Inactivated vaccines do not interfere with the immune response to other inactivated vaccines or to live vaccines. An inactivated vaccine can be administered either simultaneously or at any time before or after LAIV. Whenever possible, two live vaccines not administered on the same day should be administered >4 weeks apart.

Recommended Vaccines for HCP Who Have Close Contact with Severely Immunosuppressed Persons

Inactivated influenza vaccine is the preferred vaccine for use among HCP who have close contact with severely immunosuppressed persons (e.g., patients with hematopoietic stem cell transplants) during those periods in which the immunosuppressed person requires care in a protective environment. The rationale for not using LAIV among HCP caring for such patients is the theoretic risk that a live, attenuated vaccine virus could be transmitted to the severely immunosuppressed person. HCP who receive LAIV should refrain from contact with severely immunosuppressed patients for 7 days after vaccine receipt. In addition, visitors who have received LAIV should refrain from contact with severely immunosuppressed persons for 7 days after vaccination; however, such persons need not be excluded from visitation of patients who are not

[†] These persons should receive inactivated influenza vaccine.

severely immunosuppressed. Either inactivated influenza vaccine or LAIV can be used to vaccinate HCP who have close contact with persons with lesser degrees of immunosuppression (e.g., persons with diabetes, persons with asthma taking corticosteroids, or persons infected with human immunodeficiency virus) or who are in close contact with all other persons at high risk.

Personnel Who May Administer LAIV

The risk of acquiring vaccine viruses from the environment is unknown but likely small. Nevertheless, severely immunosuppressed persons should not administer LAIV because introduction of low levels of vaccine virus into the environment probably cannot be avoided when administering LAIV. However, other persons with conditions placing them at high risk for influenza complications (e.g., pregnant women, persons with asthma, and persons aged >50 years) may administer LAIV.

LAIV and Use of Influenza Antiviral Medications

How LAIV coadministration with influenza antiviral medications affects safety and efficacy has not been studied. However, because influenza antivirals reduce replication of influenza viruses, LAIV should not be administered until 48 hours after cessation of influenza antiviral therapy, and influenza antiviral medications should not be administered for 2 weeks after receipt of LAIV.

LAIV Storage

LAIV must be stored at -59° F (-15° C) or colder. LAIV may be stored in frost-free freezers without using a freezer-box. LAIV can be thawed in a refrigerator and stored at 35.6° F–46.4° F (2° C–8° C) for ≤60 hours before use. It should not be refrozen after thawing. Additional information regarding LAIV storage is available at <http://www.FluMist.com>.

Vaccination of Specific HCP Populations

Pregnant Women

Pregnant women are at increased risk for influenza-related complications (96–103) and hospitalizations (104). Therefore, all HCP who are pregnant during the influenza season should be vaccinated against influenza. However, pregnant women should receive only inactivated influenza vaccine; LAIV is not recommended for use during pregnancy. Inactivated influenza vaccine may be administered in any trimester. One study of influenza vaccination of approximately 2,000 pregnant women demonstrated no adverse fetal effects associated with receipt of inactivated influenza vaccine (105).

Breastfeeding Mothers

Influenza vaccine does not affect the safety of mothers who are breastfeeding or their infants. Breastfeeding does not adversely affect the immune response and is not a contraindication for vaccination.

Persons Infected with HIV

Detailed information on the use of influenza vaccine among persons infected with HIV has been published previously (18). Because influenza can result in serious illness and influenza vaccination can result in the production of protective antibody titers, vaccination with inactivated vaccine will benefit HIV-infected persons, including those that are pregnant.

Timing of Annual Influenza Vaccination of HCP

Timing of Organized Vaccination Campaigns

Planning for influenza campaigns should begin as early as February or March (106). The optimal time to vaccinate HCP is during October–November. Beginning in October each year, health-care facilities should offer influenza vaccinations to all full- and part-time staff. Particular emphasis should be placed on vaccinating HCP who care for persons at high risk. Vaccination programs should educate HCP regarding the benefits of vaccination and the potential health consequences of influenza illness for themselves and their patients. As part of employee health programs, all HCP should be provided convenient access to free influenza vaccine at the work site (107).

Vaccination in December and Later

To improve vaccine coverage among HCP, influenza vaccine should continue to be offered in December and throughout the influenza season as long as vaccine supplies are available, even after influenza activity has been documented in the community. In the United States, seasonal influenza activity can increase as early as October or November, but influenza activity has not reached peak levels in the majority of recent seasons until late December–early March. Therefore, although the timing of influenza activity can vary by region, vaccine administered after November is likely to be beneficial in the majority of influenza seasons. Adults achieve peak antibody protection against influenza infection 2 weeks after vaccination (108,109).

Recommendations for Prioritization of Influenza Vaccination During the 2005–06 Influenza Season

As a result of influenza vaccine distribution delays or supply shortages in the United States during recent influenza seasons (110,111), in September 2005, CDC issued recommendations for prioritizing the use of inactivated vaccine during the 2005–06 influenza season to ensure that early vaccine is available for those at the highest risk for complications from influenza (112). On the basis of uncertainties in doses and distribution, CDC recommended that the following groups receive priority for inactivated influenza vaccine until October 24, 2005:

- persons aged ≥ 65 years with and without comorbid conditions,
- residents of long-term-care facilities,
- persons aged 2–64 years with comorbid conditions,
- children aged 6–23 months,
- pregnant women,
- HCP who provide direct patient care, and
- household contacts and out-of-home caregivers of children aged < 6 months (112).

These groups correspond to tiers 1A–1C in the table of inactivated influenza vaccine priority groups in the event of vaccination supply disruption that was published previously (113). After October 24, 2005, all persons were eligible for vaccination.

Tiered use of prioritization was not recommended for LAIV administration. LAIV may be administered at any time for vaccination of nonpregnant healthy persons aged 5–49 years, including the majority of HCP, other persons in close contact with persons at high risk for influenza-related complications, and others desiring protection against influenza (18).

Side Effects and Adverse Reactions Associated with Vaccination

Inactivated Influenza Vaccine

When educating HCP regarding potential side effects, providers should emphasize that 1) inactivated influenza vaccine contains noninfectious killed viruses and cannot cause influenza; and 2) coincidental respiratory disease unrelated to influenza vaccination can occur after vaccination. The occurrence of vaccine-related side effects has had limited to no impact on rates of absenteeism among HCP (16,17).

Local Reactions

The most frequent side effect of vaccination (affecting 10%–64% of patients) is soreness at the vaccination site, typically lasting < 2 days (21,114–116). Local reactions typically are mild and rarely interfere with a person's ability to conduct everyday activities. In a controlled trial, only body aches (25.1%) were reported more frequently after inactivated influenza vaccine than placebo-injection (20.8%) (117).

Systemic Reactions

Fever, malaise, myalgia, and other systemic symptoms can occur after vaccination with inactivated vaccine and most often affect persons (e.g., infants) with no previous exposure to the influenza virus antigens in the vaccine (118,119). Such reactions typically begin 6–12 hours after vaccination and can persist for 1–2 days. Recent placebo-controlled trials demonstrate that among older persons and healthy young adults, administration of split-virus (i.e., detergent-disrupted virion) influenza vaccine is not associated with higher rates of systemic symptoms (e.g., fever, malaise, myalgia, and headache) compared with placebo injections (21,114–116). No increase in asthma exacerbations has been documented in association with receipt of influenza vaccine (117).

Severe Adverse Events

Immediate and presumably allergic reactions (e.g., hives, angioedema, allergic asthma, and systemic anaphylaxis) rarely occur after influenza vaccination (120). These reactions probably result from hypersensitivity to certain vaccine components; the majority of reactions probably are caused by residual egg protein. Although current influenza vaccines contain only a limited quantity of egg protein, this protein can induce immediate hypersensitivity reactions among persons who have severe egg allergy. Persons who have had hives or swelling of the lips or tongue, or who have experienced acute respiratory distress or collapse after eating eggs should consult a physician for appropriate evaluation to help determine if vaccine should be administered. Persons who have documented immunoglobulin E (IgE)-mediated hypersensitivity to eggs, including those who have had occupational asthma or other allergic responses to egg protein, might also be at increased risk for allergic reactions to influenza vaccine, and consultation with a physician should be considered. Protocols have been published for administering influenza vaccine safely to persons with egg allergies (121–123).

Hypersensitivity reactions to any vaccine component can occur. Although exposure to vaccines containing thimerosal can

lead to induction of hypersensitivity, the majority of patients do not have reactions to thimerosal when it is administered as a component of vaccines, even when patch or intradermal tests for thimerosal allergy indicate hypersensitivity (124,125). When reported, hypersensitivity to thimerosal typically has consisted of local, delayed hypersensitivity reactions (124).

GBS

Investigations to date indicate no substantial increase in GBS associated with influenza vaccines (other than the 1976 swine influenza vaccine) (126–130). If current influenza vaccines pose a risk for GBS, the estimated risk is approximately one additional case per million persons vaccinated, with the total combined number of GBS cases peaking 2 weeks after vaccination (131). This estimated risk for GBS is substantially less than the risk for severe influenza, which can be prevented by vaccination among all age groups, especially persons aged ≥ 65 years and those who have medical indications for influenza vaccination. The potential benefits of influenza vaccination in preventing serious illness, hospitalization, and death substantially outweigh the possible risks for experiencing vaccine-associated GBS. The average case-fatality ratio for GBS is 6% and increases with age (132,133). No evidence indicates that the case-fatality ratio for GBS differs among vaccinated persons and those not vaccinated.

Incidence of GBS among the general population is low, but persons with a history of GBS have a substantially greater likelihood of subsequently experiencing GBS than persons without such a history (128,134). Whether influenza vaccination might increase the risk for recurrence of GBS is unknown; for this reason, persons who are not at high risk for severe influenza complications and who are known to have experienced GBS within 6 weeks after a previous influenza vaccination should not receive vaccine. Chemoprophylaxis using influenza antivirals might be an alternative for such persons. Although data are limited, for the majority of persons who have a history of GBS and who are at high risk for severe complications from influenza, the established benefits of influenza vaccination justify yearly vaccination. Health-care professionals should promptly report all clinically significant adverse events after influenza vaccination to the Vaccine Adverse Event Reporting System (VAERS), even if evidence is lacking that the vaccine caused the event.

LAIV

Until additional data are available, persons at high risk for experiencing complications from influenza infection (e.g.,

immunocompromised patients; patients with asthma, cystic fibrosis, or chronic obstructive pulmonary disease; or persons aged ≥ 65 years) should not be vaccinated with LAIV. Protection from influenza among these groups should be accomplished by using inactivated influenza vaccine.

Among adults, runny nose or nasal congestion (28%–78%), headache (16%–44%), and sore throat (15%–27%) have been reported more often among vaccine recipients than placebo recipients (37,135,136). In one clinical trial among a subset of healthy adults aged 18–49 years, signs and symptoms reported more frequently among LAIV recipients ($n = 2,548$) than placebo recipients ($n = 1,290$) within 7 days after each dose included cough (13.9% and 10.8%, respectively); runny nose (44.5% and 27.1%, respectively); sore throat (27.8% and 17.1%, respectively); chills (8.6% and 6.0%, respectively); and tiredness or weakness (25.7% and 21.6%, respectively) (37). Pneumonia, bronchitis, bronchiolitis, or central nervous system events have not been observed more frequently among LAIV than among placebo recipients.

Severe Adverse Events

Serious adverse events associated with receipt of LAIV among healthy adults aged 18–49 years occur at a rate of $<1\%$ (137). However, surveillance should continue for adverse events that might not have been detected in previous studies. Health-care professionals should promptly report to VAERS all clinically significant adverse events after LAIV administration, even if evidence is lacking that the vaccine caused the event.

Additional Information Regarding Influenza Infection Control in Health-Care Settings

Additional information on controlling and preventing influenza in health-care settings is available in the following publications:

- CDC. Prevention and control of influenza: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2005;54(No. RR-8):1–40.
- Garner JS, Hospital Infection Control Practices Advisory Committee. Guideline for isolation precautions in hospitals. Infect Control Hosp Epidemiol 1996;17:53–80.
- CDC. Guidelines for preventing health-care-associated pneumonia, 2003: recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee. MMWR 2003;53(No. RR-3):1–36.
- CDC. Respiratory hygiene/cough etiquette in health-care settings. Atlanta, GA: US Department of Health and

Human Services, CDC; 2003. Available at <http://www.cdc.gov/flu/professionals/infectioncontrol/resphygiene.htm>.

- Bradley SF. The Long-Term-Care Committee of the Society for Healthcare Epidemiology of America. Prevention of influenza in long-term care facilities. *Infect Control Hosp Epidemiol* 1999;20:629–37.
- Sneller V-P, Izurieta H, Bridges C, et al. Prevention and control of vaccine-preventable diseases in long-term care facilities. *Journal of the American Medical Directors Association* 2000;1(Suppl):S2–37.
- Bridges CB, Kuehnert MJ, Hall CB. Transmission of influenza: implications for control in healthcare settings. *Clin Infect Dis* 2003;37:1094–101.
- CDC. Detection and control of influenza outbreaks in acute care facilities. Atlanta, GA: US Department of Health and Human Services, CDC; 2001. Available at <http://www.cdc.gov/ncidod/hip/INFECTFluBook2001.pdf>.
- Talbot TR, Bradley SE, Cosgrove SE, Ruef C, Siegel JD, Weber DJ. Influenza vaccination of healthcare workers and vaccine allocation for healthcare workers during vaccine shortages. *Infect Control Hosp Epidemiol* 2005;26:882–90.

References

1. Malavaud S, Malavaud B, Sandres K, et al. Nosocomial outbreak of influenza virus A (H3N2) infection in a solid organ transplant department. *Transplantation* 2001;72:535–7.
2. Maltezos HC, Drancourt M. Nosocomial influenza in children. *J Hosp Infect* 2003;55:83–91.
3. Weinstock DM, Eagan J, Malak SA, et al. Control of influenza A on a bone marrow transplant unit. *Infect Control Hosp Epidemiol* 2000;21:730–2.
4. Cunney RJ, Bialachowski A, Thornley D, Smaill FM, Pennie RA. An outbreak of influenza A in a neonatal intensive care unit. *Infect Control Hosp Epidemiol* 2000;21:449–54.
5. Hall CB, Douglas RG Jr. Nosocomial influenza infection as a cause of intercurrent fevers in infants. *Pediatrics* 1975;55:673–7.
6. Salgado CD, Farr BM, Hall KK, Hayden FG. Influenza in the acute hospital setting. *Lancet Infect Dis* 2002;2:145–55.
7. Kapila R, Lintz DI, Tecson FT, Ziskin L, Louria DB. A nosocomial outbreak of influenza A. *Chest* 1977;71:576–9.
8. Sartor C, Zandotti C, Romain F, et al. Disruption of services in an internal medicine unit due to a nosocomial influenza outbreak. *Infect Control Hosp Epidemiol* 2002;23:615–9.
9. Mast EE, Harmon MW, Gravenstein S, et al. Emergence and possible transmission of amantadine-resistant viruses during nursing home outbreaks of influenza A (H3N2). *Am J Epidemiol* 1991;134:988–97.
10. Drinka PJ, Krause P, Schilling M, Miller BA, Shult PA, Gravenstein S. Report of an outbreak: nursing home architecture and influenza-A attack rates. *J Am Geriatr Soc* 1996;44:910–3.
11. Degelau J, Somani SK, Cooper SL, Guay DRP, Crossley KB. Amantadine-resistant influenza in a nursing facility. *Arch Intern Med* 1992;152:390–2.
12. Coles FB, Balzano GJ, Morse DL. An outbreak of influenza A (H3N2) in a well immunized nursing home population. *J Am Geriatr Soc* 1989;40:589–92.
13. Morens DM, Rash VM. Lessons from a nursing home outbreak of influenza A. *Infect Control Hosp Epidemiol* 1995;16:275–80.
14. Carman WF, Elder AG, Wallace LA, et al. Effects of influenza vaccination of health-care workers on mortality of elderly people in long-term care: a randomised controlled trial. *Lancet* 2000;355(9198):93–7.
15. Potter J, Stott DJ, Roberts MA, et al. Influenza vaccination of health care workers in long-term-care hospitals reduces the mortality of elderly patients. *J Infect Dis* 1997;175:1–6.
16. Saxen H, Virtanen M. Randomized, placebo-controlled double blind study on the efficacy of influenza immunization on absenteeism of health care workers. *Pediatr Infect Dis J* 1999;18:779–83.
17. Wilde JA, McMillan JA, Serwint J, Butta J, O’Riordan MA, Steinhoff MC. Effectiveness of influenza vaccine in health care professionals: a randomized trial. *JAMA* 1999;281:908–13.
18. CDC. Prevention and control of influenza: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* 2005;54(No. RR-8):1–40.
19. Elder AG, O’Donnell B, McCrudden EA, Symington IS, Carman WF. Incidence and recall of influenza in a cohort of Glasgow healthcare workers during the 1993–4 epidemic: results of serum testing and questionnaire. *BMJ* 1996;313(7067):1241–2.
20. Lester RT, McGeer A, Tomlinson G, Detsky AS. Use of, effectiveness of, and attitudes regarding influenza vaccine among house staff. *Infect Control Hosp Epidemiol* 2003;24:839–44.
21. Bridges CB, Thompson WW, Meltzer MI, et al. Effectiveness and cost-benefit of influenza vaccination of healthy working adults: a randomized controlled trial. *JAMA* 2000;284:1655–63.
22. Palache AM. Influenza vaccines. A reappraisal of their use. *Drugs* 1997;54:841–56.
23. Demicheli V, Jefferson T, Rivetti D, Deeks J. Prevention and early treatment of influenza in healthy adults. *Vaccine* 2000;18:957–1030.
24. Blumberg EA, Albano C, Pruett T, et al. The immunogenicity of influenza virus vaccine in solid organ transplant recipients. *Clin Infect Dis* 1996;22:295–302.
25. Dorrell L, Hassan I, Marshall S, Chakraverty P, Ong E. Clinical and serological responses to an inactivated influenza vaccine in adults with HIV infection, diabetes, obstructive airways disease, elderly adults and healthy volunteers. *Int J STD AIDS* 1997;8:776–9.
26. Govaert TM, Thijs CT, Masurel N, Sprenger MJ, Dinant GJ, Knottnerus JA. The efficacy of influenza vaccination in elderly individuals. A randomized double-blind placebo-controlled trial. *JAMA* 1994;272:1661–5.
27. McElhane JE, Beattie BL, Devine R, Grynock R, Toth EL, Bleackley RC. Age-related decline in interleukin 2 production in response to influenza vaccine. *J Am Geriatr Soc* 1990;38:652–8.
28. CDC. Assessment of the effectiveness of the 2003–04 influenza vaccine among children and adults—Colorado, 2003. *MMWR* 2003;53:707–10.
29. 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.
30. Campbell DS, Rumley MH. Cost-effectiveness of the influenza vaccine in a healthy, working-age population. *J Occup Environ Med* 1997;39:408–14.

31. Smith JW, Pollard R. Vaccination against influenza: a five-year study in the Post Office. *J Hyg (Lond)* 1979;83:157-70.
32. Patriarca PA, Weber JA, Parker RA, et al. Risk factors for outbreaks of influenza in nursing homes. A case-control study. *Am J Epidemiol* 1986;124:114-9.
33. Gross PA, Hermogenes AW, Sacks HS, Lau J, Levandowski RA. The efficacy of influenza vaccine in elderly persons. A meta-analysis and review of the literature. *Ann Intern Med* 1995;123:518-27.
34. Mullooly JP, Bennett MD, Hornbrook MC, et al. Influenza vaccination programs for elderly persons: cost-effectiveness in a health maintenance organization. *Ann Intern Med* 1994;121:947-52.
35. Nordin J, Mullooly J, Poblete S, et al. Influenza vaccine effectiveness in preventing hospitalizations and deaths in persons 65 years or older in Minnesota, New York, and Oregon: data from 3 health plans. *J Infect Dis* 2001;184:665-70.
36. Hak E, Nordin J, Wei F, et al. Influence of high-risk medical conditions on the effectiveness of influenza vaccination among elderly members of 3 large managed-care organizations. *Clin Infect Dis* 2002;35:370-7.
37. Nichol KL, Mendelman PM, Mallon KP, et al. Effectiveness of live, attenuated intranasal influenza virus vaccine in healthy, working adults: a randomized controlled trial. *JAMA* 1999;282:137-44.
38. Treanor JJ, Kotloff K, Betts RF, et al. Evaluation of trivalent, live, cold-adapted (CAIV-T) and inactivated (TIV) influenza vaccines in prevention of virus infection and illness following challenge of adults with wild-type influenza A (H1N1), A (H3N2), and B viruses. *Vaccine* 1999;18:899-906.
39. Salgado CD, Giannetta ET, Hayden FG, Farr BM. Preventing nosocomial influenza by improving the vaccine acceptance rate of clinicians. *Infect Control Hosp Epidemiol* 2004;25:923-8.
40. Saito R, Suzuki H, Oshitani H, Sakai T, Seki N, Tanabe N. The effectiveness of influenza vaccine against influenza A (H3N2) virus infections in nursing homes in Niigata, Japan, during the 1998-1999 and 1999-2000 seasons. *Infect Control Hosp Epidemiol* 2002;23:82-6.
41. Nguyen-Van-Tam J, Granfield R, Pearson J, Fleming D, Keating N. Do influenza epidemics affect patterns of sickness absence among British hospital staff? *Infect Control Hosp Epidemiol* 1999;20:691-4.
42. Jones A. The National Nursing Home Survey: 1999 summary. National Center for Health Statistics. *Vital Health Stat* 2002;13(152):1-125.
43. Horman JT, Stetler HC, Israel E, Sorley D, Schipper MT, Joseph JM. An outbreak of influenza A in a nursing home. *Am J Public Health* 1986;76:501-4.
44. Meiklejohn G, Hall H. Unusual outbreak of influenza A in a Wyoming nursing home. *J Am Geriatr Soc* 1987;35:742-6.
45. Goodman RA, Orenstein WA, Munro TF, Smith SC, Sikes RK. Impact of influenza A in a nursing home. *JAMA* 1982;247:1451-3.
46. Office of Technology Assessment. Cost effectiveness of influenza vaccination. Washington, DC: US Government Printing Office; 1981. Available at http://www.wws.princeton.edu/ota/disk3/1981/8112_n.html.
47. Mixeu MA, Vespa GN, Forleo-Neto E, Toniolo-Neto J, Alves PM. Impact of influenza vaccination on civilian aircrew illness and absenteeism. *Aviat Space Environ Med* 2002;73:876-80.
48. Nichol KL, Mallon KP, Mendelman PM. Cost benefit of influenza vaccination in healthy, working adults: an economic analysis based on the results of a clinical trial of trivalent live attenuated influenza virus vaccine. *Vaccine* 2003;21:2207-17.
49. Nichol KL, Mendelman P. Influence of clinical case definitions with differing levels of sensitivity and specificity on estimates of the relative and absolute health benefits of influenza vaccination among healthy working adults and implications for economic analyses. *Virus Res* 2004;103:3-8.
50. Nichol KL. Cost-benefit analysis of a strategy to vaccinate healthy working adults against influenza. *Arch Intern Med* 2001;161:749-59.
51. US Department of Health and Human Services. Healthy people 2010 (conference ed, in 2 vols). Washington, DC: US Department of Health and Human Services; 2000. Available at <http://www.health.gov/healthypeople>.
52. Bryant KA, Stover B, Cain L, Levine GL, Siegel J, Jarvis WR. Improving influenza immunization rates among healthcare workers caring for high-risk pediatric patients. *Infect Control Hosp Epidemiol* 2004;25:912-7.
53. Ikeda RM, Drabkin PD. Influenza A outbreaks in nursing homes [Comment]. *J Am Geriatr Soc* 1992;40:1288.
54. Odelin MF, Pozzetto B, Aymard M, Defayolle M, Jolly-Million J. Role of influenza vaccination in the elderly during an epidemic of A/H1N1 virus in 1988-1989: clinical and serological data. *Gerontology* 1993;39:109-16.
55. Sartor C, Tissot-Dupont H, Zandotti C, Martin F, Roques P, Drancourt M. Use of a mobile cart influenza program for vaccination of hospital employees. *Infect Control Hosp Epidemiol* 2004;25:918-22.
56. Russell DW, Cameron DJ, Lockey RF, Behnke RH, Sinnott JT, Ganguly R. Influenza vaccination acceptance among health care professionals. *Vaccine* 1991;9:691-2.
57. Heimberger T, Chang HG, Shaikh M, Crotty L, Morse D, Birkhead G. Knowledge and attitudes of healthcare workers about influenza: why are they not getting vaccinated? *Infect Control Hosp Epidemiol* 1995;16:412-5.
58. Ong AK, Srimanunthiphol J, Frankel RI. Influenza vaccination status of healthcare workers and the extent of their domestic contact with individuals at high risk for influenza-related complications. *Infect Control Hosp Epidemiol* 2000;21:735-7.
59. Goldstein AO, Kincade JE, Gamble G, Bearman RS. Policies and practices for improving influenza immunization rates among healthcare workers. *Infect Control Hosp Epidemiol* 2004;25:908-11.
60. Begue RE, Gee SQ. Improving influenza immunization among healthcare workers. *Infect Control Hosp Epidemiol* 1998;19:518-20.
61. LaVela SL, Smith B, Weaver FM, Legro MW, Goldstein B, Nichol K. Attitudes and practices regarding influenza vaccination among healthcare workers providing services to individuals with spinal cord injuries and disorders. *Infect Control Hosp Epidemiol* 2004;25:933-40.
62. Harbarth S, Siegrist CA, Schira JC, Wunderli W, Pittet D. Influenza immunization: improving compliance of healthcare workers. *Infect Control Hosp Epidemiol* 1998;19:337-42.
63. Weingarten S, Riedinger M, Bolton LB, Miles P, Ault M. Barriers to influenza vaccine acceptance. A survey of physicians and nurses. *Am J Infect Control* 1989;17:202-7.
64. Nichol KL, Hauge M. Influenza vaccination of healthcare workers. *Infect Control Hosp Epidemiol* 1997;18:189-94.
65. Watanakunakorn C, Ellis G, Gemmel D. Attitude of healthcare personnel regarding influenza immunization. *Infect Control Hosp Epidemiol* 1993;14:17-20.

66. Briss PA, Rodewald LE, Hinman AR, et al. Reviews of evidence regarding interventions to improve vaccination coverage in children, adolescents, and adults. The Task Force on Community Preventive Services. *Am J Prev Med* 2000;18(1 Suppl):97-140.
67. Poland GA, Tosh P, Jacobson RM. Requiring influenza vaccination for health care workers: seven truths we must accept. *Vaccine* 2005;23:2251-5.
68. Martinello RA, Jones L, Topal JE. Correlation between healthcare workers' knowledge of influenza vaccine and vaccine receipt. *Infect Control Hosp Epidemiol* 2003;24:845-7.
69. Nafziger DA, Herwaldt LA. Attitudes of internal medicine residents regarding influenza vaccination. *Infect Control Hosp Epidemiol* 1994;15:32-5.
70. Manuel DG, Henry B, Hockin J, Naus M. Health behavior associated with influenza vaccination among healthcare workers in long-term-care facilities. *Infect Control Hosp Epidemiol* 2002;23:609-14.
71. McArthur MA, Simor AE, Campbell B, McGeer A. Influenza vaccination in long-term-care facilities. *Infect Control Hosp Epidemiol* 1999;20:499-503.
72. Ohrt CK, McKinney WP. Achieving compliance with influenza immunization of medical house staff and students. A randomized controlled trial. *JAMA* 1992;267:1377-80.
73. 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.
74. Pachucki CT, Pappas SA, Fuller GF, Krause SL, Lentino JR, Schaaff DM. Influenza A among hospital personnel and patients. Implications for recognition, prevention, and control. *Arch Intern Med* 1989;149:77-80.
75. Adal KA, Flowers RH, Anglim AM, et al. Prevention of nosocomial influenza. *Infect Control Hosp Epidemiol* 1996;17:641-8.
76. Steiner M, Vermeulen LC, Mullahy J, Hayney MS. Factors influencing decisions regarding influenza vaccination and treatment: a survey of healthcare workers. *Infect Control Hosp Epidemiol* 2002;23:625-7.
77. Shannon SC. Community hospitals can increase staff influenza vaccination rates. *Am J Public Health* 1993;83:1174-5.
78. McKibben L, Horan TC, Tokars JI, et al. Guidance on public reporting of healthcare-associated infections: recommendations of the Healthcare Infection Control Practices Advisory Committee. *Infect Control Hosp Epidemiol* 2005;26:580-7.
79. Agerton TB, Mahoney FJ, Polish LB, Shapiro CN. Impact of the bloodborne pathogens standard on vaccination of healthcare workers with hepatitis B vaccine. *Infect Control Hosp Epidemiol* 1995;16:287-91.
80. US Department of Labor, Occupational Safety and Health Administration. 2a CFR Part 1910.1030. Occupational exposure to bloodborne pathogens: final rule. *Federal Register* 1991;56:64004-182.
81. Stewart A, Cox M, Rosenbaum S. The epidemiology of U.S. immunization law: immunization requirements for staff and residents of long-term care facilities under state laws/regulations. Washington, DC: George Washington University School of Public Health and Health Services; 2005. Available at <http://www.gwumc.edu/sphhs/healthpolicy/immunization/EUSIL-LTC-report.pdf>.
82. Cate TR, Couch RB, Parker D, Baxter B. Reactogenicity, immunogenicity, and antibody persistence in adults given inactivated influenza virus vaccines—1978. *Rev Infect Dis* 1983;5:737-47.
83. Kunzel W, Glathe H, Engelmann H, Van Hoecke C. Kinetics of humoral antibody response to trivalent inactivated split influenza vaccine in subjects previously vaccinated or vaccinated for the first time. *Vaccine* 1996;14:1108-10.
84. Poland GA, Borrud A, Jacobson RM, et al. Determination of deltoid fat pad thickness. Implications for needle length in adult immunization. *JAMA* 1997;277:1709-11.
85. Riddiough MA, Sisk JE, Bell JC. Influenza vaccination. *JAMA* 1983;249:3189-95.
86. King JC Jr, Lagos R, Bernstein DI, et al. Safety and immunogenicity of low and high doses of trivalent live cold-adapted influenza vaccine administered intranasally as drops or spray to healthy children. *J Infect Dis* 1998;177:1394-7.
87. Belshe RB, Gruber WC, Mendelman PM, et al. Correlates of immune protection induced by live, attenuated, cold-adapted, trivalent, intranasal influenza virus vaccine. *J Infect Dis* 2000;181:1133-7.
88. Boyce TG, Gruber WC, Coleman-Dockery SD, et al. Mucosal immune response to trivalent live attenuated intranasal influenza vaccine in children. *Vaccine* 1999;18:82-8.
89. Zangwill KM, Droge J, Mendelman P, et al. Prospective, randomized, placebo-controlled evaluation of the safety and immunogenicity of three lots of intranasal trivalent influenza vaccine among young children. *Pediatr Infect Dis J* 2001;20:740-6.
90. Bernstein DI, Yan L, Treanor J, Mendelman PM, Belshe R. Effect of yearly vaccinations with live, attenuated, cold-adapted, trivalent, intranasal influenza vaccines on antibody responses in children. *Pediatr Infect Dis J* 2003;22:28-34.
91. Nolan T, Lee MS, Cordova JM, et al. Safety and immunogenicity of a live-attenuated influenza vaccine blended and filled at two manufacturing facilities. *Vaccine* 2003;21:1224-31.
92. Vesikari T. Randomized, double-blind, placebo-controlled trial of the safety and transmissibility and phenotypic stability of a live, attenuated, cold-adapted influenza virus vaccine (CAIV-T) in children attending day care [Abstract G-450]. Presented at the 41st Annual Interscience Conference on Antimicrobial Agents and Chemotherapy (ICAAC); Chicago, Illinois, December 16-19, 2001.
93. Talbot TR, Crocker DD, Peters J, et al. Duration of virus shedding after trivalent intranasal live attenuated influenza vaccination in adults. *Infect Control Hosp Epidemiol* 2005;26:494-500.
94. Ali T, Scott N, Kallas W, et al. Detection of influenza antigen with rapid antibody-based tests after intranasal influenza vaccination (FluMist). *Clin Infect Dis* 2004;38:760-2.
95. CDC. General recommendations on immunization: recommendations of the Advisory Committee on Immunization Practices (ACIP) and the American Academy of Family Physicians (AAFP). *MMWR* 2002;51(No. RR-2):1-36.
96. Freeman DW, Barno A. Deaths from Asian influenza associated with pregnancy. *Am J Obstet Gynecol* 1959;78:1172-5.
97. Widelock D, Csizmas L, Klein S. Influenza, pregnancy, and fetal outcome. *Public Health Rep* 1963;78:1-11.
98. Harris JW. Influenza occurring in pregnant women: a statistical study of thirteen hundred and fifty cases. *JAMA* 1919;72:978-80.
99. Irving WL, James DK, Stephenson T, et al. Influenza virus infection in the second and third trimesters of pregnancy: a clinical and seroepidemiological study. *BJOG* 2000;107:1282-9.
100. Kort BA, Cefalo RC, Baker VV. Fatal influenza A pneumonia in pregnancy. *Am J Perinatol* 1986;3:179-82.

101. Kirshon B, Faro S, Zurawin RK, Samo TC, Carpenter RJ. Favorable outcome after treatment with amantadine and ribavirin in a pregnancy complicated by influenza pneumonia. A case report. *J Reprod Med* 1988;33:399–401.
102. Schoenbaum SC, Weinstein L. Respiratory infection in pregnancy. *Clin Obstet Gynecol* 1979;22:293–300.
103. Shahab SZ, Glezen WP. Influenza viruses. In: Gonik B, ed. *Viral diseases in pregnancy*. New York, NY: Springer-Verlag; 1994.
104. Neuzil KM, Reed GW, Mitchel EF, Simonsen L, Griffin MR. Impact of influenza on acute cardiopulmonary hospitalizations in pregnant women. *Am J Epidemiol* 1998;148:1094–102.
105. Heinonen OP, Shapiro S, Monson RR, Hartz SC, Rosenberg L, Slone D. Immunization during pregnancy against poliomyelitis and influenza in relation to childhood malignancy. *Int J Epidemiol* 1973;2:229–35.
106. National Foundation for Infectious Diseases. Call to action: influenza immunization among health-care personnel, 2003. Bethesda, MD: National Foundation for Infectious Diseases; 2003. Available at <http://www.nfid.org/publications/calltoaction.pdf>.
107. CDC. Interventions to increase influenza vaccination of health-care workers—California and Minnesota. *MMWR* 2005;54:196–9.
108. Gross PA, Russo C, Dran S, Cataruozolo P, Munk G, Lancey SC. Time to earliest peak serum antibody response to influenza vaccine in the elderly. *Clin Diagn Lab Immunol* 1997;4:491–2.
109. Brokstad KA, Cox RJ, Olofsson J, Jonsson R, Haaheim LR. Parenteral influenza vaccination induces a rapid systemic and local immune response. *J Infect Dis* 1995;171:198–203.
110. CDC. Updated recommendations from the Advisory Committee on Immunization Practices in response to delays in supply of influenza vaccine for the 2000–2001 season. *MMWR* 2000;49:888–92.
111. CDC. Delayed influenza vaccine availability for 2001–02 season and supplemental recommendations of the Advisory Committee on Immunization Practices. *MMWR* 2001;50:582–5.
112. CDC. Update: influenza vaccine supply and recommendations for prioritization during the 2005–06 influenza season. *MMWR* 2005;54:850.
113. CDC. Tiered use of inactivated influenza vaccine in the event of a vaccine shortage. *MMWR* 2005;54:749–50.
114. Govaert TM, Dinant GJ, Aretz K, Masurel N, Sprenger MJ, Knottnerus JA. Adverse reactions to influenza vaccine in elderly people: randomised double blind placebo controlled trial. *BMJ* 1993;307(6910):988–90.
115. Margolis KL, Nichol KL, Poland GA, Pluhar RE. Frequency of adverse reactions to influenza vaccine in the elderly. A randomized, placebo-controlled trial. *JAMA* 1990;264:1139–41.
116. Nichol KL, Margolis KL, Lind A, et al. Side effects associated with influenza vaccination in healthy working adults. A randomized, placebo-controlled trial. *Arch Intern Med* 1996;156:1546–50.
117. American Lung Association Asthma Clinical Research Centers. The safety of inactivated influenza vaccine in adults and children with asthma. *N Engl J Med* 2001;345:1529–36.
118. Scheifele DW, Bjornson G, Johnston J. Evaluation of adverse events after influenza vaccination in hospital personnel. *CMAJ* 1990;142:127–30.
119. Barry DW, Mayner RE, Hochstein HD, et al. Comparative trial of influenza vaccines. II. Adverse reactions in children and adults. *Am J Epidemiol* 1976;104:47–59.
120. Bierman CW, Shapiro GG, Pierson WE, Taylor JW, Foy HM, Fox JP. Safety of influenza vaccination in allergic children. *J Infect Dis* 1977;136(Suppl):S652–5.
121. James JM, Zeiger RS, Lester MR, et al. Safe administration of influenza vaccine to patients with egg allergy. *J Pediatr* 1998;133:624–8.
122. Murphy KR, Strunk RC. Safe administration of influenza vaccine in asthmatic children hypersensitive to egg proteins. *J Pediatr* 1985;106:931–3.
123. Zeiger RS. Current issues with influenza vaccination in egg allergy. *J Allergy Clin Immunol* 2002;110:834–40.
124. Aberer W. Vaccination despite thimerosal sensitivity. *Contact Dermatitis* 1991;24:6–10.
125. Kirkland LR. Ocular sensitivity to thimerosal: a problem with hepatitis B vaccine? *South Med J* 1990;83:497–9.
126. Schonberger LB, Bregman DJ, Sullivan-Bolyai JZ, et al. Guillain-Barré syndrome following vaccination in the National Influenza Immunization Program, United States, 1976–1977. *Am J Epidemiol* 1979;110:105–23.
127. Safranek TJ, Lawrence DN, Kurland LT, et al. Reassessment of the association between Guillain-Barré syndrome and receipt of swine influenza vaccine in 1976–1977: results of a two-state study. *Expert Neurology Group. Am J Epidemiol* 1991;133:940–51.
128. Hurwitz ES, Schonberger LB, Nelson DB, Holman RC. Guillain-Barré syndrome and the 1978–1979 influenza vaccine. *N Engl J Med* 1981;304:1557–61.
129. Kaplan JE, Katona P, Hurwitz ES, Schonberger LB. Guillain-Barré syndrome in the United States, 1979–1980 and 1980–1981. Lack of an association with influenza vaccination. *JAMA* 1982;248:698–700.
130. Chen R, Kent J, Rhodes PH, et al. Investigation of a possible association between influenza vaccination and Guillain-Barré syndrome in the United States, 1990–1991 [Abstract 40]. *Post Marketing Surveillance* 1992;6:5–6.
131. Lasky T, Terracciano GJ, Magder L, et al. The Guillain-Barré syndrome and the 1992–1993 and 1993–1994 influenza vaccines. *N Engl J Med* 1998;339:1797–802.
132. Ropper AH. The Guillain-Barré syndrome. *N Engl J Med* 1992;326:1130–6.
133. Prevots DR, Sutter RW. Assessment of Guillain-Barré syndrome mortality and morbidity in the United States: implications for acute flaccid paralysis surveillance. *J Infect Dis* 1997;175 (Suppl 1):S151–5.
134. Barohn RJ, Saperstein DS. Guillain-Barré syndrome and chronic inflammatory demyelinating polyneuropathy. *Semin Neurol* 1998;18:49–61.
135. Jackson LA, Holmes SJ, Mendelman PM, Huggins L, Cho I, Rhorer J. Safety of a trivalent live attenuated intranasal influenza vaccine, FluMist, administered in addition to parenteral trivalent inactivated influenza vaccine to seniors with chronic medical conditions. *Vaccine* 1999;17:1905–9.
136. King JC Jr, Treanor J, Fast PE, et al. Comparison of the safety, vaccine virus shedding, and immunogenicity of influenza virus vaccine, trivalent, types A and B, live cold-adapted, administered to human immunodeficiency virus (HIV)-infected and non-HIV-infected adults. *J Infect Dis* 2000;181:725–8.
137. Izurieta HS, Haber P, Ball R, et al. Post-licensure surveillance of the first live, cold-adapted influenza vaccine in the U.S. [Abstract]. *Pharmacoepidemiol Drug Saf* 2004;13(Suppl):S145.

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TEMPLATE POLICY STATEMENT

Protect Your Patients.
Protect Yourself.



Influenza Immunization
Among Health Care Workers

An APIC Member Initiative

[YOUR INSTITUTION'S NAME] Policy for Influenza Immunization of Health Care Workers

Influenza is a serious infection that causes an average of 36,000 deaths and 114,000 hospitalizations in the United States each year.¹ Health care workers* are at high risk for acquiring influenza infection because of their exposure to ill patients, as well as their exposure in the community. Health care workers infected with influenza can spread the virus to patients in their care.²⁻⁴ In fact, research suggests that health care workers can be a key source of institutional outbreaks, contributing to increased morbidity and mortality among vulnerable patients.¹ Health care workers encounter patients throughout the influenza season in a variety of settings, including medical practices, general hospitals, specialty hospitals, pediatric hospitals,^{5,6} long-term care facilities,⁷ emergency departments,⁸ ambulatory care settings, rehabilitation facilities and home-care sites.

Vaccination is the primary means of reducing transmission and preventing influenza infection, yet immunization rates among health care workers remain low. Only 36 percent of workers who have direct contact with patients are immunized annually, despite long-standing recommendations issued by the Centers for Disease Control and Prevention (CDC) and the Association for Professionals in Infection Control and Epidemiology (APIC) and other national health care organizations.^{1,9,10}

Greater emphasis needs to be placed on improving influenza immunization rates among health care workers to help ensure patient safety and protection—especially for patients at increased risk of influenza-related complications.⁷ Immunization also provides personal protection for health care workers and minimizes workforce absenteeism during the influenza season.¹¹

TRANSMISSION

Influenza is transmitted by direct and indirect contact and by droplet contact. There may be an airborne component to transmission as well. Therefore, the virus is easily spread from person to person via coughing, sneezing, and contact with contaminated items and surfaces. The virus can spread rapidly, especially in classrooms, households, offices, and medical settings.

Individuals are generally infectious 1-4 days before the onset of symptoms; however, only around 50% of infected persons will develop classical symptoms of influenza, making exclusion of infected health care workers difficult.^{1,12} Moreover, individuals remain infectious five or more days after symptoms appear. Studies show health care personnel are more likely than staff in other areas to work through or return to work sooner during illness, thus increasing the likelihood of transmitting the virus to patients.¹³

INSTITUTIONAL INFLUENZA OUTBREAKS

Institutional influenza outbreaks can have serious implications for both the patient and health care provider. These events can put patients at risk, result in or exacerbate existing staff shortages, curtail admissions, and increase health care costs. An outbreak in a tertiary neonatal intensive care unit (NICU) in the year 2000 included 19 infants, one of whom died. Only 15 percent of staff in the facility had been immunized against influenza. Although investigators could not pinpoint the source of the outbreak, a health care worker was the suspected source; since influenza-like-illness was not found in the mothers of these infants.¹⁴

A 2001 report documented an outbreak that included four influenza cases among patients in a 12-bed, single-room transplant unit. Three of the four affected patients had no visitors between admission and influenza infection to account for the spread. Investigators concluded that health care workers were the likely source of transmission.¹⁵

A very large outbreak in the early 1990s occurred in a nursing home in New York. Nineteen percent of residents developed influenza. A total of 34 individuals developed pneumonia; 19 were hospitalized, and two died. In this facility, only 10 percent of health care workers were immunized.¹⁶

While index cases are not always identifiable, health care workers can easily propagate an outbreak as they move from patient to patient. It is also clear that unvaccinated health care workers can be the index case for influenza in a facility, potentially posing a threat to high-risk patients and other workers.

ECONOMIC IMPACT OF OUTBREAKS

Influenza outbreaks are associated with substantial direct and indirect costs. An outbreak in an internal medicine ward of a French hospital in 1999, in which 41 percent of patients and 23 percent of staff were infected, resulted in 14 days of staff sick leave and suspension of all admissions to the ward, including eight that were previously scheduled. The total cost of the outbreak in this small ward was estimated at \$34,000 (U.S. dollars).¹⁷ Amantadine resistance was documented in a small pediatric NICU outbreak. Oseltamivir, an expensive alternative therapy, was used to halt the outbreak instead. In a bone marrow transplant unit, Oseltamivir was also used in place of prophylactic amantadine during an outbreak because concomitant use of immuno-suppressant therapy and amantadine has been shown to increase the incidence of patient falls, which could have had dire consequences in these patients.¹⁸

Ensuring the health and safety of health care workers has additional implications for patient safety and health care cost containment. Hiring replacement workers often means assuming additional costs beyond those associated with salary. Studies show that using pool staff in place of experienced unit staff increases the incidence of medical errors. On occasions when staff members work a double shift, it has been shown that attention decreases after 12 hours of work.¹⁹

ROLE OF HEALTH CARE FACILITIES

Health care facilities have an important role to play in maximizing influenza vaccination rates among health care workers. Every facility should develop and implement comprehensive influenza vaccination programs for employees.^{8,9}

RECOMMENDATIONS

[NAME OF INSTITUTION] recommends the following measures be implemented to increase influenza immunization rates among its health care workers and improve patient safety and personal health.

- Health care workers should receive an annual influenza immunization to prevent spread of the virus to vulnerable patients.
- Develop an influenza immunization program that is implemented annually, to
 - Educate health care workers about the importance of influenza immunization in health care settings and the low risk of adverse events associated with immunization;²⁰
 - Increase vaccine demand among health care workers;
 - Reduce barriers to immunization of health care workers by developing programs that increase access to immunization and reduce the cost of the vaccine;²¹ and
 - Facilitate the influenza vaccination process, for example, through the use of standing orders issued by the Occupational Health Program for influenza vaccination of health care workers.
- Monitor annual immunization rates of employees and provide feedback through the infection control and patient safety programs.
- Monitor and track influenza rates among health care workers and compare those figures to this group's immunization rates. Providing this information may stimulate health care workers to seek vaccination.
- Work with public health officials to track community incidence of influenza, using data from emergency rooms, physicians' offices, and clinics. As the incidence increases, infection control and hospital administration should work together to identify pending admissions of potential influenza cases and to establish parameters for visitor restrictions.

References

1. CDC. Prevention and control of influenza: recommendations of the Advisory Committee on Immunization Practice (ACIP). *MMWR Morbid Mortal Wkly Rep* 2003;52(RR-8):1-36.
2. Horcajada JP, Pumarola T, Martinez JA, et al. A nosocomial outbreak of influenza during a period without influenza epidemic activity. *Eur Respir J* 2003;21(2):303-7.
3. Salgado CD, Farr BM, Hall KK, Hayden FG. Influenza in the acute hospital setting. *Lancet* 2002;2(3):145-55.
4. Harrison J, Abbott P. Vaccination against influenza: UK health care workers not on-message. *Occup Med* 2002;52(5):277-9.
5. Slinger R, Dennis P. Nosocomial influenza at a Canadian pediatric hospital from 1995 to 1999: opportunities for prevention. *Infect Control Hosp Epidemiol* 2002;23(10):627-9.
6. Goldman DA. Epidemiology and prevention of pediatric viral respiratory infections in health-care institutions. *Emerg Infect Dis*. [serial online] 2001 Mar Apr [cited 2004 Feb 25];7(2):249-53. Available from: <http://www.cdc.gov/ncidod/eid/vol7no2/goldmann.htm>.
7. Carman WF, Elder AG, Wallace LA, et al. Effects of influenza vaccination of health-care workers on mortality of elderly people in long-term care: a randomized controlled trial. *Lancet* 2000; 355(9198):93-7.
8. Silka PA, Geiderman JM, Goldberg JB, Kim LP. Demand on ED resources during periods of widespread influenza activity. *Am J Emerg Med* 2003;21(7):534-9.
9. 1998 APIC Guidelines Committee. APIC position paper: immunization. *Am J Infect Control* 1999;27:52-3.
10. Bolyard EA, Tablan OC, Williams WW, et al., The Hospital Infection Control Practices Advisory Committee. Guideline for infection control in health care personnel, 1998. *Am J Infect Control* 1998;26:289-354.
11. Saxen H, Virtanen M. Randomized, placebo-controlled double blind study on the efficacy of influenza immunization on absenteeism of health care workers. *Pediatr Infect Dis J* 1999;18(9):779-83.
12. CDC. *Epidemiology and Prevention of Vaccine-Preventable Diseases, 7th edition*. January 2002.
13. Weingarten S, Riedinger M, Bolton LB, et al. Barriers to influenza vaccination acceptance. A survey of physicians and nurses. *Am J Infect Control* 1989;17:202-7.
14. Cunney RJ, Bialachowski A, Thornley D, et al. An outbreak of influenza A in a neonatal intensive care unit. *Infect Control Hosp Epidemiol* 2000;21(7):449-51.
15. Malavaud S, Malavaud B, Sanders K, et al. Nosocomial outbreak of influenza virus A (H3N2) infection in a solid organ transplant department. *Transplantation* 2001;72(3):535-7.
16. CDC. Outbreak of influenza A in a nursing home—New York, Dec. 1991-Jan. 1992. *MMWR Morb Mortal Wkly Rep* 1992;Feb 4(18):129-31.
17. Sartor C, Zandotti C, Romain F, et al. Disruption of services in an internal medicine unit due to a nosocomial influenza outbreak. *Infect Control Hosp Epidemiol* 2002;23(10):615-9.
18. Munoz FM, Campbell JR, Atmar RL, et al. Influenza A virus outbreak in a neonatal intensive care unit. *Pediatr Infect Dis J* 1999;18(9):811-5.
19. Lundstrom T, Pugliese G, Bartley J, Cox J, Guither C. Organizational and environmental factors that affect worker health and safety and patient outcomes. *Am J Infect Control* 2002;30:93-106.
20. Martinello RA, Jones L, Topal JE. Correlation between healthcare workers' knowledge of influenza vaccine and vaccine receipt. *Infect Control Hosp Epidemiol* 2003;24(11):845-7.
21. Adal KA, Flowers RH, Anglim AM, et al. Prevention of nosocomial influenza. *Infect Control Hosp Epidemiol* 1996;17(10):641-8.

Annotated Code of Maryland 18-404
Article - Health - General

§ 18-404.

(a) (1) In this section the following words have the meanings indicated.

(2) "Employee" means an individual employed full-time or part-time directly, through contract with another entity, or as an independent contractor, by a related institution.

(3) "Related institution"¹ has the meaning provided under § 19-301(o) of this article.

(4) "Medically contraindicated" means that a medical treatment is potentially detrimental to the health of the individual intended to be treated.

(b) (1) Subject to subsection (e) of this section, each related institution in the State shall immunize residents against the influenza virus and pneumococcal disease.

(2) Subject to subsection (e) of this section, each related institution in the State shall immunize employees against the influenza virus.

(3) Before an immunization under this section is administered, the related institution shall obtain written consent to administer the immunization from:

(i) The resident or employee receiving the immunization; or

(ii) The legal guardian of the resident receiving the immunization.

(c) Each related institution shall conduct the immunizations required under subsection (b) of this section:

(1) In accordance with the recommendations established by the Advisory Committee on Immunization Process of the United States Centers for Disease Control and Prevention that are in effect at the time the related institution conducts the immunizations; and

(2) By December 1 of each year that the immunization is required.

(d) A related institution that accepts an individual as a new resident or accepts an individual as a new employee after December 1 but before April 1 shall:

(1) Determine the individual's status for immunization as required under subsection (b) of this section; and

(2) If necessary, provide or arrange for an immunization as required under subsection (b) of this section.

(e) A resident or employee is not required to receive a vaccine under this section if:

(1) The vaccine is medically contraindicated for the resident or employee;

(2) The vaccine is against the resident or employee's religious beliefs; or

(3) After being fully informed by the related institution of the health risks associated with not receiving a vaccine, the resident or employee refuses the vaccine.

(f) (1) (i) Each related institution shall document the annual immunization against influenza virus and immunization against pneumococcal disease received by each resident in the resident's medical record.

(ii) Each related institution shall document the annual immunization against influenza virus received by each employee in the employee's personnel file.

(2) If a resident or employee refuses to be immunized as required under subsection (b) of this section, the related institution shall document the refusal and the reason for the refusal.

(g) Each related institution shall:

(1) Notify each prospective resident and each prospective employee of the immunization requirements of this section and request that the resident or employee agree to be immunized in accordance with subsection (b)(3) of this section; and

(2) Make available to all residents and employees of the related institution educational and informational materials relating to immunization against influenza virus and immunization against pneumococcal disease.

Source: Annotated Code of Maryland 18-404.

Standing Orders for Administering Influenza Vaccine to Adults

Purpose: To reduce morbidity and mortality from influenza by vaccinating all adults who meet the criteria established by the Centers for Disease Control and Prevention’s Advisory Committee on Immunization Practices.

Policy: Under these standing orders, eligible nurses and other healthcare professionals (e.g., pharmacists), where allowed by state law, may vaccinate patients who meet any of the criteria below.

Procedure:

1. Identify adults in need of influenza vaccination based on meeting any of the following criteria:
 - a. Want to reduce the likelihood of becoming ill with influenza or of transmitting it to others
 - b. Age 50 years or older
 - c. Having any of the following conditions:
 - chronic disorder of the pulmonary or cardiovascular system, including asthma
 - chronic metabolic disease (e.g., diabetes), renal dysfunction, hemoglobinopathy, or immunosuppression (e.g., caused by medications, HIV)
 - any condition that compromises respiratory function or the handling of respiratory secretions or that can increase the risk of aspiration (e.g., cognitive dysfunction, spinal cord injury, seizure disorder or other neuromuscular disorder)
 - d. Being pregnant during the influenza season
 - e. Residence in a nursing home or other chronic-care facility that houses persons of any age who have chronic medical conditions
 - f. In an occupation or living situation that puts one in proximity to persons at high risk, including
 - a healthcare worker, caregiver, or household member in contact with person(s) at high risk of developing complications from influenza
 - a household contact or out-of-home caretaker of a child age 0–59 months or of an adult age 50 years or older
2. Screen all patients for contraindications and precautions to influenza vaccine:
 - a. **Contraindications:** serious reaction (e.g., anaphylaxis) after ingesting eggs or after receiving a previous dose of influenza vaccine or an influenza vaccine component. For a list of vaccine components, go to www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/B/excipient-table-2.pdf. Do not give live attenuated influenza vaccine (LAIV) to an adult who is pregnant or who has any of the conditions described in 1.b. or 1.c. above. Use of inactivated influenza vaccine is preferred over LAIV for close contacts of severely immunosuppressed persons during periods when the immunocompromised person requires a protective environment.
 - b. **Precautions:** moderate or severe acute illness with or without fever; history of Guillain Barré syndrome within 6 weeks of a previous influenza vaccination.
3. Provide all patients with a copy of the most current federal Vaccine Information Statement (VIS). You must document in the patient’s medical record or office log, the publication date of the VIS and the date it was given to the patient. Provide non-English speaking patients with a copy of the VIS in their native language, if available; these can be found at www.immunize.org/vis.
4. Administer 0.5 mL of injectable trivalent inactivated influenza vaccine (TIV) IM (22–25g, 1–1½" needle) in the deltoid muscle. Alternatively, healthy adults younger than age 50 years without contraindications may be given 0.2 mL of intranasal LAIV; 0.1 mL is sprayed into each nostril while the patient is in an upright position.
5. Document each patient’s vaccine administration information and follow up in the following places:
 - a. **Medical chart:** Record the date the vaccine was administered, the manufacturer and lot number, the vaccination site and route, and the name and title of the person administering the vaccine. If vaccine was not given, record the reason(s) for non-receipt of the vaccine (e.g., medical contraindication, patient refusal).
 - b. **Personal immunization record card:** Record the date of vaccination and the name/location of the administering clinic.
6. Be prepared for management of a medical emergency related to the administration of vaccine by having a written emergency medical protocol available, as well as equipment and medications.
7. Report all adverse reactions to influenza vaccine to the federal Vaccine Adverse Event Reporting System (VAERS) at www.vaers.hhs.gov or (800) 822-7967. VAERS report forms are available at www.vaers.hhs.gov.

This policy and procedure shall remain in effect for all patients of the _____ until rescinded or until _____ (date).
(name of practice or clinic)

Medical Director’s signature: _____ Effective date: _____

Standing Orders for Administering Influenza Vaccines to Children & Adolescents

Purpose: To reduce morbidity and mortality from influenza by vaccinating all children and adolescents who meet the criteria established by the Centers for Disease Control and Prevention's Advisory Committee on Immunization Practices.

Policy: Under these standing orders, eligible nurses and other healthcare professionals (e.g., pharmacists), where allowed by state law, may vaccinate children and adolescents who meet any of the criteria below.

Procedure:

1. Identify children and adolescents in need of influenza vaccination based on meeting any of the following criteria:
 - a. Age 6 months through 18 years
 - b. Age 19 years and older with any of the following conditions:
 - chronic disorder of the pulmonary or cardiovascular system, including asthma
 - chronic metabolic disease (e.g., diabetes), renal dysfunction, hemoglobinopathy, or immunosuppression (e.g., caused by medications, HIV)
 - any condition that compromises respiratory function or the handling of respiratory secretions or that can increase the risk of aspiration (e.g., cognitive dysfunction, spinal cord injury, seizure disorder or other neuromuscular disorder)
 - long-term aspirin therapy (applies to a child or adolescent ages 6 months–18 years)
 - c. Being pregnant during the influenza season
 - d. Residence in a nursing home or other chronic-care facility that houses persons of any age who have chronic medical conditions
 - e. In an occupation or living situation that puts one in proximity to persons at high risk, including
 - a healthcare worker, caregiver, or household member in contact with person(s) at high risk of developing complications from influenza
 - a household contact or out-of-home caretaker of a child age 0–59 months or of an adult age 50 years or older
2. Screen all patients for contraindications and precautions to influenza vaccine:
 - a. **Contraindications:** serious reaction (e.g., anaphylaxis) after ingesting eggs or after receiving a previous dose of influenza vaccine or an influenza vaccine component. For a list of vaccine components, go to www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/B/exipient-table-2.pdf. Do not give live attenuated influenza vaccine (LAIV) to pregnant adolescents, children younger than age 2 years, children younger than age 5 years with possible reactive airways disease (e.g., history of recurrent wheezing or a recent wheezing episode), or to children or adolescents with any of the conditions described in 1.b. above. Use of inactivated influenza vaccine is preferred over LAIV for close contacts of severely immunosuppressed persons during periods when the immunocompromised person requires a protective environment.
 - b. **Precautions:** moderate or severe acute illness with or without fever; history of Guillain-Barré syndrome within 6 weeks of a previous influenza vaccination
3. Provide all patients (or, in the case of a minor, their parent or legal representative) with a copy of the most current federal Vaccine Information Statement (VIS). You must document in the patient's medical record or office log, the publication date of the VIS and the date it was given to the patient (parent/legal representative). Provide non-English speaking patients with a copy of the VIS in their native language, if available; these can be found at www.immunize.org/vis.
4. Administer injectable trivalent inactivated vaccine (TIV) intramuscularly in the vastus lateralis for infants (and toddlers lacking adequate deltoid mass) or in the deltoid muscle (for toddlers, children, and teens). Use a 22–25 g needle. Choose needle length appropriate to the child's age and body mass: infants 6–11 mos: 1"; 12 mos–10 yrs: 1–1¼"; 11 yrs and older: 1–1½". Give 0.25 mL for children 6–35 months and 0.5 mL for all others age 3 years and older. Alternatively, healthy children age 2 years and older without contraindications may be given 0.2 mL of intranasal LAIV; 0.1 mL is sprayed into each nostril while the patient is in an upright position. Children age 6 months through 8 years who are receiving influenza vaccine for the first time should receive 2 doses (separated by at least 4 weeks).
5. Document each patient's vaccine administration information and follow up in the following places:
 - a. **Medical chart:** Record the date the vaccine was administered, the manufacturer and lot number, the vaccination site and route, and the name and title of the person administering the vaccine. If vaccine was not given, record the reason(s) for non-receipt of the vaccine (e.g., medical contraindication, patient refusal).
 - b. **Personal immunization record card:** Record the date of vaccination and the name/location of the administering clinic.
6. Be prepared for management of a medical emergency related to the administration of vaccine by having a written emergency medical protocol available, as well as equipment and medications.
7. Report all adverse reactions to influenza vaccine to the federal Vaccine Adverse Event Reporting System (VAERS) at www.vaers.hhs.gov or (800) 822-7967. VAERS report forms are available at www.vaers.hhs.gov.

This policy and procedure shall remain in effect for all patients of the _____ until rescinded or until _____ (date).
(name of practice or clinic)

Medical Director's signature: _____ Effective date: _____

APPROVED: New Infection Control Requirement for Offering Influenza Vaccination to Staff and Licensed Independent Practitioners

The Joint Commission has approved a new Infection Control standard that requires organizations to offer influenza vaccination to staff and licensed independent practitioners, applicable to **critical access hospitals, hospitals, and long term care, effective July 1, 2007**. This standard conforms to recommendations recently made by the Centers for Disease Control and Prevention. This new requirement is shown in the box on page 11 in underlined text.

These revisions will also be published in the *2007 Comprehensive Accreditation Manual for Critical Access Hospitals (CAMCAH)*, Update 2 to the *2006 Comprehensive Accreditation Manual for Hospitals: The Official Handbook (CAMH)*, and Update 2 to the *2005–2006 Comprehensive Accreditation Manual for Long Term Care (CAMLTC)*, available September 2006. ▲

(Continued on page 11)

New IC Requirement for Offering Flu Vaccinations (continued)

(Continued from page 10)



OFFICIAL PUBLICATION OF NEW STANDARD

New Standard IC.4.15

APPLICABLE TO CRITICAL ACCESS HOSPITAL, HOSPITAL, AND LONG TERM CARE

Standard IC.4.15

Immunization against influenza is offered to staff¹ and licensed independent practitioners.

Rationale for IC.4.15

Transmission of influenza from staff and licensed independent practitioners to [patients/residents] can create serious health care problems, especially among those who are at high risk for complications related to influenza. There are multiple effective measures that can reduce the risk of health care–associated influenza, including strict adherence to respiratory precautions; prompt treatment; and restricting ill staff and licensed independent practitioners from providing [patient/resident] care. However, the most successful measure to prevent health care–associated transmission of influenza is vaccinating staff and licensed independent practitioners.

Since 1981, the Centers for Disease Control and Prevention (CDC) has recommended annual influenza vaccinations for all health care personnel.² The recommendations of the Healthcare Infection Control Practices Advisory Committee (HICPAC) and the Advisory Committee on Immunization Practices (ACIP) concerning influenza vaccination of health care personnel (HCP) in the United States apply to HCP in acute care hospitals, nursing homes, skilled nursing facilities, physician's offices, urgent care centers, and outpatient clinics, and to persons who provide home health care and emergency medical services.³ Despite ongoing recommendations, vaccination rates as measured by the CDC remain low. Influenza among health care personnel, especially during an epidemic, might increase transmission to [patients/residents], and may compromise the ability of an organization to provide care.

¹ The requirements in standard IC.4.15 do not apply to students.

² The CDC defines health care personnel (HCP) as all paid and unpaid persons working in health care settings who have the potential for exposure to infectious materials, including body substances, contaminated medical supplies and equipment, contaminated environmental surfaces, or contaminated air. HCP might include (but are not limited to) physicians, nurses, nursing assistants, therapists, technicians, emergency medical service personnel, dental personnel, pharmacists, laboratory personnel, autopsy personnel, students and trainees, contractual staff not employed by the health-care facility, and persons (for example, clerical, dietary, housekeeping, maintenance, and volunteers) not directly involved in [patient/resident] care but potentially exposed to infectious agents that can be transmitted to and from HCP.

³ The following is a summary of the recommendations of the Healthcare Infection Control Practices Advisory Committee (HICPAC) and the Advisory Committee on Immunization Practices (ACIP) concerning influenza vaccination of health-care personnel (HCP) in the United States. These recommendations apply to HCP in acute care hospitals, nursing homes, skilled nursing facilities, physician's offices, urgent care centers, and outpatient clinics, and to persons who provide home health care and emergency medical services.

- Educate HCP regarding the benefits of influenza vaccination and the potential health consequences of influenza illness for themselves and their [patients/residents], the epidemiology and modes of transmission, diagnosis, treatment, and nonvaccine infection control strategies, in accordance with their level of responsibility in preventing health-care–associated influenza (category IB).
- Offer influenza vaccine annually to all eligible HCP to protect staff, [patients/residents], and family members and to decrease HCP absenteeism. Use of

One obstacle to effective vaccination is declination by health care personnel. Health care personnel may decline vaccination for many reasons. They may have been vaccinated elsewhere, have a medical contraindication, or have other personal reasons for declining the vaccine.

Vaccination might also be declined because it is offered at inconvenient times or locations. Whatever the reason, it is important for organizations to identify why individuals do not participate in the vaccination program, work to overcome these reasons, and increase vaccination rates.

Optimally, influenza vaccination will be offered to everyone. During periods of influenza vaccine supply disruption, organizations may have to establish priorities for who they will vaccinate. The CDC recommends the use of vaccination priority groups only in the event of vaccine supply disruptions.

Elements of Performance for IC.4.15

- A 1.** The organization establishes an annual influenza vaccination program that includes at least staff and licensed independent practitioners.
- A 2.** The organization provides access to influenza vaccination on-site.
- B 3.** The organization educates staff and licensed independent practitioners about the following:
 - Flu vaccination
 - Non-vaccine control measures (such as the use of appropriate precautions)
 - The diagnosis, transmission, and potential impact of influenza
- B 4.** The organization annually evaluates vaccination rates and reasons for non-participation in the organization's immunization program.
- B 5.** The organization implements enhancements to the program to increase participation.

either available vaccine (inactivated and live, attenuated influenza vaccine [LAIV]) is recommended for eligible persons. During periods when inactivated vaccine is in short supply, use of LAIV is especially encouraged when feasible for eligible HCP (category IA).

- Provide influenza vaccination to HCP at the work site and at no cost as one component of employee health programs. Use strategies that have been demonstrated to increase influenza vaccine acceptance, including vaccination clinics, mobile carts, vaccination access during all work shifts, and modeling and support by institutional leaders (category IB).
- Obtain a signed declination from HCP who decline influenza vaccination for reasons other than medical contraindications (category III).
- Monitor HCP influenza vaccination coverage and declination at regular intervals during influenza season and provide feedback of ward-, unit-, and specialty-specific rates to staff and administration (category IB).
- Use the level of HCP influenza vaccination coverage as one measure of a [patient/resident] safety quality program (category II).

Evidence Ranking Scheme

Category IA. Strongly recommend for implementation and strongly supported by well-designed experimental, clinical, or epidemiological studies.
Category IB. Strongly recommended for implementation and supported by certain experimental, clinical, or epidemiological studies and a strong theoretic rationale.
Category IC. Required by state or federal regulation, or representing an established association standard.
Category II. Suggested for implementation and supported by suggestive clinical or epidemiologic studies, or a theoretic rationale.
Unresolved Issue. No recommendation is offered. No consensus or insufficient evidence exists regarding efficacy.

Immunization Reduces Disease Risk Inherent with Patient Contact

Through their clinical skills and experience, health-care workers (HCWs) provide immeasurable benefits to patients in all health-care settings. While direct patient contact is an occupational necessity, it also carries the risk of transmitting or contracting diseases, such as influenza, and pertussis.

The good news is that immunization against vaccine-preventable diseases is available, enabling HCWs to protect themselves from acquiring or transmitting infections. Vaccines help HCWs to protect themselves, their families, and their patients. Studies have shown that hospital outbreaks of diseases such as influenza have resulted from transmission from patient to HCW and vice versa.¹ The path of transmission is usually undetected before an outbreak.

The reality is that direct patient contact is conducive to spreading disease. For all HCWs with the vital role of patient contact, immunization offers the best defense against disease transmission.

HCW immunization remains low

Studies have shown that, in general, HCWs do not take advantage of the protection that immunizations provide. Despite organizational efforts to encourage influenza vaccinations, national influenza immunization rates among HCWs **remain below 40%**.² The Centers for Disease Control and Prevention (CDC) recommends annual influenza vaccine for all HCWs, yet a high percentage of them remain unprotected each year.² Influenza immunization can help protect HCWs and reduce the national burden of morbidity and mortality associated with the disease.²

Consider another disease, **pertussis, commonly called whooping cough, which reached a 45-year high in 2004, with 25,827 reported cases**.³ Adults, whose childhood immunity to pertussis may have worn off, are often unknowingly a major source of pertussis infection for infants, who suffer the most severe and deadly consequences from this vaccine-preventable disease.³

Now, with the availability of tetanus/diphtheria/acellular pertussis (**Tdap**) booster vaccines, the Advisory Committee on Immunization Practices (ACIP) recently voted to recommend that all HCWs receive a **Tdap booster vaccine as soon as feasible**.⁴ The ACIP recommendation is intended to increase protection against pertussis and to prevent pertussis transmission to infants. Specifically, the ACIP is **focusing on health-care personnel who work in hospitals or ambulatory care settings and have direct patient contact. Priority should be given to health-care personnel who have direct contact with infants younger than 12 months of age**.⁴

While immunization helps to protect HCWs, does it actually benefit patients as well? Results from the following study indicate that increasing HCW influenza immunization rates can reduce nosocomial influenza cases among hospitalized patients.⁵

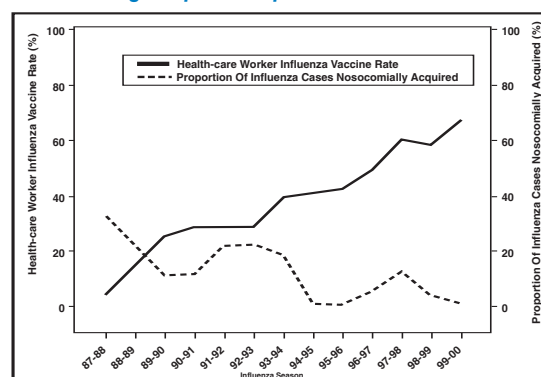
The benefits of influenza vaccination are borne out in a review of 12 influenza seasons in a tertiary-care facility⁵

The relationship between staff vaccination coverage and annual incidence of nosocomial influenza was assessed for 12 influenza seasons in one institution from 1987-2000. During this period, **staff vaccination increased from 4% in 1987-1988 to 67% in 1999-2000, and HCWs accounted for 42% of all confirmed influenza cases** during 1990-1993, and accounted for 9% during 1997-2000.⁵

There was also a progressive and significant reduction in the relative frequency of nosocomial influenza cases among hospitalized patients during this period ($P < .0001$). From 1987-1988, **32% of influenza cases** among hospitalized patients were due to nosocomial acquisition; this decreased to just **3%** during the 1998-1999 season, and there were no reported nosocomial cases during the 1999-2000 season. Analysis indicated that there was a statistically significant inverse association between staff compliance with vaccination and the rate of nosocomial influenza among patients.⁵

As shown in the following graph, the significant increase in HCW immunization coverage corresponds to a significant reduction in laboratory-confirmed nosocomial influenza cases among hospitalized patients.⁵

Significant increase in rate of HCW vaccination corresponds with significant reduction in the proportion of all nosocomial influenza cases among hospitalized patients⁵



HCWs need to lead the way in reducing transmission of vaccine-preventable diseases

By getting recommended immunizations, HCWs can help protect themselves, patients, and other staff members. The benefits that HCWs accrue from influenza and Tdap vaccinations are far-reaching:

- Reduce the incidence of hospital-acquired (nosocomial) outbreaks⁵
- Decrease transmission of influenza, pertussis, or other vaccine-preventable diseases to their patients, their families, or community⁶
- Reduce the number of HCW sick days and absenteeism from respiratory infections by as much as 28%¹
- Promote herd immunity among HCWs by increasing the percentage of workers who are immunized, which reduces the risk of disease transmission¹—thus protecting the health of all HCWs, even those noncompliant with immunizations
- Reduce disruptions and costs incurred by HCWs and hospitals resulting from pertussis outbreaks⁷
- Cut down on double shifts, staff shortages, and use of replacement workers, factors shown to lower workplace quality and increase adverse events in patients⁶

HCWs play a key role in reducing outbreaks of vaccine-preventable diseases in health-care facilities. Immunization is their best defense in fulfilling that role. ACIP recommends that health-care facilities do their part to encourage immunization by providing HCWs with free vaccinations such as Tdap, convenient access, and education about the benefits of vaccination.⁴

HCW immunization improves the quality of patient care by reducing the spread of disease to patients, such as the elderly and infants, who are especially at risk for complications from many vaccine-preventable diseases. HCWs with patient contact provide essential medical services—and immunization helps reduce the risk of transmitting disease while providing those services to patients.

ACIP recommendations for HCW Tdap vaccination:⁴

On February 22, 2006, ACIP voted to recommend Tdap booster vaccine for HCWs as soon as feasible. **HCWs in direct contact with infants less than 12 months of age should receive a Tdap booster vaccination. Use of an interval between this Tdap vaccination and the last Td vaccination as short as 2 years is recommended and even encouraged.**

CDC recommendations for HCW influenza vaccination:²

All HCWs should receive annual influenza immunization.

Timing: Begin in October and continue throughout the influenza season.

References: 1. Centers for Disease Control and Prevention (CDC). Influenza vaccination of health-care personnel: recommendations of the Healthcare Infection Control Practices Advisory Committee (HICPAC) and the Advisory Committee on Immunization Practices (ACIP). *MMWR*. 2006;55(RR-2):1-16. 2. CDC. Prevention and control of influenza: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR*. 2006;55(RR-10):1-43. 3. CDC. Pertussis. In: Atkinson W, Hamborsky J, McIntyre L, Wolfe C, eds. *Epidemiology and Prevention of Vaccine-Preventable Diseases*. The Pink Book. 9th ed. Washington, DC: Public Health Foundation; 2006:79-96. 4. CDC. National Immunization Program. ACIP votes to recommend use of combined tetanus, diphtheria and pertussis (Tdap) vaccine for adults (Advisory Committee on Immunization Practices): March 2, 2006. Available at: http://www.cdc.gov/nip/vaccine/tdap/tdap_adult_recs.pdf. Accessed July 10, 2006. 5. Salgado CD, Giannetta ET, Hayden FG, Farr BM. Preventing nosocomial influenza by improving the vaccine acceptance rate of clinicians. *Infect Control Hosp Epidemiol*. 2004;25:923-928. 6. National Foundation for Infectious Diseases. Improving influenza vaccination rates in health care workers: strategies to increase protection for workers and patients. 2004:1-21. 7. Calugar A, Ortega-Sánchez IR, Tiwari T, Oakes L, Jahre JA, Murphy TV. Nosocomial pertussis: costs of an outbreak and benefits of vaccinating health care workers. *Clin Infect Dis*. 2006;42:981-988.

Successful Campaigns for Vaccinating Health Care Workers

- ✦ Prior to the start of influenza season, remind health care personnel of the importance of vaccination and when the vaccine will be available.
- ✦ Sponsor a kick-off event.
- ✦ Offer vaccine free of charge to all staff and volunteers.
- ✦ Educate employees via fact sheets, newsletters or bulletin board posting. Advise employees about the benefits of vaccination for themselves, patients, and co-workers.
- ✦ Administer vaccine under a standing orders protocol. Request that staff who decline vaccination sign a declination form that includes their reason for not getting vaccinated.
- ✦ Make vaccines available to all employees on all shifts.
- ✦ Use mobile carts to offer vaccine in all different clinic areas, service meetings, grand rounds, and or near cafeteria entrances.
- ✦ In late November, identify employees not yet vaccinated and remind them by email or telephone that the flu vaccine is available.
- ✦ Work closely with the pharmacy department to get an ample supply of vaccine for employees.
- ✦ Encourage the facility director, service chiefs, and other managers to set an example by getting vaccinated and encouraging their staff to get immunized.
- ✦ Offer employees who have been vaccinated buttons or stickers that say “Ask me if I got my flu vaccination” or “Flu Fighter”.

FACES OF



INFLUENZA

American Lung Association's
Influenza Prevention Program

In collaboration with sanofi pasteur

MYTHS & FACTS About Influenza

We all know someone who needs to be immunized against influenza this year. In fact, it is likely that you or someone in your family fall into one of the groups that health-care officials recommend to receive an influenza immunization. Many misconceptions about the influenza virus and influenza vaccine persist, despite the widespread impact of the disease and the benefit of the vaccine.

MYTH: Influenza is no more than a nuisance, much like the common cold, that cannot be prevented.

FACT: Influenza, commonly referred to as the “flu,” is a severe and sometimes life-threatening disease that causes an average of 36,000 deaths and approximately 226,000 hospitalizations in the U.S. each year. You can avoid getting influenza by getting vaccinated each year.¹

MYTH: You can get influenza from the injectable vaccination.

FACT: The injectable vaccine does not contain any of the live virus so it is impossible to get influenza from the vaccine. Side effects may occur in some people, such as mild soreness, redness or swelling at the injection site, headache or a low-grade fever. Vaccination is the best way to prevent influenza and its complications.¹

MYTH: It is not necessary to get immunized against influenza every year because protection lasts from previous vaccinations.

FACT: The types of influenza viruses circulating in the community change from year to year. Because of this, a new vaccine is made each year to protect against the current strains. Also, immunity to influenza viruses only lasts for a year, so it is important to get vaccinated against influenza every year.

MYTH: People shouldn't be immunized against influenza if they are sick.

FACT: Minor illnesses with or without fever should not prevent vaccination, especially in children with mild upper respiratory infections (colds) or upper respiratory allergies. In addition, people with chronic illnesses, such as asthma, diabetes and heart disease have a higher risk for contracting the influenza virus and for developing complications. These individuals should be immunized each year. Individuals with severe allergies to eggs or those who have had a previous vaccine-associated allergic reaction should avoid immunization. Talk to your health-care provider for more information.¹

MYTH: Only the elderly are at risk for developing serious complications from the influenza virus.

FACT: Influenza impacts people of all ages. Each year, more than 226,000 Americans are hospitalized and about 36,000 die from influenza-related complications, including an average of 92 children under age 5.¹

MYTH: I missed the chance to get an influenza vaccination in the fall, so now I have to wait until next year.

FACT: Influenza vaccination is beneficial throughout the fall and winter months. The best time to get vaccinated is in October and November, but vaccination in December or even later is still effective because the virus that causes influenza circulates into late winter. The number of influenza cases usually peaks around February, but can range from December to May.¹

MYTH: I seem to get the stomach flu each year. My friend told me the influenza vaccine might prevent the stomach flu next year.

FACT: Unlike most other common respiratory and stomach infections that are often referred to as “the flu,” influenza can cause more severe illness and can result in complications leading to hospitalization and death, especially among the elderly. Common symptoms of influenza infection include a high fever (101°F-102°F) that begins suddenly, sore throat, chills, cough, headache and muscle aches. The influenza vaccine protects you against the influenza virus but not against viral gastroenteritis, which is the correct term to use when referring to the “stomach flu.”¹

MYTH: If I receive an annual influenza vaccination, I am also protected against avian flu.

FACT: An annual influenza vaccination is designed to protect against the strains of influenza circulating that year. The seasonal influenza vaccine is not designed to protect against avian or bird flu. While there has been a recent focus on bird flu, seasonal influenza infection currently poses a far greater danger to Americans. Seasonal influenza kills and hospitalizes hundreds of thousands of people each year. Seasonal influenza infection may be prevented through vaccination.¹

The CDC recommends the influenza vaccine every year for the following groups:¹

- Adults and children with a chronic medical condition, such as heart disease, asthma, COPD (chronic obstructive pulmonary disease), weakened immune system and diabetes
- Children 6 – 59 months of age
- Children 6 months – 18 years of age who are on long-term aspirin treatment
- Women who are pregnant during the influenza season
- Household contacts and out-of-home caregivers of anyone in a high-risk group, including children younger than 6 months of age who are too young to be vaccinated. This includes parents, grandparents, siblings, babysitters and daycare providers.
- Adults 50 years of age and older
- Residents of long-term care facilities and nursing homes
- Health care workers who come in contact with patients
- Anyone who wants to prevent influenza

Note: Children under 9 years of age receiving an influenza vaccination for the first time need two doses approximately 1 month apart.¹

To ensure families everywhere understand the risks of influenza, the American Lung Association has joined with Jean Smart, actress and mother, and Admiral John O. Agwunobi, Assistant Secretary of Health as well as everyday people to launch a national public educational initiative called the *Faces of Influenza*. To learn more about the program, influenza and vaccination, visit www.facesofinfluenza.org.

1. Centers for Disease Control and Prevention. Prevention and Control of Influenza: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR*. 2006; 55(RR-10):1-42.




Influenza Immunization for Health-care Workers: Nothing to Sneeze at

Health-care workers are a primary target of the Centers for Disease Control and Prevention (CDC) for influenza (flu) immunization.¹ That's because health-care workers—including physicians, nurses, and others in both hospital and outpatient settings, such as emergency medical personnel and employees of chronic-care facilities—can transmit influenza to patients who may be at high risk of complications if they contract the disease. These include the following groups¹:

- Persons ≥ 65 years of age
- Residents of nursing homes and other chronic-care facilities
- Adults and children with chronic disorders of the pulmonary or cardiovascular systems, including asthma
- Adults and children with chronic metabolic diseases (including diabetes), renal dysfunction, hemoglobinopathies, or immunosuppression (including immunosuppression caused by medications or by HIV infection)
- Adults and children with conditions such as cognitive dysfunction, spinal cord injuries, or seizure disorders that can compromise respiratory function
- Children and adolescents (aged 6 months-18 years) who are receiving long-term aspirin therapy and therefore might be at risk for developing Reye syndrome if they contract influenza
- Women who will be pregnant during influenza season
- Children 6-59 months of age

For these high-risk individuals, influenza can have very serious consequences, including hospitalization and death. Each year in the United States (US), an estimated 36,000 people die from influenza and there are approximately 226,000 influenza-related hospitalizations.¹ Most mortality is a result of pneumonia and exacerbation of cardiopulmonary and other chronic conditions.

Because individuals can be infectious before symptoms appear, you may be spreading influenza to vulnerable patients without even knowing it—or patients may be infecting you! Your importance as a role model cannot be overstated. You are not only protecting yourself, but also the health of patients, as well as your family.




Influenza immunization among health-care workers is associated with reduced work absenteeism and fewer deaths among nursing home patients.¹ Yet, despite their key role in transmitting influenza, more than half of health-care workers do not receive annual immunization. In 2003, only 40.1% of health-care workers in the US were immunized.¹ According to a recent study, the most common reason cited by health-care workers for not receiving influenza immunization was concerns about side effects.² But, because the injectable vaccine contains only *inactivated*, or *killed*, virus, the vaccine *cannot* cause influenza.

Vaccination is the best way to control influenza and its devastating complications. When you recommend influenza immunization to patients, don't forget about yourself and your staff. Receiving influenza immunization will help protect not only you and your family, but also the many patients with whom you come into contact every day. The CDC recommends that health-care workers receive influenza immunization in October. However, the CDC also recommends that vaccinations should continue throughout the influenza season.¹

Sincerely,

References: 1. Centers for Disease Control and Prevention. Prevention and control of influenza: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Early Release*. 2006;55:1-42. 2. LaVela SL, Smith B, Weaver FM, Legro MW, Goldstein B, Nichol K. Attitudes and practices regarding influenza vaccination among healthcare workers providing services to individuals with spinal cord injuries and disorders. *Infect Control Hosp Epidemiol*. 2004;25:933-940.



Measles, Mumps, and Rubella: Increased Risk in the Health-care Setting

- Persons born before 1957 are often considered to be immune to measles, but age does not guarantee immunity. For example, from 1985-1992 in the US, 27% of all measles cases among HCWs occurred in persons born before 1957 (CDC, unpublished data)
- HCW risk for measles infection is estimated to be 13 times that for the general population⁸
- Mumps transmission in medical settings has still been reported nationwide (CDC, unpublished data)
- Transmission, via contact with respiratory secretions or droplets, can occur from HCWs to patients, and from patients to HCWs

ACIP recommendations for HCW MMR immunization^{8,9}:

- All HCWs who cannot document prior vaccination should receive 2 doses of MMR separated by at least 4 weeks
- Alternatively, serologic testing can determine a worker's immunity to measles and rubella
- ACIP recommends that at least 1 dose of MMR be considered for those in this group who cannot document previous measles vaccination, measles history, or laboratory evidence of immunity

Increasing HCW Immunization Rates Helps Save Lives

- Immunization protects HCWs, patients, and the community against vaccine-preventable diseases
- Immunizing HCWs against influenza can help reduce the high morbidity and mortality associated with the disease
- A single Tdap vaccine booster provides HCWs with further protection against pertussis and helps reduce transmission to vulnerable infants
- Immunization is a quality-of-care measure that helps protect us all

Vaccine-Preventable Diseases and Health-care Workers (HCWs)



**Protecting Yourself,
Your Patients, and Your Family
Through Immunization**

References: 1. Centers for Disease Control and Prevention (CDC). Prevention and control of influenza: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR*. 2005;54(RR-8):1-40. 2. CDC. Influenza. In: Atkinson W, Hamborsky J, McIntyre L, Wolfe C, eds. *Epidemiology and Prevention of Vaccine-Preventable Diseases*. *The Pink Book*. 9th ed. Washington, DC: Public Health Foundation; 2006:233-253. 3. CDC. Pertussis. In: Atkinson W, Hamborsky J, McIntyre L, Wolfe C, eds. *Epidemiology and Prevention of Vaccine-Preventable Diseases*. *The Pink Book*. 9th ed. Washington, DC: Public Health Foundation; 2006:79-96. 4. Cherry JD. The epidemiology of pertussis: a comparison of the epidemiology of the disease pertussis with the epidemiology of *bordetella pertussis* infection. *Pediatrics*. 2005;115:1422-1427. 5. CDC. National Immunization Program. ACIP votes to recommend use of combined tetanus, diphtheria and pertussis (Tdap) vaccine for adults (Advisory Committee on Immunization Practices); March 2, 2006. Available at: http://www.cdc.gov/nip/vaccine/tdap/tdap_adult_recs.pdf. Accessed March 10, 2006. 6. CDC. Hepatitis B. In: Atkinson W, Hamborsky J, McIntyre L, Wolfe C, eds. *Epidemiology and Prevention of Vaccine-Preventable Diseases*. *The Pink Book*. 9th ed. Washington, DC: Public Health Foundation; 2006:207-231. 7. Bolyard EA, Tablan OC, Williams WW, Pearson ML, Shapiro CN, Deitchman SD, and The Hospital Infection Control Practices Advisory Committee. Guidelines for infection control in health care personnel, 1998. *Am J Infect Control*. 1998;26:289-354. 8. CDC. Immunization of health-care workers: recommendations of the Advisory Committee on Immunization Practices (ACIP) and the Hospital Infection Control Practices Advisory Committee (HICPAC). *MMWR*. 1997;46(RR-18):1-42. 9. CDC. Recommended adult immunization schedule—United States, October 2005–September 2006. *MMWR*. 2005;54:Q1-Q4.

Influenza Immunization Rates Remain Low Among HCWs

- Influenza is still responsible for an estimated 226,000 hospitalizations and 36,000 deaths in the United States (US) annually¹
- According to the Centers for Disease Control and Prevention (CDC), in 2003 less than half (approximately 40%) of all HCWs were immunized against influenza¹
- HCW immunization helps minimize infection and/or transmission of influenza to your patients at higher risk for severe complications, such as:
 - Persons ≥50 years of age
 - Infants 6-23 months of age
 - Pregnant (or about to be) women
 - People of any age with certain chronic medical conditions, such as asthma, heart disease, diabetes, or suppressed immune systems
- Remember: injectable influenza vaccine is inactivated, and *cannot* cause influenza¹

Advisory Committee on Immunization Practices (ACIP) recommendations for HCW influenza vaccination^{1,2}:

All HCWs should receive annual inactivated influenza vaccine

Timing: Begin in October and continue throughout the influenza season

Pertussis: Returning to Levels Not Seen in 45 Years

- According to the CDC, pertussis hit a 45-year high in 2004, with nearly 26,000 reported cases³—but many cases go unreported; data suggest that there are between 800,000 and 3.3 million cases among adolescents and adults per year in the US⁴
- Adolescents 11-18 years of age and adults have accounted for an increasing proportion of cases in recent years. In 2004, over 60% of cases were among persons 11 years of age and older³
- Adults, often unknowingly, are the primary source of pertussis infection for infants³
- HCWs can transmit pertussis to patients or catch it from them. So it is important to get immunized to prevent the spread of this disease
- ACIP voted to recommend a single dose of tetanus/diphtheria/acellular pertussis (Tdap) vaccine for adolescents and adults 11-64 years of age to replace a booster dose of tetanus/diphtheria toxoid (Td)⁵

ACIP recommendations for HCW Tdap vaccinations⁵:

On February 22, 2006, ACIP voted to recommend Tdap vaccine for HCWs as soon as feasible. HCWs in direct contact with infants less than 12 months of age should receive a Tdap vaccination—even if less than 10 years have passed since the last Td vaccination.

If HCWs have a high risk of contact with patients infected with pertussis, then shorter intervals between the Td and Tdap vaccinations may be used

Hepatitis B Virus (HBV): HCWs Are at Increased Risk

- In the US, approximately 3000-4000 people die annually from HBV-related cirrhosis, and an estimated 1000-1500 die from HBV-related liver cancer⁶
- HCW HBV infections declined 90% between 1985-1994, due in part to vaccine use and other prevention measures. But from 1988-1998, an estimated 100-200 HCWs died each year from HBV infection⁷
- Because HBV is transmitted by body fluids (most often blood), HCWs are at increased risk
- Actual cases could greatly outnumber reported cases⁸

ACIP recommendations for HCW HBV immunization⁸:

All workers who have a reasonable expectation of being exposed to blood at work (including custodial workers who clean areas contaminated with blood and other body fluids) should be given HBV vaccine

INACTIVATED INFLUENZA VACCINE

WHAT YOU NEED TO KNOW 2009-10

Many Vaccine Information Statements are available in Spanish and other languages. See www.immunize.org/vis.

1 Why get vaccinated?

Influenza (“flu”) is a contagious disease.

It is caused by the influenza virus, which can be spread by coughing, sneezing, or nasal secretions.

Other illnesses can have the same symptoms and are often mistaken for influenza. But only an illness caused by the influenza virus is really influenza.

Anyone can get influenza, but rates of infection are highest among children. For most people, it lasts only a few days. It can cause:

- fever
- sore throat
- chills
- fatigue
- cough
- headache
- muscle aches

Some people, such as infants, elderly, and those with certain health conditions, can get much sicker. Flu can cause high fever and pneumonia, and make existing medical conditions worse. It can cause diarrhea and seizures in children. On average, 226,000 people are hospitalized every year because of influenza and 36,000 die – mostly elderly. **Influenza vaccine can prevent influenza.**

2 Inactivated influenza vaccine

There are two types of seasonal influenza vaccine:

1. **Inactivated** (killed) vaccine, or the “flu shot” is given by injection into the muscle. 2. **Live, attenuated** (weakened) influenza vaccine is sprayed into the nostrils. *This vaccine is described in a separate Vaccine Information Statement.*

These “seasonal” influenza vaccines are formulated to prevent annual flu. They do not protect against pandemic H1N1 influenza.

Influenza viruses are always changing. Because of this, influenza vaccines are updated every year, and an annual vaccination is recommended.

Each year scientists try to match the viruses in the vaccine to those most likely to cause flu that year. When there is a close match the vaccine protects most people from serious influenza-related illness. But even when there is not a close match, the vaccine provides some protection. Influenza vaccine will *not* prevent “influenza-like” illnesses caused by other viruses.

It takes up to 2 weeks for protection to develop after the shot. Protection lasts up to a year.

Some inactivated influenza vaccine contains a preservative called thimerosal. Some people have suggested that thimerosal may be related to developmental problems in children. In 2004 the Institute of Medicine reviewed many studies looking into this theory and concluded that there is no evidence of such a relationship. Thimerosal-free influenza vaccine is available.

3 Who should get inactivated influenza vaccine?

*Anyone who wants to **reduce the likelihood of becoming ill with influenza or spreading influenza to others.***

*All children **6 months and older** and all **older adults:***

- All children from 6 months through 18 years of age.
- Anyone 50 years of age or older.

*Anyone who is **at risk of complications from influenza, or more likely to require medical care:***

- Women who will be **pregnant** during influenza season.
- Anyone with **long-term health problems** with:
 - heart disease
 - kidney disease
 - liver disease
 - lung disease
 - metabolic disease, such as diabetes
 - asthma
 - anemia, and other blood disorders
- Anyone with a **weakened immune system** due to:
 - HIV/AIDS or other diseases affecting the immune system
 - long-term treatment with drugs such as steroids
 - cancer treatment with x-rays or drugs
- Anyone with certain **muscle or nerve disorders** (such as seizure disorders or cerebral palsy) that can lead to breathing or swallowing problems.
- Anyone 6 months through 18 years of age on **long-term aspirin treatment** (they could develop Reye Syndrome if they got influenza).
- **Residents of nursing homes** and other **chronic-care facilities.**

Anyone who lives with or cares for people at high risk for influenza-related complications:

- **Health care providers.**
- **Household contacts and caregivers of children** from birth up to 5 years of age.
- **Household contacts and caregivers of**
 - people 50 years and older, or
 - anyone with medical conditions that put them at higher risk for severe complications from influenza.

Health care providers may also recommend a yearly influenza vaccination for:

- People who provide **essential community services.**
- People living in **dormitories, correctional facilities,** or under other **crowded conditions,** to prevent outbreaks.
- People at high risk of influenza complications who **travel** to the Southern hemisphere between April and September, or to the tropics or in organized tourist groups at any time.

4 When should I get influenza vaccine?

You can get the vaccine as soon as it is available, usually in the fall, and for as long as illness is occurring in your community. Influenza can occur any time from November through May, but it most often peaks in January or February. Getting vaccinated in December, or even later, will still be beneficial in most years.

Most people need one dose of influenza vaccine each year.

Children younger than 9 years of age getting influenza vaccine for the first time – or who got influenza vaccine for the first time last season but got only one dose – should get 2 doses, at least 4 weeks apart, to be protected.

Influenza vaccine may be given at the same time as other vaccines, including pneumococcal vaccine.

5 Some people should talk with a doctor before getting influenza vaccine

Some people should not get inactivated influenza vaccine or should wait before getting it.

- Tell your doctor if you have any **severe** (life-threatening) allergies. Allergic reactions to influenza vaccine are rare.
 - Influenza vaccine virus is grown in eggs. People with a severe egg allergy should not get the vaccine.
 - A severe allergy to any vaccine component is also a reason to not get the vaccine.
 - If you have had a severe reaction after a previous dose of influenza vaccine, tell your doctor.
- Tell your doctor if you ever had Guillain-Barré Syndrome (a severe paralytic illness, also called GBS). You may be able to get the vaccine, but your doctor should help you make the decision.
- People who are moderately or severely ill should usually wait until they recover before getting flu vaccine. If you are ill, talk to your doctor or nurse about whether to reschedule the vaccination. People with a mild illness can usually get the vaccine.

6 What are the risks from inactivated influenza vaccine?

A vaccine, like any medicine, could possibly cause serious problems, such as severe allergic reactions. The risk of a vaccine causing serious harm, or death, is extremely small.

Serious problems from influenza vaccine are very rare. The viruses in inactivated influenza vaccine have been killed, so you cannot get influenza from the vaccine.

Mild problems:

- soreness, redness, or swelling where the shot was given
- hoarseness, sore or red eyes, cough, itchiness
- fever • aches

If these problems occur, they usually begin soon after the shot and last 1-2 days.

Severe problems:

- Life-threatening allergic reactions from vaccines are very rare. If they do occur, it is usually within a few minutes to a few hours after the shot.
- In 1976, a type of influenza (swine flu) vaccine was associated with Guillain-Barré Syndrome (GBS). Since then, flu vaccines have not been clearly linked to GBS. However, if there is a risk of GBS from current flu vaccines, it would be no more than 1 or 2 cases per million people vaccinated. This is much lower than the risk of severe influenza, which can be prevented by vaccination.

7 What if there is a severe reaction?

What should I look for?

Any unusual condition, such as a high fever or behavior changes. Signs of a severe allergic reaction can include difficulty breathing, hoarseness or wheezing, hives, paleness, weakness, a fast heart beat or dizziness.

What should I do?

- **Call** a doctor, or get the person to a doctor right away.
- **Tell** the doctor what happened, the date and time it happened, and when the vaccination was given.
- **Ask** your provider to report the reaction by filing a Vaccine Adverse Event Reporting System (VAERS) form. Or you can file this report through the VAERS website at www.vaers.hhs.gov, or by calling 1-800-822-7967.

VAERS does not provide medical advice.

8 The National Vaccine Injury Compensation Program

A federal program exists to help pay for the care of anyone who has a serious reaction to a vaccine.

For more information about the National Vaccine Injury Compensation Program, call **1-800-338-2382**, or visit their website at www.hrsa.gov/vaccinecompensation.

9 How can I learn more?

- Ask your provider. They can give you the vaccine package insert or suggest other sources of information.
- Call your local or state health department.
- Contact the Centers for Disease Control and Prevention (CDC):
 - Call **1-800-232-4636 (1-800-CDC-INFO)** or
 - Visit CDC's website at www.cdc.gov/flu



DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION



Vaccine Information Statement (Interim)
Inactivated Influenza Vaccine (8/11/09) 42 U.S.C. §300aa-26

LIVE, INTRANASAL INFLUENZA VACCINE

WHAT YOU NEED TO KNOW 2009-10

Many Vaccine Information Statements are available in Spanish and other languages. See www.immunize.org/vis.

1 Why get vaccinated?

Influenza (“flu”) is a contagious disease.

It is caused by the influenza virus, which can be spread by coughing, sneezing, or nasal secretions.

Other illnesses can have the same symptoms and are often mistaken for influenza. But only an illness caused by the influenza virus is really influenza.

Anyone can get influenza, but rates of infection are highest among children. For most people, it lasts only a few days.

It can cause:

- fever
- sore throat
- chills
- muscle aches
- cough
- headache
- fatigue

Some people, such as infants, elderly, and those with certain health conditions, can get much sicker. Flu can cause high fever and pneumonia, and make existing medical conditions worse. It can cause diarrhea and seizures in children. On average, 226,000 people are hospitalized every year because of influenza and 36,000 die – mostly elderly. **Influenza vaccine can prevent influenza.**

2 Live, attenuated influenza vaccine - LAIV (nasal spray)

There are two types of seasonal influenza vaccine:

1. **Live, attenuated** influenza vaccine (LAIV) contains live but attenuated (weakened) influenza virus. It is sprayed into the nostrils.

2. **Inactivated** influenza vaccine, sometimes called the “flu shot,” is given by injection. *Inactivated influenza vaccine is described in a separate Vaccine Information Statement.*

These “seasonal” influenza vaccines are formulated to prevent annual flu. They do not protect against pandemic H1N1 influenza.

Influenza viruses are always changing. Because of this, influenza vaccines are updated every year, and an annual vaccination is recommended.

Each year scientists try to match the viruses in the vaccine to those most likely to cause flu that year. When there is a close match the vaccine protects most people from serious influenza-related illness. But even when there is not a close match, the vaccine provides some protection. Influenza vaccine will *not* prevent “influenza-like” illnesses caused by other viruses.

It takes up to 2 weeks for protection to develop after the vaccination. Protection lasts up to a year.

LAIV does not contain thimerosal or other preservatives.

3 Who can get LAIV?

LAIV is approved for people from **2 through 49 years of age**, who are not pregnant and do not have certain health conditions (see #4, below). Influenza vaccination is recommended for people who can spread influenza to others at high risk, such as:

- **Household contacts and out-of-home caregivers** of children up to 5 years of age, and people 50 and older.
- Physicians and nurses, and family members or anyone else in **close contact with people at risk** of serious influenza.

Health care providers may also recommend a yearly influenza vaccination for:

- People who provide **essential community services**.
- People living in **dormitories, correctional facilities**, or under other crowded conditions, to prevent outbreaks.

Influenza vaccine is also recommended for anyone who wants to **reduce the likelihood of becoming ill** with influenza or **spreading influenza to others**.

4 Some people should not get LAIV

LAIV is not licensed for everyone. The following people should get the **inactivated** vaccine (flu shot) instead:

- **Adults 50 years of age and older or children between 6 months and 2 years of age.** (Children younger than 6 months should not get either influenza vaccine.)
- Children younger than 5 with asthma or one or more episodes of wheezing within the past year.
- People who have long-term health problems with:
 - heart disease
 - kidney or liver disease
 - lung disease
 - metabolic disease, such as diabetes
 - asthma
 - anemia, and other blood disorders
- Anyone with certain muscle or nerve disorders (such as seizure disorders or cerebral palsy) that can lead to breathing or swallowing problems.
- Anyone with a weakened immune system.
- Children or adolescents on long-term aspirin treatment.
- Pregnant women.

Tell your doctor if you ever had Guillain-Barré syndrome (a severe paralytic illness also called GBS). You may be able to get the vaccine, but your doctor should help you make the decision.

The **flu shot** is preferred for people (including health-care workers, and family members) in close contact with anyone who has a *severely* weakened immune system (requiring care in a protected environment, such as a bone marrow transplant unit). People in close contact with those whose immune systems are less severely weakened (including those with HIV) may get LAIV.

Anyone with a nasal condition serious enough to make breathing difficult, such as a very stuffy nose, should get the flu shot instead.

Some people should talk with a doctor before getting either influenza vaccine:

- Anyone who has ever had a serious allergic reaction to eggs or another vaccine component, or to a previous dose of influenza vaccine. *Tell your doctor if you have any severe allergies.*
- People who are moderately or severely ill should usually wait until they recover before getting flu vaccine. If you are ill, talk to your doctor or nurse about whether to reschedule the vaccination. People with a mild illness can usually get the vaccine.

5 When should I get influenza vaccine?

You can get the vaccine as soon as it is available, usually in the fall, and for as long as illness is occurring in your community. Influenza can occur any time from November through May, but it most often peaks in January or February. Getting vaccinated in December, or even later, will still be beneficial in most years.

Most people need one dose of influenza vaccine each year.

Children younger than 9 years of age getting influenza vaccine for the first time – or who got influenza vaccine for the first time last season but got only one dose – should get 2 doses, at least 4 weeks apart, to be protected.

Influenza vaccine may be given at the same time as other vaccines.

6 What are the risks from LAIV?

A vaccine, like any medicine, could possibly cause serious problems, such as severe allergic reactions. The risk of a vaccine causing serious harm, or death, is extremely small.

Live influenza vaccine viruses rarely spread from person to person. Even if they do, they are not likely to cause illness.

LAIV is made from weakened virus and does not cause influenza. The vaccine can cause mild symptoms in people who get it (see below).

Mild problems:

Some children and adolescents 2-17 years of age have reported mild reactions, including:

- runny nose, nasal congestion or cough
- fever
- headache and muscle aches
- wheezing
- abdominal pain or occasional vomiting or diarrhea

Some adults 18-49 years of age have reported:

- runny nose or nasal congestion
- sore throat
- cough, chills, tiredness/weakness
- headache

Severe problems:

- Life-threatening allergic reactions from vaccines are very rare. If they do occur, it is usually within a few minutes to a few hours after the vaccination.
- If rare reactions occur with any product, they may not be identified until thousands, or millions, of people have used it. Millions of doses of LAIV have been distributed since it was licensed, and no serious problems have been identified. Like all vaccines, LAIV will continue to be monitored for unusual or severe problems.

7 What if there is a severe reaction?

What should I look for?

Any unusual condition, such as a high fever or behavior changes. Signs of a severe allergic reaction can include difficulty breathing, hoarseness or wheezing, hives, paleness, weakness, a fast heart beat or dizziness.

What should I do?

- **Call** a doctor, or get the person to a doctor right away.
- **Tell** the doctor what happened, the date and time it happened, and when the vaccination was given.
- **Ask** your provider to report the reaction by filing a Vaccine Adverse Event Reporting System (VAERS) form. Or you can file this report through the VAERS website at www.vaers.hhs.gov, or by calling 1-800-822-7967.

VAERS does not provide medical advice.

8 The National Vaccine Injury Compensation Program

A federal program exists to help pay for the care of anyone who has a serious reaction to a vaccine.

For more information about the National Vaccine Injury Compensation Program, call **1-800-338-2382**, or visit their website at www.hrsa.gov/vaccinecompensation.

9 How can I learn more?

- Ask your provider. They can give you the vaccine package insert or suggest other sources of information.
- Call your local or state health department.
- Contact the Centers for Disease Control and Prevention (CDC):
 - Call **1-800-232-4636 (1-800-CDC-INFO)** or
 - Visit CDC's website at www.cdc.gov/flu



DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION



Vaccine Information Statement
Live, Attenuated Influenza Vaccine (8/11/09) U.S.C. §300aa-26

INFLUENZA VACCINE ADMINISTRATION RECORD:

“I have read or have had explained to me the information in the Vaccine Information Statement about the influenza vaccine. I have had a chance to ask questions that were answered to my satisfaction. I believe I understand the benefits and risks of the vaccine(s) listed below and ask that the vaccine(s) be given to me or to the person named below for whom I am authorized to make this consent.”

Information about the person to receive vaccine – PLEASE PRINT				
Name:				
_____	_____	_____	/ _____ /	_____
Last	First	Middle Initial	Birthdate	Age
Address:				
_____	_____	_____	_____	_____
Street	City	County	State	Zip
Signature of person to receive vaccine or person authorized to make the request:				
X _____			Date: _____	

Clinic/Office Address:	
VIS(s) given to patient? (Please initial)	Date of VIS: <input type="checkbox"/> 8/11/09 (Inactivated) <input type="checkbox"/> 8/11/09 (LAIV)
Vaccine Given:	<input type="checkbox"/> Inactivated _____ <input type="checkbox"/> Live (LAIV)
Date Vaccine Administered:	
Vaccine Manufacturer:	<input type="checkbox"/> Inactivated _____ <input type="checkbox"/> MedImmune (LAIV)
Vaccine Lot Number:	
Administration Site:	<input type="checkbox"/> Injection Site _____ <input type="checkbox"/> Intranasal
Signature and Title of Vaccine Administrator:	

Declination of Influenza Vaccination

My employer or affiliated health facility, _____, has recommended that I receive influenza vaccination in order to protect myself and the patients I serve.

I acknowledge that I am aware of the following facts:

- Influenza is a serious respiratory disease that kills an average of 36,000 persons and hospitalizes more than 200,000 persons in the United States each year.
- Influenza vaccination is recommended for me and all other healthcare workers to prevent influenza disease and its complications, including death.
- If I contract influenza, I will shed the virus for 24–48 hours before influenza symptoms appear. My shedding the virus can spread influenza infection to patients in this facility.
- If I become infected with influenza, even when my symptoms are mild, I can spread severe illness to others.
- I understand that the strains of virus that cause influenza infection change almost every year, which is why a different influenza vaccine is recommended each year.
- I cannot get the influenza disease from the influenza vaccine.
- The consequences of my refusing to be vaccinated could endanger my health and the health of those with whom I have contact, including
 - patients in this healthcare setting
 - my coworkers
 - my family
 - my community

Despite these facts, I am choosing to decline influenza vaccination right now.

I understand that I may change my mind at any time and accept influenza vaccination, if vaccine is available.

I have read and fully understand the information on this declination form.

Signature: _____ Date: _____

Name (print): _____

Department: _____

Sample Declination Form

Declination: I understand that, because I work in a health care environment, I may place patients and co-workers at risk if I work while infected with influenza. Although I have been informed of the risks and benefits of the vaccine, I am giving up my right to be vaccinated and declining the vaccine at this time. I understand that by declining this vaccine, I will be at risk of acquiring influenza and spreading it to others.

Reason(s) I do not wish to take the vaccine. Check all that apply.

- I never get the Flu
- Don't feel I need to take the vaccine
- I will get the Flu if I receive the vaccine
- I had side effects after I had the vaccine - so I won't take it again
- I stay home when I'm sick so I won't spread it to patients or colleagues
- I'm allergic to eggs
- I have had Guillain-Barre Syndrome
- Other _____

I understand that this declination can be null and void if I change my mind.

Print name

Date

Signature

Sample Letter from CEO/DON/Administrator to Those Who Decline Vaccination

Dear [*Name of Employee*]:

Each year, approximately 36,000 people die and more than 100,000 are hospitalized because of influenza. Sadly, much of this illness could have been prevented by immunization. Healthcare professionals play a particularly important role in preventing influenza. Your vaccination helps protect you from the flu and from giving it to your patients and colleagues.

[*Name of Organization*] is committed to reducing the spread of influenza among our patients, staff, and volunteers. I encourage you to learn more about your responsibility in protecting yourself and others from influenza. You may obtain more information about healthcare workers and vaccination at <http://www.immunize.org/hcw/> or by calling [*Name of Organization Contact*] at [*Phone Number*]. Once you have accessed these resources, I hope you will reconsider your position and get vaccinated against the flu.

As healthcare professionals, our priority is patients. I hope you will join us in [*Name of Organization*]'s united effort to reduce influenza within our institution and beyond.

Sincerely,

[*Administrator's Name and Title*]

Other Vaccinations Recommended for Healthcare Professionals

Hepatitis B and the healthcare worker

CDC answers frequently asked questions about how to protect healthcare workers

The Immunization Action Coalition thanks Eric E. Mast, MD, MPH, chief, Prevention Branch, Division of Viral Hepatitis, National Center for HIV/AIDS, Hepatitis, STD, and TB Prevention; William L. Atkinson, MD, MPH, medical epidemiologist, National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention; and Linda A. Moyer, RN, consultant to the Immunization Action Coalition, for reviewing and updating the following questions and answers.

Healthcare workers need more vaccinations than just hepatitis B!

For information about additional vaccines you may need, see the references at the bottom of page 3.

Which workers in the healthcare setting need hepatitis B vaccine?

The Occupational Safety and Health Administration (OSHA) requires that hepatitis B vaccine be offered to healthcare workers (HCWs) who have a reasonable expectation of being exposed to blood on the job. This requirement does not include HCWs who would not be expected to have occupational risk, such as receptionists, billing staff, and general office workers.

At what anatomic site should hepatitis B vaccine be administered to adults? What needle size should be used?

The deltoid muscle is recommended for routine intramuscular (IM) vaccination among adults. The gluteus muscle should not be used as a site for administering hepatitis B vaccine. The suggested needle size is 1"–2" depending on the recipient's gender and weight (1" for females weighing less than 70 kg; 1½" for females weighing 70–100 kg; 1"–1½" for males weighing less than 120 kg; and 2" for males weighing 120 kg or more and females more than 100 kg). A 22- to 25-gauge needle should be used. For optimal protection, it is crucial that the vaccine be administered IM, not subcutaneously.

If a HCW had one dose only of hepatitis B vaccine 4 months ago, should the series be restarted?

No. The hepatitis B vaccine series should not be restarted when doses are delayed; rather, the series should be continued from where it stopped. The HCW should receive the second dose of vaccine now and the third dose at least 8 weeks later. There needs to be at least 16 weeks between the first and the third doses and at least 8 weeks between the second and third doses of vaccine.

Is it safe for HCWs to be vaccinated during pregnancy?

Yes. Limited data indicate no apparent risk for adverse events to developing fetuses. Current hepatitis B vaccines contain noninfectious hepatitis B surface antigen (HBsAg) and should pose no risk to the fetus. If the mother is being vaccinated be-

cause she is at risk for hepatitis B virus (HBV) infection (e.g., a HCW, a person with a sexually transmitted disease, an injection drug user, multiple sex partners), vaccination should be initiated as soon as her risk factor is identified during the pregnancy. If not vaccinated, a pregnant woman may contract an HBV infection, which might result in severe disease for the mother and chronic infection for the newborn. In addition, giving hepatitis B vaccine to the mother is not a contraindication to breastfeeding.

Which HCWs need serologic testing after receiving 3 doses of hepatitis B vaccine?

All HCWs who have a reasonable risk of exposure to blood or body fluids containing blood (e.g., HCWs with direct patient contact, HCWs who have the risk of needlestick or sharps injury, laboratory workers who draw or test blood) should have postvaccination testing for antibody to hepatitis B surface antigen (anti-HBs). Postvaccination testing should be done 1–2 months after the last dose of vaccine.

What should be done if a HCW's postvaccination anti-HBs test is negative 1–2 months after the last dose of vaccine?

Repeat the 3-dose series and test for anti-HBs 1–2 months after the last dose of vaccine. If the HCW is still negative after a second vaccine series, the HCW is considered a non-responder to hepatitis B vaccination. HCWs who do not respond to vaccination should be tested for HBsAg to determine if they have chronic HBV infection. If the HBsAg test is positive, the person should receive appropriate counseling and medical management. Persons who test negative for HBsAg should be considered susceptible to HBV infection and should be counseled about precautions to prevent HBV infection and the need to obtain hepatitis B immune globulin (HBIG) prophylaxis for any known or likely exposure to HBsAg-positive blood.

How often should I test HCWs after they've received the hepatitis B vaccine series to make sure they're protected?

For immune competent HCWs, periodic testing or

periodic boosting is not needed. Postvaccination testing (anti-HBs) should be done 1–2 months after the last dose of hepatitis B vaccine. If adequate anti-HBs (at least 10 mIU/mL) is present, nothing more needs to be done. If postvaccination testing is less than 10 mIU/mL, the vaccine series should be repeated and anti-HBs testing done, 1–2 months after the last dose of the second series. This information should be recorded in the HCW's employee health record.

Should a HCW who performs invasive procedures and who once had a positive anti-HBs result be revaccinated if the anti-HBs titer is rechecked and is less than 10 mIU/mL?

No. Immune competent persons known to have responded to hepatitis B vaccination do not require additional passive or active immunization. Postvaccination testing should be done 1–2 months after the original vaccine series is completed. In this scenario, the initial postvaccination testing showed that the HCW was protected. Substantial evidence suggests that adults who respond to hepatitis B vaccination (anti-HBs of at least 10 mIU/mL) are protected from chronic HBV infection for as long as 23 years, even if there is no detectable anti-HBs currently. Only immunocompromised persons (e.g., hemodialysis patients, some HIV-positive persons) need to have anti-HBs testing and booster doses of vaccine to maintain their protective anti-HBs concentrations of at least 10 mIU/mL.

Before reading the recommendations of CDC's Advisory Committee on Immunization Practices (ACIP) that say not to do this, we tested our employees for anti-HBs several years after they were vaccinated and some people had inadequate results, even though they had all completed a 3-dose series. What should we do now?

ACIP does not recommend periodic testing of vaccinated HCWs because anti-HBs concentrations decline over time, and HCWs remain protected even if their anti-HBs concentration declines to below

(page 1 of 3)

10 mIU/mL. For HCWs who have been vaccinated in the past and who do not have a documented response to vaccination of at least 10 mIU/mL, ACIP recommends testing for anti-HBs at the time of an exposure and providing appropriate management based on the results of testing. (See postexposure guidelines in Table 1.) If cost is not a great concern or if an employee or employer wants documented assurance of immunity, a revaccination series can be undertaken followed by testing 1–2 months after the 3rd dose of hepatitis B vaccine.

How often should anti-HBs testing be done on HCWs who perform invasive procedures?

For persons whose immune status is normal, periodic serologic testing to assess anti-HBs concentrations is not necessary. Persons who perform invasive procedures should be treated no differently from other HCWs with respect to anti-HBs testing. If a HCW has an exposure (e.g., needlestick), s/he should be evaluated for their need for immunoprophylaxis according to postexposure guidelines in Table 1.

If HCWs received hepatitis B vaccination in the past and were not tested for immunity, should

they be tested now?

No. In this scenario, a HCW does not need to be tested unless s/he has an exposure. If an exposure occurs, refer to the postexposure guidelines in Table 1.

How should a vaccinated HCW with an unknown anti-HBs response be managed if they have a percutaneous or mucosal exposure to blood or body fluids from an HBsAg-positive source?

This person should be tested for anti-HBs as soon as possible after exposure. If the anti-HBs concentration is at least 10 mIU/mL, no further treatment is needed. If the anti-HBs concentration is less than 10 mIU/mL, HBIG and one dose of hepatitis B vaccine should be administered. Prior to administering the HBIG and vaccine, blood should be drawn for a baseline HBsAg test. Subsequently, in 3–6 months, an additional anti-HBs and an HBsAg test should be performed. If the HBsAg is positive, the person is infected and should be referred for medical evaluation. If the anti-HBs result is at least 10 mIU/mL, the person is seroprotected. It is necessary to do postvaccination testing later than the usual recommended time frame because anti-HBs from HBIG

might be detected if testing is done any earlier. The postvaccination test result should be recorded in the person’s health record.

For a pre-employment physical, a HCW states she received all three hepatitis B vaccine doses as an adolescent. Would you test for anti-HBs?

If the HCW has written documentation of a full hepatitis B vaccine series, testing for anti-HBs at this point is not necessary. If the HCW has a subsequent exposure to HBV, hepatitis B immunoprophylaxis should be administered following guidelines for a person who has been vaccinated, but the immune response is not known (Table 1). This information should be documented in the HCW’s employee health record. This approach should be sufficient to meet the needs of the employer and the requirements of OSHA. If there is no written documentation of hepatitis B vaccination, see the next question.

(continued on next page)

Table 1: Recommendations for postexposure prophylaxis after percutaneous or mucosal exposure to HBV in an occupational setting

Vaccination and antibody response status of exposed persons ¹	Treatment			
	Source is HBsAg positive	Source is HBsAg negative	Source is unknown or not tested	
			High risk	Low risk
Unvaccinated	HBIG ² (1 dose) and begin a hepatitis B vaccine series	Begin a hepatitis B vaccine series	Begin a hepatitis B vaccine series	Begin a hepatitis B vaccine series
Known responder ³	No treatment	No treatment	No treatment	No treatment
Nonresponder ³				
Not revaccinated ⁴	HBIG (1 dose) and begin a revaccination series	Begin a revaccination series	HBIG (1 dose) and begin a revaccination series	Begin a revaccination series
After revaccination ⁴	HBIG (2 doses) ⁵	No treatment	HBIG (2 doses) ⁵	No treatment
Antibody response unknown	Test for anti-HBs ⁶ If adequate ³ , no treatment If inadequate, HBIG x 1 and vaccine booster	No treatment	Test for anti-HBs ⁶ If adequate, ³ no treatment If inadequate, give vaccine booster and check anti-HBs in 1–2 months	

1. Persons known to have had HBV infection in the past or who are chronically infected do not require HBIG or vaccine.
 2. Hepatitis B immune globulin (0.06 mL/kg) administered IM.
 3. Adequate response is anti-HBs of at least 10 mIU/mL after vaccination.
 4. Revaccination = additional 3-dose series of hepatitis B vaccine administered after the primary series.
 5. First dose as soon as possible after exposure and the second dose 1 month later.
 6. Testing should be done as soon as possible after exposure.

Source: This table was adapted from “Updated U.S. PHS Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis,” MMWR, 6/29/01, Vol. 50 (RR-11)

Several physicians in our group have no documentation showing they received hepatitis B vaccine. They are relatively sure, however, that they received the doses many years ago. What do we do now?

Because there is no documentation of vaccination, the 3-dose vaccination series should be administered and postvaccination testing should be performed 1–2 months after the third dose of vaccine. There is no harm in receiving extra doses of vaccine. Care should always be taken to document vaccine lot, date, manufacturer, route, and vaccine dosages. Postvaccination testing results should also be documented, including the date testing was performed. All organizations (e.g., hospitals, clinics) should develop policies or guidelines to assure valid hepatitis B immunization.

A healthcare worker (HCW) thinks she had 3 doses of hepatitis B vaccine in the past but has no documentation of receiving those doses. Before reading the recommendations to revaccinate her, we obtained an anti-HBs titer and the result was greater than 10 mIU/mL. With this lab result, can't we assume she is immune?

A positive anti-HBs indicates that the vaccinated person is immune at the time the HCW was tested, but does not necessarily assure that the HCW has long-term immunity. Long-term immunity has been shown only for persons attaining an adequate anti-HBs result of at least 10 mIU/mL after a 3-dose vaccination series. The most direct way to deal with this is to vaccinate the HCW with the 3-dose series of hepatitis B vaccine; test for anti-HBs in 1–2 months and document the result in the HCW's employee health record. An adequate anti-HBs result from a documented 3-dose vaccine series would assure not only seroprotection, but long-term protection, as well.

Of course, it is possible that the HCW has an anti-HBs result of greater than 10 mIU/mL because of an HBV infection in the past. If this is of concern, a total anti-HBc test could be performed to discern this (a positive result indicates a history of HBV infection at some undefined period in time).

I'm a nurse who received the hepatitis B vaccine series more than 10 years ago and had a positive follow-up titer (at least 10 mIU/mL). At present, my titer is negative (less than 10 mIU/mL). What should I do now?

Nothing. Data show that vaccine-induced anti-HBs levels might decline over time; however, immune memory (anamnestic anti-HBs response) remains

intact indefinitely following immunization. Persons with anti-HBs concentrations that decline to less than 10 mIU/mL are still protected against HBV infection. For HCWs with normal immune status who have demonstrated adequate anti-HBs (at least 10 mIU/mL) following vaccination, booster doses of vaccine or periodic anti-HBs testing is not recommended.

A person who is a known non-responder to hepatitis B vaccine has a percutaneous exposure to HBsAg-positive blood. According to older ACIP recommendations, I have the option to give HBIG x 2 or HBIG x 1 and initiate revaccination. How do I decide which to do?

Current recommendations have been revised. The recommended postexposure prophylaxis for persons who are non-responders to hepatitis B vaccine (i.e., have not responded to an initial 3-dose series and revaccination with a 3-dose series) is to give HBIG as soon as possible after exposure and a second dose of HBIG one month later (see Table 1). Exposed persons, who are known not to have responded to a primary vaccine series, but have not been revaccinated with a second 3-dose series, should receive a single dose of HBIG and reinstate the hepatitis B vaccine series with the first dose of hepatitis B vaccine as soon as possible after exposure.

If an employee does not respond to hepatitis B vaccination (employee has had two full series of hepatitis B vaccine), does s/he need to be removed from activities that expose her/him to bloodborne pathogens? Does the employer have a responsibility in this area beyond providing the vaccine?

There are no regulations that require removal from job situations where exposure to bloodborne pathogens could occur; this is an individual policy decision within the organization. OSHA regulations require that employees in jobs where there is a reasonable risk of exposure to blood be offered hepatitis B vaccine. In addition, the regulation states that adequate personal protective equipment be provided and that standard precautions be followed. Check your state OSHA regulations regarding additional requirements. If there are no state OSHA regulations, federal OSHA regulations should be followed. Adequate documentation should be placed in the employee record regarding non-response to vaccination. HCWs who do not respond to vaccination should be tested for HBsAg to determine if they have chronic HBV infection.

If the HBsAg test is positive, the person should receive appropriate counseling and medical management. Persons who test negative for HBsAg should be considered susceptible to HBV infection and should be counseled about precautions to prevent HBV infection and the need to obtain HBIG prophylaxis for any known or likely exposure to HBsAg-positive blood (see Table 1).

Can a person with chronic HBV infection become a HCW?

Yes. All HCWs should practice standard precautions, which are designed to prevent HBV transmission, both from patients to HCW and from HCW to patient. There is, however, one caveat concerning HBV-infected HCWs. Those who are HBsAg positive and HBeAg (hepatitis B e antigen) positive should not perform exposure-prone procedures (e.g., gynecologic, cardiothoracic surgery) unless they have sought counsel from an expert review panel and been advised under what circumstances, if any, they may continue to perform these procedures. Such circumstances might include notifying prospective patients of the HCW's seropositivity before they undergo exposure-prone invasive procedures. For more information on this issue, see the *Mortality and Morbidity Weekly Report*, "Recommendations for Preventing Transmission of Human Immunodeficiency Virus and Hepatitis B Virus to Patients During Exposure-Prone Invasive Procedures," *MMWR*, 7/12/91, Vol. 40(RR-8);1–9. This document is available at www.cdc.gov/mmwr/preview/mmwrhtml/00014845.htm.

Keep your own vaccination history!

Record the dates you received hepatitis B vaccine, as well as the results of your postvaccination serologic testing (anti-HBs).

Remember to save records of any vaccinations you receive so you don't have to repeat them.

To order adult immunization record cards, visit www.immunize.org/adultizcards.

For more information on vaccination recommendations for healthcare workers, see the following:

1. "Immunization of Health-Care Workers," *MMWR*, 12/26/97, Vol. 46 (RR-18), www.cdc.gov/mmwr/PDF/rr/rr4618.pdf
2. "Influenza Vaccination of Health-Care Personnel," *MMWR*, 2/24/06, Vol. 55 (RR-2), www.cdc.gov/mmwr/PDF/rr/rr5502.pdf
3. "Healthcare Personnel Vaccination Recommendations," Immunization Action Coalition, www.immunize.org/catg.d/p2017.pdf



UNITED STATES DEPARTMENT OF LABOR
OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION

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Regulations (Standards - 29 CFR)

Hepatitis B Vaccine Declination (Mandatory) - 1910.1030 App A

[← Regulations \(Standards - 29 CFR\) - Table of Contents](#)

● Part Number:	1910
● Part Title:	Occupational Safety and Health Standards
● Subpart:	Z
● Subpart Title:	Toxic and Hazardous Substances
● Standard Number:	1910.1030 App A
● Title:	Hepatitis B Vaccine Declination (Mandatory)

I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with hepatitis B vaccine, at no charge to myself. However, I decline hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with hepatitis B vaccine, I can receive the vaccination series at no charge to me.

[56 FR 64004, Dec. 06, 1991, as amended at 57 FR 12717, April 13, 1992; 57 FR 29206, July 1, 1992; 61 FR 5507, Feb. 13, 1996]

[← Next Standard \(1910.1043\)](#)

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Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

MENINGOCOCCAL VACCINES

WHAT YOU NEED TO KNOW

Many Vaccine Information Statements are available in Spanish and other languages. See www.immunize.org/vis.

1 What is meningococcal disease?

Meningococcal disease is a serious bacterial illness. It is a leading cause of **bacterial meningitis** in children 2 through 18 years old in the United States. Meningitis is an infection of the fluid surrounding the brain and spinal cord.

Meningococcal disease also causes blood infections.

About 1,000 - 2,600 people get meningococcal disease each year in the U.S. Even when they are treated with antibiotics, 10-15% of these people die. Of those who survive, another 11-19% lose their arms or legs, become deaf, have problems with their nervous systems, become mentally retarded, or suffer seizures or strokes.

Anyone can get meningococcal disease. But it is most common in infants less than one year of age and people with certain medical conditions, such as lack of a spleen. College freshmen who live in dormitories, and teenagers 15-19 have an increased risk of getting meningococcal disease.

Meningococcal infections can be treated with drugs such as penicillin. Still, about 1 out of every ten people who get the disease dies from it, and many others are affected for life. This is why *preventing* the disease through use of meningococcal vaccine is important for people at highest risk.

2 Meningococcal vaccine

There are two kinds of meningococcal vaccine in the U.S.:

- **Meningococcal conjugate vaccine (MCV4)** was licensed in 2005. It is the preferred vaccine for people 2 through 55 years of age.
- **Meningococcal polysaccharide vaccine (MPSV4)** has been available since the 1970s. It may be used if MCV4 is not available, and is the only meningococcal vaccine licensed for people older than 55.

Both vaccines can prevent **4 types** of meningococcal disease, including 2 of the 3 types most common in the United States and a type that causes epidemics in Africa. Meningococcal vaccines cannot prevent all types of the disease. But they do protect many people who might become sick if they didn't get the vaccine.

Both vaccines work well, and protect about 90% of people who get them. MCV4 is expected to give better, longer-lasting protection.

MCV4 should also be better at preventing the disease from spreading from person to person.

3 Who should get meningococcal vaccine and when?

A dose of MCV4 is recommended for children and adolescents 11 through 18 years of age.

This dose is normally given during the routine pre-adolescent immunization visit (at 11-12 years). But those who did not get the vaccine during this visit should get it at the earliest opportunity.

Meningococcal vaccine is also recommended for other people at increased risk for meningococcal disease:

- College freshmen living in dormitories.
- Microbiologists who are routinely exposed to meningococcal bacteria.
- U.S. military recruits.
- Anyone traveling to, or living in, a part of the world where meningococcal disease is common, such as parts of Africa.
- Anyone who has a damaged spleen, or whose spleen has been removed.
- Anyone who has terminal complement component deficiency (an immune system disorder).
- People who might have been exposed to meningitis during an outbreak.

MCV4 is the preferred vaccine for people 2 through 55 years of age in these risk groups. MPSV4 can be used if MCV4 is not available and for adults over 55.

How Many Doses?

People 2 years of age and older should get 1 dose. Sometimes a second dose is recommended for people who remain at high risk. Ask your provider.

MPSV4 may be recommended for children 3 months to 2 years of age under special circumstances. These children should get 2 doses, 3 months apart.

4 Some people should not get meningococcal vaccine or should wait

- Anyone who has ever had a severe (life-threatening) **allergic reaction to a previous dose** of either meningococcal vaccine should not get another dose.
- Anyone who has a severe (life threatening) **allergy to any vaccine component** should not get the vaccine. Tell your provider if you have any severe allergies.
- Anyone who is **moderately or severely ill** at the time the shot is scheduled should probably wait until they recover. Ask your provider. People with a **mild illness** can usually get the vaccine.
- Anyone who has ever had **Guillain-Barré Syndrome** should talk with their provider before getting MCV4.
- Meningococcal vaccines may be given to pregnant women. However, MCV4 is a new vaccine and has not been studied in pregnant women as much as MPSV4 has. It should be used only if clearly needed.
- Meningococcal vaccines may be given at the same time as other vaccines.

5 What are the risks from meningococcal vaccines?

A vaccine, like any medicine, could possibly cause serious problems, such as severe allergic reactions. The risk of meningococcal vaccine causing serious harm, or death, is extremely small.

Mild problems

As many as half the people who get meningococcal vaccines have mild side effects, such as redness or pain where the shot was given.

If these problems occur, they usually last for 1 or 2 days. They are more common after MCV4 than after MPSV4.

A small percentage of people who receive the vaccine develop a fever.

Severe problems

- Serious allergic reactions, within a few minutes to a few hours of the shot, are very rare.
- A serious nervous system disorder called **Guillain-Barré Syndrome** (or GBS) has been reported among some people who received MCV4. This happens so rarely that it is currently not possible to tell if the vaccine might be a factor. Even if it is, the risk is very small.

6 What if there is a moderate or severe reaction?

What should I look for?

- Any unusual condition, such as a high fever, weakness, or behavior changes. Signs of a serious allergic reaction can include difficulty breathing, hoarseness or wheezing, hives, paleness, weakness, a fast heart beat or dizziness.

What should I do?

- **Call** a doctor, or get the person to a doctor right away.
- **Tell** your doctor what happened, the date and time it happened, and when the vaccination was given.
- **Ask** your doctor, nurse, or health department to report the reaction by filing a Vaccine Adverse Event Reporting System (VAERS) form.

Or you can file this report through the VAERS web site at www.vaers.hhs.gov, or by calling **1-800-822-7967**.

VAERS does not provide medical advice.

7 The National Vaccine Injury Compensation Program

A federal program exists to help pay for the care of anyone who has had a rare serious reaction to a vaccine.

For information about the National Vaccine Injury Compensation Program, call **1-800-338-2382** or visit their website at www.hrsa.gov/vaccinecompensation.

8 How can I learn more?

- Ask your doctor or nurse. They can give you the vaccine package insert or suggest other sources of information.
- Call your local or state health department.
- Contact the Centers for Disease Control and Prevention (CDC):
 - Call **1-800-232-4636 (1-800-CDC-INFO)**
 - Visit CDC's National Immunization Program website at www.cdc.gov/vaccines
 - Visit CDC's meningococcal disease website at www.cdc.gov/ncidod/dbmd/diseaseinfo/meningococcal_g.htm
 - Visit CDC's Travelers' Health website at wwwn.cdc.gov/travel



Prevention & Control of Mumps in Healthcare Settings

Background

Mumps transmission has occurred in past outbreaks involving hospitals and long-term care facilities housing adolescents and young adults. Mumps is transmitted by contact with virus-containing respiratory secretions, including saliva; the portals of entry are the nose and mouth. The incubation period varies from 12 to 25 days and is usually 16 to 18 days. In unvaccinated persons, unilateral or bilateral parotitis occurs in approximately half of patients infected with mumps; 15-20% are asymptomatic and the remainder have nonspecific, flu-like symptoms without parotitis. Although the virus has been isolated from saliva from 2 to 7 days before parotitis and may persist for as long as 9 days after onset of disease, the infectious period is considered to be from 3 days before to 9 days after symptom onset. The risk of transmission from infected individuals who are asymptomatic or have non-specific respiratory symptoms is not known.

Preventing transmission of mumps in healthcare settings consists of four major components: 1) assessment of evidence of immunity of healthcare workers, including: a documentation of physician-diagnosed mumps, laboratory evidence of immunity, birth before 1957 or appropriate vaccination history 2) vaccination of those without evidence of immunity, 3) exclusion of healthcare workers with active mumps illness as well as non-immune healthcare workers who are exposed to confirmed, probable or suspected mumps patients, and 4) isolation of patients in whom mumps is suspected.

Although birth before 1957 is generally considered proof of immunity, during outbreaks, this criterion should not be used as proof of immunity for healthcare workers. During outbreaks, all healthcare workers should be asked to demonstrate immunity based documentation of physician-diagnosed mumps, vaccination or serologic evidence of immunity. Because outbreaks of mumps cannot be anticipated, healthcare facilities may choose to proactively assess the immunity of healthcare workers born before 1957 and recommend serologic testing for immunity or vaccination to those without documentation of physician-diagnosed mumps.

Healthcare worker immune-status assessment:

Prevention and control strategies should be applied in all healthcare settings where patient care occurs, including outpatient and long-term care facilities. An effective vaccination program is the best approach to prevent healthcare-associated mumps transmission. Healthcare facilities are encouraged to review employee immunization status for this and other vaccine preventable infections. Vaccination with MMR vaccine is recommended unless otherwise contraindicated for all healthcare workers for whom immune status cannot be documented. Receipt of MMR vaccine is not a reason to exclude personnel from work. Ideally, healthcare facilities should provide MMR vaccine at no charge to all eligible employees involved in direct patient care.

The immune status of personnel should be determined by either of the following criteria:

- Documentation of physician-diagnosed mumps
- Documentation of mumps vaccination (mumps or MMR vaccines)
 - Current recommendations state that healthcare personnel should receive one dose of mumps vaccine and 2 doses of measles containing vaccine preferentially administered as MMR vaccine. During an outbreak of mumps, health care facilities should ensure that health care personnel have received two doses of mumps vaccine.

Serologic evidence of immunity (i.e., positive mumps IgG):

- Though there is no data that correlates levels of serum antibody with protection from disease, in unvaccinated persons or persons with a history of mumps disease, presence of mumps specific antibodies should be considered evidence of natural infection and immunity. However, documentation of physician diagnosed mumps is considered reliable proof of immunity and antibody testing of such individuals is not recommended. Serologic testing may be helpful in assessing the true immune status healthcare workers with a reported history of mumps, but without documentation of the diagnosis.
- Results of serum antibody tests in vaccinated persons are difficult to interpret. In vaccinated persons, antibody levels are often lower than following natural infection, and commercially available tests may not detect such low levels of antibody. As a result, post-vaccination serologic testing to verify an immune response to MMR or its component vaccines is not recommended. There are no data on the impact of additional (greater than two) doses of mumps vaccine on antibody levels or protection from disease.

Healthcare worker exclusion:

Exclude healthcare workers with active mumps illness; and those who are non-immune and have been exposed to mumps. Exposure is defined as being within three feet of a patient with a diagnosis of mumps. Irrespective of their immune status, all exposed healthcare workers should report any signs or symptoms of illness during the incubation period, 12-25 days after exposure.

Management of healthcare workers with illness due to mumps:

- A diagnosis of mumps should be considered in exposed healthcare workers who develop non-specific respiratory infection symptoms during the incubation period after exposure to mumps, even in the absence of parotitis.
- Healthcare workers with mumps illness should be excluded until 9 days after the onset of parotitis.

Management of healthcare personnel who are exposed to patients with mumps

For healthcare personnel who are non-immune

- Non-immune personnel should be excluded from the 12th day after the first exposure to mumps through the 26th day after the last exposure. The mumps vaccine cannot be used as post-exposure therapy. Hence, previously unvaccinated healthcare personnel who receive a 1st dose of vaccine after an exposure are considered non-immune and must be excluded from the 12th day after the first exposure to mumps through the 26th day after the last exposure.

For healthcare personnel who are immune

- Healthcare workers with any of the following are considered immune to mumps: history of physician diagnosed mumps, past receipt of at least one dose of mumps vaccine or positive mumps IgG.
- Those personnel who had been previously vaccinated for mumps, but received only one dose of mumps vaccine may continue working following an exposure to mumps. Such workers should receive a 2nd dose as soon as possible, but no sooner than 28 days after the first.
- Healthcare personnel who are immune do not need to be excluded from work following an exposure. However, health care workers should be educated about symptoms of mumps, including non-specific presentations, and should notify employee health if they develop these symptoms. Because 1 dose of MMR vaccine is about 80% effective in preventing mumps and 2 doses is about 90% effective, vaccinated personnel remain at risk for infection.

Patient isolation:

- In addition to standard precautions, patients with clinical signs and symptoms of mumps illness should be cared for using droplet precautions (http://www.cdc.gov/ncidod/dhqp/gl_isolation_droplet.html)
- Droplet precautions should be maintained for 9 days after onset of parotitis.

Proposed Changes of MMR Vaccine 'Evidence of Immunity' Requirements for Healthcare Personnel

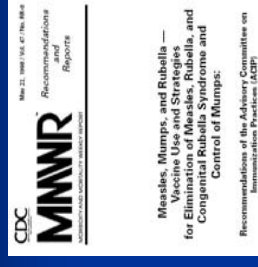
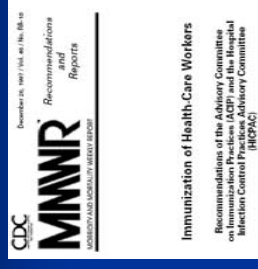
Amy Parker, Kathleen Gallagher, Joe Perz, Mike Bell, Jane Seward

February 25, 2009
ACIP Meeting

Outline

- Provide background on current MMR vaccine recommendations for HCP
 - Routine vaccination
 - Vaccination during outbreaks
- Discuss proposed changes & rationales

ACIP/ HICPAC MMR Recommendations



<http://www.cdc.gov/mmwr/preview/mmwrhtml00059577.htm>, *MMWR* 1997;46(RR-18):1-42

Routine MMR Vaccine Recommendations for HCP*

- MMR vaccine policy recommendations:
 - Measles (1998)¹ & Mumps (2006)²: 2 doses*
 - Rubella (1998)¹: 1 dose
- "Persons who work within medical facilities should be immune to measles and rubella... vaccine should be considered for all personnel, including those born before 1957, who have no proof of immunity"
- "Health-care workers have a responsibility to avoid transmitting these diseases and thereby causing harm to patients"¹
- "health-care facilities should consider recommending MMR vaccine(s) to unvaccinated workers born before 1957"¹

*Without other evidence of immunity
 "MMR is the vaccine of choice when protection against any of these three diseases is required on or after the first birthday, unless any of its component vaccines is contraindicated."
 1. CDC *MMWR* 1997;46(RR-18):1-42. 2. CDC. *MMWR*. 1998;47(RR-8):1-57
 2. CDC. *MMWR* Notice to Readers. 2006;55(22):629-630

Current ACIP MMR Vaccine 'Presumptive Evidence of Immunity' Requirements for HCP^{1,2}

1. Documentation of administration of appropriate vaccination against measles, mumps, and rubella (i.e., administration on or after the first birthday of two doses of live measles and mumps vaccine separated by greater than or equal to 28 days and one dose of live rubella vaccine)
2. Laboratory evidence of immunity
3. Documentation of physician diagnosed disease (measles & mumps)
4. Born before 1957**

**May vary depending on current state or local requirements.
 + Health-care facilities should consider recommending doses of MMR vaccine for unvaccinated workers born before 1957 who are at risk for occupational exposure to measles and who do not have a history of measles disease or laboratory evidence of measles immunity.

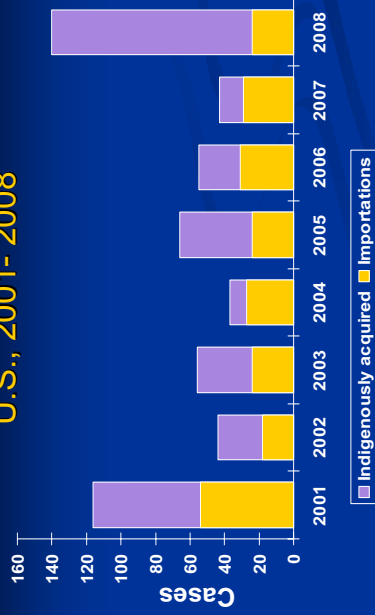
1. CDC. *MMWR* 1998;47(RR-8):1-57 2. CDC. *MMWR* Notice to Readers. 2006;55(22):629-630

ACIP Recommendations for MMR Vaccine during Outbreaks

- Measles and rubella outbreaks-- "during outbreaks, health-care facilities also should strongly consider recommending a dose of MMR vaccine to unvaccinated health-care workers born before 1957 who do not have serologic evidence of measles or rubella immunity or a history of measles disease."¹
- Mumps outbreaks-- "During an outbreak, health-care facilities should strongly consider recommending 2 doses of a live mumps virus vaccine to unvaccinated workers born before 1957 who do not have evidence of mumps immunity"²

1. CDC. *MMWR* 1998;47(RR-8):1-57 2. CDC. *MMWR* Notice to Readers. 2006;55(22):629-630

Reported Measles Cases U.S., 2001- 2008



Population Seroprevalence to Measles, Mumps, & Rubella

- Overall, population seroprevalence to measles, mumps, and rubella in the U.S. is high
- In persons born between 1967-1976, 15-20% do not have antibodies to one or more of the three diseases
- Among adults born before 1957, ~3-8% lack antibodies to at least one of the MMR antigens

Measles in Healthcare Facilities

- Measles is a well-described nosocomial problem; infected persons frequently seek medical care^{1, 2, 3}
- Washington state, 1996— HCP have a greater risk of being exposed to and acquiring measles than adults of similar age⁴
 - 19x risk (RR 19, 95% CI 7.4, 45.4, p< 0.01)
- During 1985–1992, 643 measles cases were reported; 27% were born before 1957⁵

1. Atkinson WL, Maronitz LE, Adams MC, Sautom G. Transmission of measles in medical settings—United States, 1996. *JAMA*. 1997;277:1020-25.
 2. Dilling S, Sorenson AL, Wood J. Measles in medical settings. *JAMA*. 1982;245:1045-8.
 3. Atkinson WL. Measles and health care workers. *Infect Control/Hosp Epidemiol*. 1984;15:5-7.
 4. Smeigler PR, Tomasz AP, Dwyer CA, Reed SC. Transmission of measles virus in healthcare settings during a communitywide outbreak. *Infect Control Hosp Epidemiol*. 1998;23:137.

Measles in Healthcare Facilities in the Post-Elimination Era, 2001- 08

- During 2001- 08, 27 reported measles cases were transmitted in healthcare settings, accounting for 5% of all reported U.S. measles cases (CDC, unpublished data)
 - 15 (11%) of 140 cases in 2008 were transmitted in a healthcare setting
- Considerable economic costs
 - Range of ~\$100,000 to \$400,000

1. CDC. *MMWR: Outbreak of Measles* — San Diego, California, January–February, 2009. 57 (Early Release):1-4.

Economic Impact Nosocomial Measles Outbreak AZ, 2008

- In Arizona in 2008, the largest nosocomial U.S. measles outbreak (14 cases) occurred in 20 years
- At hospital A, hospitalization of measles case resulted in:
 - > 6,000 hospital contact investigations
 - 4,269 hospital contacts
 - 1,872 HCP
 - Review of measles documentation of immunity of 2,000 HCP and emergency serology and vaccination of 400
 - One HCP vaccinated during the outbreak developed measles
 - Cost > \$400,000

Rationale for Proposed Changes

- In era of measles and rubella elimination, the tolerance for any cases or exposures has decreased
- To maintain elimination, goal is 100% immunity in high risk populations (e.g., HCP)
 - Proposed changes are driven by measles
 - Highly contagious with chance of spread in unvaccinated groups
 - Importations into U.S. are continuing
 - With high exposure risk, it is important to protect HCP preemptively
- During outbreaks, it is disruptive and time-consuming to determine which staff are born before 1957, to find them, and to vaccinate
- Current permissive vaccine recommendations are not clear

Implementation

- Testing for measles, mumps and rubella immunity for persons born <1957 could be conducted concurrently with varicella immunity testing (required since 2007)
- These policies could be implemented as new employees join the staff and/or with other annual routine disease-prevention measures (e.g., influenza vaccination, TB skin testing)
- Implementation could be started soon and phased in within a few years.

Conclusions

- Current policy established more than a decade ago
- In an era of measles and rubella elimination, high standards for immunity are appropriate for HCP
- HCP have a duty to protect themselves and their patients from diseases preventable by vaccination
- Current permissive recommendations are confusing
- Determining who is presumed immune & provide vaccination during measles outbreaks is costly & disruptive
- Despite elimination, measles exposures and outbreaks are likely to continue in healthcare facilities
- Some facilities are already implementing the proposed changes

Thank you

Facts About Pertussis for Adults

What is pertussis?

Pertussis, also known as whooping cough, is a serious infection that spreads easily from person to person. The infection causes coughing spells so severe that it can be hard to breathe, eat or sleep. It can even lead to cracked ribs, pneumonia or hospitalization.

Pertussis has been on the rise in the United States since an all-time low of just over 1,000 cases were reported in 1976. While 25,616 cases were reported to the U.S. Centers for Disease Control and Prevention (CDC) in 2005, the vast majority of cases go unreported and some estimates of true incidence range from one to three million cases annually.

Symptoms

Early symptoms of pertussis are similar to the common cold or bronchitis and may include runny nose, sneezing and low-grade fever. The infection also causes coughing that lasts for weeks, even months. Sometimes a “whoop” sound occurs while gasping for breath during a bad coughing spell. However, the “whoop” is not always present; adults rarely have the classic “whoop.”

Prevention

Whooping cough is most contagious before the coughing starts, so the most effective way to prevent it is through immunization. The whooping cough booster vaccine for adults (and adolescents) is called Tdap (tetanus-diphtheria-acellular pertussis). Children get a different formulation, called DTaP. Both protect against tetanus, diphtheria and pertussis.

Two Tdap vaccines are currently licensed for use in the U.S. One preparation can be used for both adults and adolescents, and the other has been approved for use only in adolescents:

- ADACEL (sanofi pasteur) for use in persons 11 to 64 years of age
- Boostrix (GlaxoSmithKline) for use in persons 10 to 18 years of age

Who should get the Tdap vaccine?

The CDC recommends that adults 19 to 64 years of age (and adolescents 11 to 18 years of age) receive a single dose of Tdap in place of the Td (tetanus-diphtheria) booster previously recommended for all adults and adolescents. In addition, the CDC has issued recommendations for specific adult populations:

- Adults who have or who anticipate having close contact with infants younger than 12 months of age. (e.g., parents, grandparents younger than 65 years of age, childcare providers, healthcare workers)
- Healthcare personnel in hospitals or ambulatory care settings who have direct patient contact. Priority is given to vaccination of workers in direct contact with infants younger than 12 months of age.
- Pregnant women after delivery, before discharge from the hospital or birthing center.

Vaccine Safety

The Tdap vaccine is safe. Reactions to the vaccine are usually mild. The most common reactions after vaccination are pain and redness at the injection site. Other adverse events are possible. Please consult with your doctor. A healthcare professional should be informed if you have developed Guillain-Barré syndrome within six weeks following a prior tetanus vaccination, if you are pregnant or nursing, or if you have experienced Arthus-type hypersensitivity reactions (i.e., rare but severe, exaggerated local reactions) following a prior tetanus vaccine.

Facts About Pertussis for Adults

- FACT:** Pertussis is a serious infectious disease that has been on the rise in the United States over the last decade, across all age groups.
- FACT:** Protection against pertussis from early childhood vaccines wears off, leaving adults and adolescents at risk for infection.
- FACT:** The Chinese refer to pertussis as the “cough of 100 days” due to the prolonged, dry cough that is experienced by infected individuals.
- FACT:** Pertussis can be difficult to diagnose because early symptoms may appear like the common cold or bronchitis.
- FACT:** Pertussis causes coughing spells that can affect breathing, eating and sleeping. It can even lead to cracked ribs and hospitalization.
- FACT:** Pertussis causes coughing that lasts for weeks, even months. Sometimes a “whoop” sound occurs while gasping for breath during a bad coughing spell. However, the “whoop” is not always present; adults rarely have the classic “whoop.”
- FACT:** The vast majority of cases are not reported. While 25,616 cases of pertussis were reported to the U.S. Centers for Disease Control and Prevention in 2005, experts estimate that the true number may actually be one to three million cases annually.
- FACT:** Adults and adolescents can spread pertussis to infants who have not yet had all of their vaccines, even before a cough develops.
- FACT:** Parents, grandparents and older siblings are often the source of pertussis in babies.
- FACT:** A booster vaccine, known as Tdap (tetanus-diphtheria-acellular pertussis), is available to protect against pertussis. One formulation can be used for adults and adolescents. The other has been approved for adolescents only.
- FACT:** The pertussis booster vaccine protects against two other highly infectious diseases—tetanus and diphtheria.
- FACT:** The CDC recommends that adults 19 to 64 years of age (and adolescents 11 to 18 years of age) receive a single dose of Tdap in place of the Td (tetanus-diphtheria) booster previously recommended for all adults.
- FACT:** The CDC also recommends that adults in close contact with infants younger than 12 months of age, healthcare personnel with direct patient contact — especially with infants younger than 12 months of age — and pregnant women directly after delivery receive a single dose of Tdap.



MMWRTM

Morbidity and Mortality Weekly Report

Recommendations and Reports

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Preventing Tetanus, Diphtheria, and Pertussis Among Adults: Use of Tetanus Toxoid, Reduced Diphtheria Toxoid and Acellular Pertussis Vaccine

**Recommendations of the Advisory Committee
on Immunization Practices (ACIP)**

and

**Recommendation of ACIP, supported by the Healthcare
Infection Control Practices Advisory Committee (HICPAC),
for Use of Tdap Among Health-Care Personnel**

INSIDE: Continuing Education Examination

preventing transmission to the infant. Administration of Tdap to adult contacts at least 2 weeks before contact with an infant is optimal. Near peak antibody responses to pertussis vaccine antigens can be achieved with booster doses by 7 days postvaccination, as demonstrated in a study in Canadian children after receipt of DTaP-IPV booster (131).

The strategy of vaccinating contacts of persons at high risk to reduce disease and therefore transmission is used with influenza. Influenza vaccine is recommended for household contacts and out-of-home caregivers of children aged 0–59 months, particularly infants aged 0–6 months, the pediatric group at greatest risk for influenza-associated complications (162). A similar strategy for Tdap is likely to be acceptable to physicians. In a 2005 national survey, 62% of obstetricians surveyed reported that obstetricians and adult primary-care providers should administer Tdap to adults anticipating contact with an infant, if recommended by ACIP and the American College of Obstetricians and Gynecologists (ACOG) (163).

Protecting women with Tdap before pregnancy also could reduce the number of mothers who acquire and transmit pertussis to their infant. ACOG states that preconceptional vaccination of women to prevent disease in the offspring, when practical, is preferred to vaccination of pregnant women (164). Because approximately half of all pregnancies in the United States are unplanned, targeting women of child-bearing age before they become pregnant for a dose of Tdap might be the most effective strategy (165). Vaccinating susceptible women of childbearing age with measles, mumps, and rubella vaccine also is recommended to protect the mother and to prevent transmission to the fetus or young infant (166). Implementing preconception vaccination in general medical offices, gynecology outpatient care centers, and family-planning clinics is essential to ensure the success of this preventive strategy.

If Tdap vaccine is not administered before pregnancy, immediate postpartum vaccination of new mothers is an alternative. Rubella vaccination has been successfully administered postpartum. In studies in New Hampshire and other sites, approximately 65% of rubella-susceptible women who gave birth received MMR postpartum (167,168). In a nationwide survey, 78% of obstetricians reported that they would recommend Tdap for women during the postpartum hospital stay if it were recommended (163). Vaccination before discharge from the hospital or birthing center, rather than at a follow-up visit, has the advantage of decreasing the time when new mothers could acquire and transmit pertussis to their newborn. Other household members, including fathers, should receive Tdap before the birth of the infant as recommended.

Mathematical modeling can provide useful information about the potential effectiveness of a vaccination strategy targeting contacts of infants. One model evaluating different vaccine strategies in the United States suggested that vaccinating household contacts of newborns, in addition to routine adolescent Tdap vaccination, could prevent 76% of cases in infants aged <3 months (169). A second model from Australia estimated a 38% reduction in cases and deaths among infants aged <12 months if both parents of the infant were vaccinated before the infant was discharged from the hospital (170).

Vaccination of Pregnant Women

ACIP has recommended Td routinely for pregnant women who received the last tetanus toxoid-containing vaccine ≥ 10 years earlier to prevent maternal and neonatal tetanus (33,171). Among women vaccinated against tetanus, passive transfer of antitetanus antibodies across the placenta during pregnancy protect their newborn from neonatal tetanus (101,172,173).

As with tetanus, antibodies to pertussis antigens are passively transferred during pregnancy (174,175); however, serologic correlates of protection against pertussis are not known (113). Whether passive transfer of maternal antibodies to pertussis antigens protects neonates against pertussis is not clear (113,176); whether increased titers of passive antibody to pertussis vaccine antigens substantially interfere with response to DTaP during infancy remains an important question (177–179). All licensed Td and Tdap vaccines are categorized as Pregnancy Category C^{††} agents by FDA. Pregnant women were excluded from prelicensure trials, and animal reproduction studies have not been conducted for Td or Tdap (111,180–183). Td and TT have been used extensively in pregnant women, and no evidence indicates use of tetanus and diphtheria toxoids administered during pregnancy are teratogenic (33,184,185).

Pertussis Among Health-Care Personnel

This section has been reviewed by and is supported by the Healthcare Infection Control Practices Advisory Committee (HICPAC)

Nosocomial spread of pertussis has been documented in various health-care settings, including hospitals and emergency

^{††} U.S. Food and Drug Administration Pregnancy Category C. Animal studies have documented an adverse effect, and no adequate and well-controlled studies in pregnant women have been conducted or no animal studies and no adequate and well-controlled studies in pregnant women have been conducted.

departments serving pediatric and adult patients (186–189), out-patient clinics (CDC, unpublished data, 2005), nursing homes (89), and long-term-care facilities (190–193). The source case of pertussis has been reported as a patient (188, 194–196), HCP with hospital- or community-acquired pertussis (192, 197, 198), or a visitor or family member (199–201).

Symptoms of early pertussis (catarrhal phase) are indistinguishable from other respiratory infections and conditions. When pertussis is not considered early in the differential diagnosis of patients with compatible symptoms, HCP and patients are exposed to pertussis, and inconsistent use of face or nose and mouth protection during evaluation and delay in isolating patients can occur (187, 188, 197, 200, 202). One study described the diagnosis of pertussis being considered in an HCP experiencing paroxysmal cough, posttussive emesis, and spontaneous pneumothorax, but only after an infant patient was diagnosed with pertussis 1 month later and after three other HCP had been infected (198). Pertussis among HCP and patients can result in substantial morbidity (187, 188, 197, 200, 202). Infants who have nosocomial pertussis are at substantial risk for severe and, rarely, fatal disease (187, 188, 197, 200, 202).

Risk for Pertussis Among HCP

HCP are at risk for being exposed to pertussis in inpatient and outpatient pediatric facilities (186–188, 194–200, 203, 204) and in adult health-care facilities and settings including emergency departments (196, 202, 205–207). In a survey of infection-control practitioners from pediatric hospitals, 90% reported HCP exposures to pertussis over a 5-year period; at 11% of the reporting institutions, a physician contracted the disease (208). A retrospective study conducted in a Massachusetts tertiary-care center with medical, surgical, pediatric, and obstetrical services during October 2003–September 2004 documented pertussis in 20 patients and three HCP, and pertussis exposure in approximately 300 HCP (209). One infected HCP exposed 191 other persons, including co-workers and patients in a postanesthesia care unit. Despite aggressive investigation and prophylaxis, a patient and the HCP's spouse were infected (209).

In a California university hospital with pediatric services, 25 patients exposed 27 HCP over a 5-year period (210). At a North Carolina teaching hospital during 2002–2005, a total of 21 pertussis patients exposed 72 unprotected HCP (DJ Weber, Hospital Epidemiology and Occupational Health, University of North Carolina Health Care System, personal communication, 2006). A Philadelphia children's hospital that tracked exposures during September 2003–April 2005 identified seven patients who exposed 355 unprotected HCP

(211). The exposed HCP included 163 nurses, 106 physicians, 42 radiology technicians, 29 respiratory therapists, and 15 others. Recent estimates suggest that up to nine HCP are exposed on average for each case of pertussis with delayed diagnosis (203).

Serologic studies among hospital staff suggest *B. pertussis* infection among HCP is more frequent than suggested by the attack rates of clinical disease (212, 213). In one study, annual rates of infection among a group of clerical HCP with minimal patient contact ranged from 4%–43% depending on the serologic marker used (4%–16% based on anti-PT IgG antibodies) (208). The seroprevalence of pertussis agglutinating antibodies among HCPs in one hospital outbreak correlated with the degree of patient contact. Pediatric house staff and ward nurses were 2–3 times more likely to have *B. pertussis* agglutinating antibodies than nurses with administrative responsibilities, 82% and 71% versus 35%, respectively (197). In another study, the annual incidence of *B. pertussis* infection among emergency department staff was approximately three times higher than among resident physicians (3.6% versus 1.3%, respectively), on the basis of elevated anti-PT IgG titers. Two of five HCP (40%) with elevated anti-PT IgG titers had clinical signs of pertussis (213).

The risk for pertussis among HCP relative to the general population was estimated in a Quebec study of adult and adolescent pertussis. Among the 384 (58%) of 664 eligible cases among adults aged ≥ 18 years (41), HCP accounted for 32 (8%) of the pertussis cases and 5% of the population. Pertussis among HCP was 1.7 times higher than among the general population. Similar studies have not been conducted in the United States.

Pertussis outbreaks are reported from chronic-care or nursing home facilities and in residential-care institutions; these HCP might be at increased risk for pertussis. However, the risk for pertussis among HCP in these settings compared with the general population has not been evaluated (190–193).

Management of Exposed Persons in Settings with Nosocomial Pertussis

Investigation and control measures to prevent pertussis after unprotected exposure in health-care settings are labor intensive, disruptive, and costly, particularly when the number of exposed contacts is large (203). Such measures include identifying contacts among HCP and patients, providing postexposure prophylaxis for asymptomatic close contacts, and evaluating, treating, and placing symptomatic HCP on administrative leave until they have received effective treatment. Despite the effectiveness of control measures to prevent further transmission of pertussis, one or more cycle of transmis-

sion with exposures and secondary cases can occur before pertussis is recognized. This might occur regardless of whether the source case is a patient or HCP, the age of the source case, or the setting (e.g., emergency department [203], postoperative suite or surgical ward [209,214], nursery [198,215], inpatient ward [187,194,216], or maternity ambulatory care [202]). The number of reported outbreak-related secondary cases ranges from none to approximately 80 per index case and includes other HCP (205), adults (209), and pediatric patients (203). Secondary cases among infants have resulted in prolonged hospital stay, mechanical ventilation (198), or death (215).

The cost of controlling nosocomial pertussis is high, regardless of the size of the outbreak. The impact of pertussis on productivity can be substantial, even when no secondary case of pertussis occurs. The hospital costs result from infection prevention and control/occupational health employee time to identify and notify exposed patients and personnel, to educate personnel in involved areas, and to communicate with HCP and the public; from providing prophylactic antimicrobial agents for exposed personnel; laboratory testing and treating symptomatic contacts; placing symptomatic personnel on administrative leave; and lost time from work for illness.

Cost-Benefit of Vaccinating Health-Care Personnel with Tdap

By vaccinating HCP with Tdap and reducing the number of cases of pertussis among HCP, hospitals will reduce the costs associated with resource-intensive hospital investigations and control measures (e.g., case/contact tracking, postexposure prophylaxis, and treatment of hospital acquired pertussis cases). These costs can be substantial. In four recent hospital-based pertussis outbreaks, the cost of controlling pertussis ranged from \$74,870–\$174,327 per outbreak (203,207). In a Massachusetts hospital providing pediatric, adult, and obstetrical care, a prospective study found that the cost of managing pertussis exposures over a 12-month period was \$84,000–\$98,000 (209). Similarly, in a Philadelphia pediatric hospital, the estimated cost of managing unprotected exposures over a 20-month period was \$42,900 (211). Vaccinating HCP could be cost-beneficial for health-care facilities if vaccination reduces nosocomial infections and outbreaks, decreases transmission, and prevents secondary cases. These cost savings would be realized even with no change in the guidelines for investigation and control measures.

A model to estimate the cost of vaccinating HCP and the net return from preventing nosocomial pertussis was constructed using probabilistic methods and a hypothetical cohort of 1,000 HCP followed for 10 years. Data from the literature were used to determine baseline assumptions. The

annual rate of pertussis infection among HCP was approximately 7% on the basis of reported serosurveys (212,213); of these, 40% were assumed to be symptomatic (213). The ratio of identified exposures per HCP case was estimated to be nine (187,199,202,206), and the cost of infection-control measures per exposed person was estimated to be \$231 (187,203,209). Employment turnover rates were estimated to be 17% (217,218), mean vaccine effectiveness was 71% over 10 years (28,155), vaccine coverage was 66% (160), the rate of anaphylaxis following vaccination was 0.0001% (42,219,220), and the costs of vaccine was \$30 per dose (155,221). For each year, the number of nosocomial pertussis exposures requiring investigation and control interventions was calculated for two scenarios: with or without a vaccination program for HCP having direct patient contact.

In the absence of vaccination, approximately 203 (range: 34–661) nosocomial exposures would occur per 1,000 HCP annually. The vaccination program would prevent 93 (range: 13–310) annual nosocomial pertussis exposures per 1,000 HCP per year. Over a 10-year period, the cost of infection control without vaccination would be \$388,000; with a Tdap vaccination program, the cost of infection control would be \$213,000. The Tdap vaccination program for a stable population of 1,000 HCP population over the same period would be \$69,000. Introduction of a vaccination program would result in an estimated median net savings of \$95,000 and a benefit-cost ratio of 2.38 (range: 0.4–10.9) (i.e., for every dollar spent on the vaccination program, the hospital would save \$2.38 on control measures).

Implementing a Hospital Tdap Program

Infrastructure for screening, administering, and tracking vaccinations exists at occupational health or infection prevention and control departments in most hospitals and is expected to provide the infrastructure to implement Tdap vaccination programs. New personnel can be screened and vaccinated with Tdap when they begin employment. As Tdap vaccination coverage in the general population increases, many new HCP will have already received a dose of Tdap.

To achieve optimal Tdap coverage among personnel in health-care settings, health-care facilities are encouraged to use strategies that have enhanced HCP participation in other hospital vaccination campaigns. Successful strategies for hospital influenza vaccine campaigns have included strong proactive educational programs designed at appropriate educational and language levels for the targeted HCP, vaccination clinics in areas convenient to HCP, vaccination at worksites, and provision of vaccine at no cost to the HCP (222–224). Some health-care institutions might favor a tiered

approach to Tdap vaccination, with priority given to HCP who have contact with infants aged <12 months and other vulnerable groups of patients.

Purchase and administration of Tdap for HCP is an added financial and operational burden for health-care facilities. A cost-benefit model suggests that the cost of a Tdap vaccination program for HCP is offset by reductions in investigation and control measures for pertussis exposures from HCP, in addition to the anticipated enhancement of HCP and patient safety (203).

Pertussis Exposures Among HCP Previously Vaccinated with Tdap

Health-care facilities could realize substantial cost-saving if exposed HCP who are already vaccinated against pertussis with Tdap were exempt from control interventions (225). The guidelines for control of pertussis in health-care settings were developed before pertussis vaccine (Tdap) was available for adults (68,226). Studies are needed to evaluate the effectiveness of Tdap to prevent pertussis in vaccinated HCP, the duration of protection, and the effectiveness of Tdap in preventing infected vaccinated HCP from transmitting *B. pertussis* to patients and other HCP. Until studies define the optimal management of exposed vaccinated HCP or a consensus of experts is developed, health-care facilities should continue postexposure prophylaxis for vaccinated HCP who have unprotected exposure to pertussis.

Alternatively, each health-care facility can determine an appropriate strategy for managing exposed vaccinated HCP on the basis of available human and fiscal resources and whether the patient population served is at risk for severe pertussis if transmission were to occur from an unrecognized case in a vaccinated HCP. Some health-care facilities might have infrastructure to provide daily monitoring of exposed vaccinated HCP for early symptoms of pertussis and for instituting prompt assessment, treatment, and administrative leave if early signs or symptoms of pertussis develop. Daily monitoring of HCP 21–28 days before beginning each work shift has been successful for vaccinated workers exposed to varicella (227,228) and for monitoring the site of vaccinia (smallpox vaccine) inoculation (229,230). Daily monitoring of pertussis-exposed HCP who received Tdap might be a reasonable strategy for postexposure management, because the incubation period of pertussis is up to 21 days and the minimal risk for transmission before the onset of signs and symptoms of pertussis. In considering this approach, hospitals should maximize efforts to prevent transmission of *B. pertussis* to infants or other groups of vulnerable persons. Additional study is needed to determine the effectiveness of this control strategy.

Recommendations

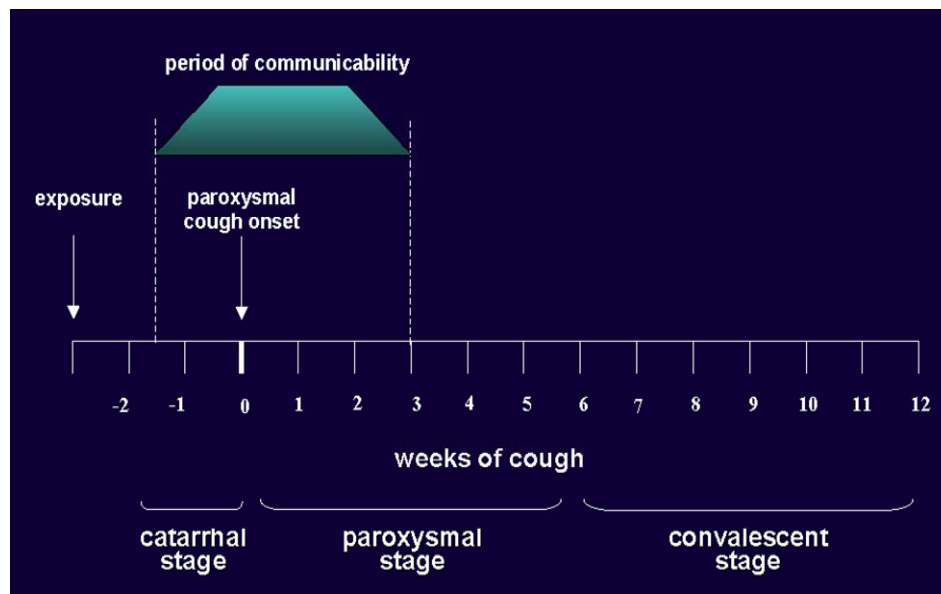
The following recommendations for the use of Tdap (ADACEL[®]) are intended for adults aged 19–64 years who have not already received a dose of Tdap. Tdap is licensed for a single use only; prelicensure studies on the safety or efficacy of subsequent doses were not conducted. After receipt of a single dose of Tdap, subsequent doses of tetanus- and diphtheria toxoid-containing vaccines should follow guidance from previously published recommendations for the use of Td and TT (33). Adults should receive a decennial booster with Td beginning 10 years after receipt of Tdap (33). Recommendations for the use of Tdap (ADACEL[®] and BOOSTRIX[®]) among adolescents are described elsewhere (12). BOOSTRIX[®] is not licensed for use in adults.

1. Routine Tdap Vaccination

1-A. Recommendations for Use

- 1) Routine use: Adults aged 19–64 years should receive a single dose of Tdap to replace a single dose of Td for active booster vaccination against tetanus, diphtheria, and pertussis if they received their last dose of Td ≥ 10 years earlier. Replacing 1 dose of Td with Tdap will reduce the morbidity associated with pertussis in adults and might reduce the risk for transmitting pertussis to persons at increased risk for pertussis and its complications.
- 2) Short interval between Td and Tdap: Intervals <10 years since the last Td may be used to protect against pertussis. Particularly in settings with increased risk for pertussis or its complications, the benefit of using a single dose of Tdap at an interval <10 years to protect against pertussis generally outweighs the risk for local and systemic reactions after vaccination. The safety of an interval as short as approximately 2 years between Td and Tdap is supported by a Canadian study; shorter intervals may be used (see Safety Considerations for Adult Vaccination with Tdap).
For adults who require tetanus toxoid-containing vaccine as part of wound management, a single dose of Tdap is preferred to Td if they have not previously received Tdap (see Tetanus Prophylaxis in Wound Management).
- 3) Prevention of pertussis among infants aged <12 months by vaccinating their adult contacts: Adults who have or who anticipate having close

Pertussis Becomes Communicable Before the Onset of Paroxysmal Cough¹



Reference: 1. Centers for Disease Control and Prevention. *Epidemiology and Prevention of Vaccine-Preventable Disease*. 2007;81-100.

Pertussis Cases Among Infants Occur in the Very Youngest¹

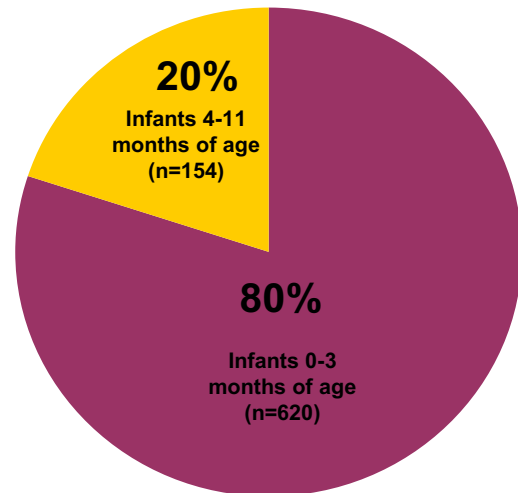
Proportion of pertussis cases among infants less than 1 year of age

Findings from a CDC study:

Infants 0-3 months of age were significantly more likely to be hospitalized or to have apnea than were infants 4-11 months of age

Vulnerability to pertussis:

Children do not complete their infant diphtheria, tetanus, and acellular pertussis (DTaP) series until 6 months of age or later



References: 1. Bisgard KM, et al. *Pediatr Infect Dis J.* 2004;23:985-989

For more information about vaccination of healthcare workers, go to: <http://www.cdc.gov/vaccines/spec-grps/hcw.htm>



Vaccines and Immunizations

Vaccines and Preventable Diseases:

Varicella Vaccine - Q&As about Healthcare Providers

Clinical Questions and Answers



Does ACIP recommend varicella vaccination of healthcare providers (HCPs)?

ACIP, with support by the Hospital Infection Control Practices Advisory Committee (HICPAC), recommends that healthcare institutions ensure that all healthcare providers have evidence of immunity to varicella. For healthcare providers, evidence of immunity includes any of the following:

- Documentation of two doses of varicella vaccine;
- Blood tests showing immunity to varicella or laboratory confirmation of prior disease; or
- Receipt from a healthcare provider of a) a diagnosis of chickenpox or herpes zoster (shingles); or b) verification of a history of chickenpox or herpes zoster (shingles).

Birth before 1980 is not considered evidence of immunity for HCPs because of the potential for nosocomial transmission of varicella to high-risk patients.

Healthcare institutions should establish protocols and recommendations for screening and vaccinating HCPs and for management of HCPs after exposure in the workplace.

Should HCPs be tested for varicella zoster virus (VZV) immunity prior to vaccination?

Serologic screening before vaccination of personnel who have negative or uncertain history of varicella disease is likely to be cost effective. Most adults (70-90%) who do not remember having chickenpox actually have protection in their blood when tested. Institutions may elect to test all HCPs regardless of disease history because a small proportion of persons with a positive history of disease might be susceptible. The tests most widely used to detect varicella IgG antibody after natural varicella infection among HCPs are latex agglutination (LA) and ELISA. Although the LA test is generally more sensitive than commercial ELISAs, a recent report indicated that the LA test can produce false-positive results, particularly when only a single concentration of serum is evaluated. Therefore, for the purpose of screening HCPs for varicella susceptibility, a less sensitive and more specific commercial ELISA should be considered.

Should HCPs be tested after vaccination to ensure that they are immune?

The ACIP and HICPAC do not recommend routine testing of HCPs for varicella immunity after two doses of vaccine. Available commercial assays are not sensitive enough to detect antibody after

vaccination in all instances. Sensitive tests have indicated that 99% of adults develop antibodies after the second dose. However, seroconversion does not always result in full protection against disease, and no data regarding correlates of protection are available for adults. See also How should vaccinated HCPs be managed after exposure to natural varicella? .



Are recently vaccinated HCPs at risk for transmitting vaccine virus to susceptible persons?

The risk of transmission of vaccine virus from persons who develop a varicella-like rash after vaccination is low, and has been documented only after exposures in households and long term care facilities. No cases have been documented after vaccination of HCPs. Moreover, the benefits of vaccinating HCPs who do not have evidence of immunity outweigh this extremely low potential risk. As a safeguard, precautions should be taken for personnel who develop rash after vaccination. These individuals should avoid contact with persons without evidence of immunity who are at risk for severe disease and complications until all lesions resolve (i.e., crusted over or fade away) or no new lesions appear within a period of 24 hours.

How should vaccinated HCPs be managed after exposure to natural varicella?

Exposed HCPs who have received 2 doses of vaccine should be monitored daily during days 10-21 after exposure through the employee health program or by an infection control nurse to determine clinical status (i.e., daily screening for fever, skin lesions, and systemic symptoms). They should also be instructed to report any symptoms as they occur without delay. If symptomatic, HCPs should be placed on sick leave immediately. Exposed HCPs who have received 1 dose of vaccine and who are exposed to VZV should receive the second dose of vaccine within 3-5 days post exposure to rash (provided 4 weeks have elapsed after the first dose). After vaccination, management is similar to that of 2-dose vaccine recipients described above.

What is recommended for unvaccinated HCPs without evidence of immunity (Can you link this to the first question?) who are exposed to natural varicella?

Unvaccinated HCPs who have no evidence of immunity and are exposed to natural varicella are potentially infective from days 10-21 after exposure and should be furloughed during this period. Postexposure vaccination is recommended within 3-5 days of exposure to rash, since it may attenuate the disease substantially if infection occurred. If the exposure did not cause infection, vaccination more than 5 days after exposure is still indicated as it induces protection against subsequent infection.



Return to main Varicella Vaccination page

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Content last reviewed on June 1, 2009

Content Source: National Center for Immunization and Respiratory Diseases

Page Located on the Web at <http://www.cdc.gov/vaccines/vpd-vac/varicella/vac-faqs-clinic-hcp.htm>

CHICKENPOX VACCINE

WHAT YOU NEED TO KNOW

Many Vaccine Information Statements are available in Spanish and other languages. See www.immunize.org/vis.

1 Why get vaccinated?

Chickenpox (also called varicella) is a common childhood disease. It is usually mild, but it can be serious, especially in young infants and adults.

- It causes a rash, itching, fever, and tiredness.
- It can lead to severe skin infection, scars, pneumonia, brain damage, or death.
- The chickenpox virus can be spread from person to person through the air, or by contact with fluid from chickenpox blisters.
- A person who has had chickenpox can get a painful rash called shingles years later.
- Before the vaccine, about 11,000 people were hospitalized for chickenpox each year in the United States.
- Before the vaccine, about 100 people died each year as a result of chickenpox in the United States.

Chickenpox vaccine can prevent chickenpox.

Most people who get chickenpox vaccine will not get chickenpox. But if someone who has been vaccinated does get chickenpox, it is usually very mild. They will have fewer blisters, are less likely to have a fever, and will recover faster.

2 Who should get chickenpox vaccine and when?

Routine

Children who have never had chickenpox should get 2 doses of chickenpox vaccine at these ages:

1st Dose: 12-15 months of age

2nd Dose: 4-6 years of age (may be given earlier, if at least 3 months after the 1st dose)

People 13 years of age and older (who have never had chickenpox or received chickenpox vaccine) should get two doses at least 28 days apart.

Chickenpox

3/13/08

Catch-Up

Anyone who is not fully vaccinated, and never had chickenpox, should receive one or two doses of chickenpox vaccine. The timing of these doses depends on the person's age. Ask your provider.

Chickenpox vaccine may be given at the same time as other vaccines.

Note: A "combination" vaccine called **MMRV**, which contains both chickenpox and MMR vaccines, may be given instead of the two individual vaccines to people 12 years of age and younger.

3 Some people should not get chickenpox vaccine or should wait

- People should not get chickenpox vaccine if they have ever had a life-threatening allergic reaction to a previous dose of chickenpox vaccine or to gelatin or the antibiotic neomycin.
- People who are moderately or severely ill at the time the shot is scheduled should usually wait until they recover before getting chickenpox vaccine.
- Pregnant women should wait to get chickenpox vaccine until after they have given birth. Women should not get pregnant for 1 month after getting chickenpox vaccine.
- Some people should check with their doctor about whether they should get chickenpox vaccine, including anyone who:
 - Has HIV/AIDS or another disease that affects the immune system
 - Is being treated with drugs that affect the immune system, such as steroids, for 2 weeks or longer
 - Has any kind of cancer
 - Is getting cancer treatment with radiation or drugs
- People who recently had a transfusion or were given other blood products should ask their doctor when they may get chickenpox vaccine.

Ask your provider for more information.

4**What are the risks from chickenpox vaccine?**

A vaccine, like any medicine, is capable of causing serious problems, such as severe allergic reactions. The risk of chickenpox vaccine causing serious harm, or death, is extremely small.

Getting chickenpox vaccine is much safer than getting chickenpox disease. Most people who get chickenpox vaccine do not have any problems with it. Reactions are usually more likely after the first dose than after the second.

Mild Problems

- Soreness or swelling where the shot was given (about 1 out of 5 children and up to 1 out of 3 adolescents and adults)
- Fever (1 person out of 10, or less)
- Mild rash, up to a month after vaccination (1 person out of 25). It is possible for these people to infect other members of their household, but this is extremely rare.

Moderate Problems

- Seizure (jerking or staring) caused by fever (very rare).

Severe Problems

- Pneumonia (very rare)

Other serious problems, including severe brain reactions and low blood count, have been reported after chickenpox vaccination. These happen so rarely experts cannot tell whether they are caused by the vaccine or not. If they are, it is extremely rare.

Note: The first dose of **MMRV** vaccine has been associated with rash and higher rates of fever than MMR and varicella vaccines given separately. Rash has been reported in about 1 person in 20 and fever in about 1 person in 5. Seizures caused by a fever are also reported more often after MMRV. These usually occur 5-12 days after the first dose.

5**What if there is a moderate or severe reaction?****What should I look for?**

- Any unusual condition, such as a high fever, weakness, or behavior changes. Signs of a serious

allergic reaction can include difficulty breathing, hoarseness or wheezing, hives, paleness, weakness, a fast heart beat or dizziness.

What should I do?

- **Call** a doctor, or get the person to a doctor right away.
- **Tell** your doctor what happened, the date and time it happened, and when the vaccination was given.
- **Ask** your provider to report the reaction by filing a Vaccine Adverse Event Reporting System (VAERS) form.

Or you can file this report through the VAERS website at www.vaers.hhs.gov, or by calling **1-800-822-7967**.

VAERS does not provide medical advice.

6**The National Vaccine Injury Compensation Program**

A federal program has been created to help people who may have been harmed by a vaccine.

For details about the National Vaccine Injury Compensation Program, call **1-800-338-2382** or visit their website at www.hrsa.gov/vaccinecompensation.

7**How can I learn more?**

- Ask your provider. They can give you the vaccine package insert or suggest other sources of information.
- Call your local or state health department.
- Contact the Centers for Disease Control and Prevention (CDC):
 - Call **1-800-232-4636 (1-800-CDC-INFO)**
 - Visit CDC website at: www.cdc.gov/vaccines



**DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION**

Vaccine Information Statement (Interim)
Varicella Vaccine (3/13/08) 42 U.S.C. §300aa-26

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If you would like to become a partner in the Maryland Healthcare Workers Immunization Initiative, please email hcwinfo@immunizemaryland.org or call 410-902-4677.

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