U.S. Department of Veterans Affairs

VA INFLUENZA TOOLKIT MANUAL

2006 – 2007

Infection: Don't Pass It On

www.publichealth.va.gov/flu

VA Influenza Toolkit Manual 2006 - 2007

Office of Public Health & Environmental Hazards
Employee Education System
National Center for Patient Safety
VA Infection Control Professionals
Infectious Diseases Program Office
National Center for Health Promotion and Disease Prevention

Veterans Health Administration
U.S. Department of Veterans Affairs

http://www.publichealth.va.gov/flu
http://vaww.vhaco.va.gov/phshcg/Flu/index.htm
http://www.publichealth.va.gov/InfectionDontPassItOn
http://vaww.vhaco.va.gov/phshcg/InfectionDontPassItOn/index.htm

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Foreword

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Acting Under Secretary for Health

Safe, effective, efficient, compassionate health care includes making sure that problems that can be prevented are prevented. In almost no area is our commitment more evident than in our annual drive for influenza vaccination of all eligible patients and staff. VA has established a seasonal influenza vaccination program that is unequalled in effectiveness by any other public or private integrated health care system.

You – our staff in the field – are responsible for this success. And what a success it has been. The results of our influenza vaccination program are better than all other government and private sector results for which there are data.

The VA-wide rate of influenza vaccination of our patients (as documented through abstraction of medical charts) was 75% for the 2003-2004 influenza season and 75% again in the 2004-2005 flu season despite problems with vaccine shortages. By another measure, self-reporting by veterans, the VA rate for vaccination of patients over the age of 50 was 71% in 2004-2005.

In contrast, the non-VA self-report rates by a Centers for Disease Control and Prevention (CDC) phone survey of adults over 65—a high risk group much more likely to be vaccinated than those over 50—showed only 68% for 2003-2004 and 63% for 2004-2005, the year of the shortage. A survey of the Medicare population (also over 65 and with the added advantage of flu vaccine coverage) showed rates nearly identical to the VA rates for those over 50. VA also outperformed other groups as seen in data from the CDC that showed commercial insurance plan flu vaccination rates for ages 50-64 to be only 52% in 2003-2004, dropping to 28% in 2004-2005.

We are extremely proud of these great rates of patient vaccination. I am happy to report that we are also "above average" in our rates of employee vaccination, one of the areas we are really emphasizing. For this past influenza season, for the first time that I am aware of, we have numbers to describe our staff vaccination rates.

On the average, almost 53% of our health care employees received an influenza vaccination. That is something to be proud of, given that the average in the country as a whole for health care workers is still under 40%. We know that some of our medical centers have approached 90% of employee vaccinations and others are much much lower. We are examining the reasons for this and, this year, will be emphasizing vaccination of all employees and volunteers so we can strive towards vaccination rates that approach that of our patient rates. Vaccination is essential in order to keep our workforce healthy and able to take care of our veterans and to prevent transmission of influenza to patients, other staff members, our families, and our communities.

As we come into this influenza vaccination season, there is tremendous work going on in VA, the country, and the world to prepare for and mitigate the possibility of pandemic influenza. Vaccination against seasonal influenza is not direct protection from the pandemic form, but it is an essential part

of staying healthy along with as are a range of commonsense public health measures, particularly hand and respiratory hygiene. I know seasonal influenza campaigns embrace and promote these essential measures that also play a key role in our defense against infectious disease in general.

Thank you to the many VA staff involved in the seasonal influenza vaccination campaign. I know you will have another successful year of promoting and providing influenza vaccine to our veteran patients and our staff.

Introduction

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The potential threat of pandemic influenza is on everyone's mind. During the 1918 influenza pandemic, more than 500,000 people died in the United States and 20 to 50 million people died worldwide. Recent outbreaks of highly pathogenic avian influenza (e.g. bird flu) in the Near East, Asia, Africa, and Europe with reports of human cases now numbering more than 220 have heightened awareness in this country and globally of the potential for another pandemic that could be associated with high attack and case fatality rates. These concerns are driven by several key characteristics of the ongoing bird flu outbreaks: the viruses are especially virulent, they are being spread by migratory birds, they can be transmitted from birds to mammals – and in some instances humans, and they continue to evolve. The United States has been working closely with other countries around the world and with the World Health Organization (WHO) to develop effective plans to detect and respond to influenza outbreaks that might cause a pandemic. The US government has also been working to ensure that we are prepared in this country for a potential pandemic. The President released the national strategy for pandemic influenza last November. The key pillars of the national strategy are preparedness and communication, surveillance and detection, and response and containment. The Department of Veterans Affairs has also been heavily involved with planning for a potential influenza pandemic and completed its pandemic influenza plan in March of 2006. The VA Pandemic Influenza Plan identifies necessary actions to protect patients and employees, maintain continuity of operations, communication and coordination of activities with Federal, state, local and tribal efforts as appropriate. Sections of the Plan address preparation, response strategies and functions, and recovery actions along with references and planning and educational documents. In response to the national Plan, each facility and network has developed a local action plan to address pandemic influenza. The national VA Pandemic Influenza Plan can be found at http://vaww.vhaco.va.gov/phshcg/Flu/pandemicflu_plan.htm.

One of the most important ways that we can, in the VA, be prepared to address the threat of pandemic influenza is to have a strong seasonal influenza vaccination program – the focus of this toolkit. Influenza each year is responsible for tens of millions of illnesses, hundreds of thousands of hospitalizations, tens of thousands of deaths and billions of dollars in health care costs. In fact, influenza is responsible for more deaths due to vaccine preventable diseases than from all other vaccine preventable diseases. The elderly and others with chronic medical conditions are at increased risk for the serious complications of influenza that might result in hospitalization or death. Many of the veterans we serve fall into one of these categories and are included in the high priority groups for vaccination.

Many of the veterans who fall into a high priority group for influenza vaccination are also in a high priority group for pneumococcal vaccination. While we emphasize the importance of assessing patients and vaccinating year round with the pneumococcal polysaccharide vaccine, many medical centers especially emphasize pneumococcal vaccinations during the influenza vaccination season. This makes sense given the overlap in priority groups and similarities in strategies that are effective in enhancing vaccination rates. Initiatives that emphasize giving both vaccines can also be highly efficient.

Influenza and pneumococcal vaccinations are safe and effective. The VA nationally has done well in achieving relatively high vaccination rates for our veterans 65 and older, but we still have room for improvement, especially among high-risk veterans under 65. Effective strategies for improving vaccination rates include provider recommendation and systems approaches such as reminders to patients and providers, standing orders for nurses and other health care professionals to offer and administer vaccine, feedback, and walk-in clinics. This toolkit provides a wealth of information and aids to help us implement these kinds of strategies.

This year there is also a continued emphasis on the importance of increasing health care worker (employee and volunteer) influenza vaccination rates. Health care workers have been implicated as sources and/or vectors for influenza transmission in the health care setting, sometimes with dire consequences for patients who may have contracted influenza and then developed serious complications. Nationally only about 40% of health care workers receive their influenza vaccinations every year. As outlined in the February 2006 recommendations of the Healthcare Infection Control Practices Advisory Committee (HICPAC) and the Advisory Committee on Immunization Practices (ACIP) on *Influenza Vaccination of Health-care Workers,* strategies for improving health care worker influenza vaccination rates include:

- Education about the disease, safety of vaccination, and the rationale for targeting health care workers (first and foremost to protect our patients)
- Convenient access to vaccination (e.g. mobile carts, etc)
- Removal of cost barriers (e.g. offering vaccine without charge)
- Top management buy in and role modeling

Improving influenza and pneumococcal vaccination rates of our veterans and VA health care workers will enhance the health and well being of our veterans. This toolkit will help us all do just that!

Important Note on Influenza Vaccination

Keeping the VA Community Healthy
With the threat of pandemic influenza looming, it is more important than ever that our veterans, employees, and volunteers maintain their health. Getting vaccinated for seasonal influenza is just one step individuals can take toward keeping their immune systems strong. An active seasonal flu campaign can save many lives and resources, especially as VA plans and prepares for pandemic influenza and continues to keep our VA community healthy.

It is important that all veterans, VA employees, and volunteers be vaccinated against influenza unless they have a contraindication to the vaccine. Vaccination for influenza is one of the best ways to protect our entire VA community.

Obtaining Influenza Vaccine
This spring, the Pharmacy Benefits Management Strategic Health Care Group (PBM) awarded national contracts to Sanofi Pasteur and GlaxoSmithKline for influenza vaccine. PBM receives vaccine orders from individual facilities, usually in May, for the upcoming influenza season. This year each facility could order vaccine in multidose vials and/or prefilled syringes.

Distributing Influenza Vaccine
Facility influenza coordinators and others involved in vaccinating patients, employees, and volunteers should discuss the quantities ordered and the distribution schedules. The exact dates of vaccine delivery at each facility are not known as this manual goes to print. The intent of the manufacturers is to distribute the vaccine equitably to the Nation, of which our VA supply is one component. It is expected that by mid to late October facilities should have their first shipment. It is expected that facilities will have 50% of their requirements by that time. Flu coordinators and other VA staff involved in implementing the influenza vaccination campaign at each facility should contact their Pharmacy Chief in August of September regarding the vaccine delivery dates and quantities.

VA Flu Updates
VA staff and providers can review the latest information on 2006-2007 influenza vaccine found in flu advisories, tips, and other updates on email and on the Web by visiting www.publichealth.va.gov/flu or on the VA intranet site at http://vaww.vhaco.va.gov/phshcg/Flu/index.htm.

Supply Planning for the Influenza Season
Facilities should consider what additional supplies are needed to implement their seasonal influenza vaccination program, such as safety needles for vaccine packaged in individual doses and safety syringes and needles for vaccine that comes in multidose vials. You may also want to consider other supply needs for vaccination such as alcohol swabs, gloves, sharps disposal containers, vaccine information sheets, tables, chairs, and clipboards.

Finally, in planning influenza vaccination events and clinics, facilities should keep in mind the expected delivery dates and quantities of vaccine.

Section 1
Overview of This Year's Manual

This year's *VA Influenza Toolkit Manual* contains basic background information and resources designed to help VA staff plan and implement a successful seasonal influenza vaccination campaign.

The 2006-2007 Influenza Toolkit

Printed versions of the entire toolkit (this manual and other materials) are being sent to three groups of key VA staff in VA facilities:

- "Flu" coordinators at medical centers and long-term care facilities
- Occupational health clinicians
- Infection control professionals

Goals for the vaccination program

- Increase the influenza vaccination rate of VHA employees to 60 % within each health care facility.
- Increase our rate of influenza vaccination of veteran patients for each VA health care facility.
- Promote consistent and proper documentation and tracking for all influenza vaccinations.
- Promote nonvaccine methods of preventing infection, particularly hand hygiene and respiratory etiquette.
- Encourage the entire VA health care community to promote and support influenza vaccination.

Contents of the manual

- **Section 2** of the manual provides fact sheets and guidance for both the inactivated and live forms of influenza vaccines. It also provides reproducible copies of the most current Vaccine Information Statements (VIS) available from the Centers for Disease Control and Prevention (CDC). The appropriate VIS must be provided to each person receiving a given vaccine.

- **Section 3** was written to support this year's emphasis on employee and volunteer vaccination. It offers practical information on improving rates of vaccination and identifies barriers, with suggestions for overcoming these barriers.

- **Section 4** is a compilation of material from published studies as well as feedback from VA staff on strategies and ideas for carrying out successful veteran vaccination programs.

- **Section 5** is an overview of the tools in the 2006 – 2007 Influenza Toolkit (posters, stickers, and buttons) that were created separately from this manual and offers suggestions on how to use them. This section contains information on how to order additional materials to support your vaccination campaign.

- **Section 6** covers a variety of frequently asked questions that VA employees and volunteers may have concerning influenza, vaccination, pandemic influenza, and other aspects of this year's influenza vaccination campaign.

- **Section 7** offers guidance on how to effectively track influenza vaccination by encouraging documentation into the VA Computerized Patient Record System (CPRS) and creating uniform health summaries at all VA sites.

- **Section 8** contains the **Appendices.** These include an explanation of the steps involved in vaccinating individuals, reprints of the latest CDC information on immunization practices, information on prevention and treatment of influenza with antiviral drugs, information on the pneumococcal vaccine, a long list of additional seasonal influenza resources, and the list of coordinating offices and staff that assembled this material.

All of this material – and any subsequent revisions – will be posted on the Web at www.publichealth.va.gov/flu and www.publichealth.va.gov/InfectionDontPassItOn, and the VA Intranet sites http://vaww.vhaco.va.gov/phshcg/Flu and http://vaww.vhaco.va.gov/phshcg/InfectionDontPassItOn.

Section 2
Vaccine Information
Inactivated (Injectable) Influenza Vaccine 2006-2007

The 2006-07 trivalent influenza vaccine (TIV) for the United States will contain:

- A/New Caledonia/20/99 (H1N1)-like virus
- A/Wisconsin/67/2005 (H3N2) –like virus (A/Wisconsin/67/2005 and A/Hiroshima/52/2005 strains)
- B/Malaysia/2506/2004-like virus (B/Malaysia/2506/2005 and B/Ohio/1/2005 strains)

Vaccine programs should employ both forms of influenza vaccine—inactivated (injectable) and live attenuated (intranasal) influenza vaccine-in order to extend the supply available for persons only eligible to receive the inactivated form. Although a vaccine shortage is not expected this season, a shortage of vaccine may occur and facility plans should be in place to address this issue.

1. What's new this year?

- A continued emphasis on influenza vaccination of all VHA employees, patients, and volunteers with a concerted effort to vaccinate more this year than before.
- Development of contingency plans for timing and prioritization of administering influenza vaccine if supply is delayed or reduced.
- A broader age range of children recommended for vaccination, including their household contacts and out-of-home caregivers, and recommendations for changes in vaccine administration procedure based on age.
- Recommendations to offer influenza vaccine throughout the full season until the supply is exhausted; consider vaccinating October through March if vaccine is available. Long-term/nursing home residents should not be vaccinated prior to October.
- Neither amantadine nor rimantadine should be used for treatment or chemoprophylaxis of influenza A illness.

2. Who should be vaccinated?

The updated 2006 Advisory Committee on Immunization Practices (ACIP) and CDC recommends influenza vaccination for people at high risk for complications from influenza, or who are important for the care of infants, are health care workers or are in an age group where many members are at high risk .[1] VA recommends the following when considering who to vaccinate.

Persons at high-risk from influenza

- adults aged 50 years and older;
- residents of nursing homes and long-term care facilities;
- persons of any age with underlying chronic medical conditions;
- children 6 months-18 years who are on long-term aspirin therapy;
- all children aged 6–59 months;
- all women who will be pregnant during the influenza season; and
- people with weakened immune systems, certain cognitive muscle or nerve disorders, or compromised respiratory function.

Persons who may transmit influenza, who are important in the care of infants, or who work in health care settings

- VHA employees and volunteers; and
- out-of-home caregivers and household contacts of children aged <6 months.

[1] Prevention and Control of Influenza: Recommendations of the Advisory Committee on Immunization Practices (ACIP), MMWR, June 28, 2006. Vol. 55. Available at http://www.cdc.gov/mmwr/preview/mmwrhtml/rr55e628a1.htm

INACTIVATED INFLUENZA VACCINE

WHAT YOU NEED TO KNOW 2006-07

1 Why get vaccinated?

Influenza ("flu") is a contagious disease.

It is caused by the **influenza virus**, which spreads from person to person through coughing or sneezing.

Other illnesses have the same symptoms and are often mistaken for influenza. But only the influenza virus can cause influenza.

Anyone can get influenza. For most people, it lasts only a few days. It can cause:

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

Some people get much sicker. Influenza can lead to pneumonia and can be dangerous for people with heart or breathing conditions. It can cause high fever and seizures in children. Influenza kills about 36,000 people each year in the United States, mostly among the elderly.

Influenza vaccine can prevent influenza.

2 Inactivated Influenza vaccine

There are two types of influenza vaccine:

An **inactivated** (killed) vaccine, or "flu shot," has been used in the United States for many years. It is given by injection.

A **live**, weakened vaccine was licensed in 2003. It is sprayed into the nostrils. *This vaccine is described in a separate Vaccine Information Statement.*

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

For most people influenza vaccine prevents serious influenza-related illness. It will *not* prevent "influenza-like" illnesses caused by other viruses.

It takes about 2 weeks for protection to develop after the vaccination, and protection can last up to a year.

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

Some inactivated influenza vaccine contains thimerosal, a preservative that contains mercury. Some people believe thimerosal may be related to developmental problems in children. In 2004 the Institute of Medicine published a report concluding that, based on scientific studies, there is no evidence of such a relationship. If you are concerned about thimerosal, ask your doctor about thimerosal-free influenza vaccine.

3 Who should get inactivated influenza vaccine?

Inactivated influenza vaccine can be given to people 6 months of age and older. It is recommended for **people who are at risk of complications from influenza**, and for **people who can spread influenza to those at high risk** (including all household members):

People at high risk for complications from influenza:

- People **65 years of age and older**.
- Residents of **long-term care facilities** housing persons with chronic medical conditions.
- People who have **long-term health problems** with:
  - heart disease - kidney disease
  - lung disease - metabolic disease, such as diabetes
  - asthma - anemia, and other blood disorders
- People with certain **muscle or nerve disorders** (such as seizure disorders or severe cerebral palsy) that can lead to breathing or swallowing problems.
- People 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
- People 6 months to 18 years of age on **long-term aspirin treatment** (these people could develop Reye Syndrome if they got influenza).
- Women who will be **pregnant** during influenza season.
- **All children** 6-59 months of age.

People who can spread influenza to those at high risk:

- **Household contacts and out-of-home caretakers** of infants from 0-59 months of age.
- Physicians, nurses, family members, or anyone else in **close contact with people at risk** of serious influenza.

Influenza vaccine is also recommended for adults 50-64 years of age and anyone else who wants to **reduce their chance of getting influenza.**

An yearly influenza vaccination should be *considered* for:

- People who provide **essential community services.**
- People living in **dormitories** 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?

The best time to get influenza vaccine is in **October** or **November**.

Influenza season usually peaks in February, but it can peak any time from November through May. So getting the vaccine in December, or even later, can be beneficial in most years.

Some people should get their flu shot in ***October*** or earlier:

- people **50 years of age and older**,
- younger people at **high risk** from influenza and its complications (including **children 6 through 59 months of age**),
- **household contacts** of people at high risk,
- **health care workers**, and
- **children younger than 9 years of age** getting influenza vaccine for the first time.

Most people need one flu shot each year. **Children younger than 9 years of age getting influenza vaccine for the first time** should get 2 doses, given at least one month apart.

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
• 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 within a few minutes to a few hours after the shot.
- In 1976, a certain 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 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.

8 The National Vaccine Injury Compensation Program

In the event that you or your child has a serious reaction to a vaccine, a federal program has been created to help pay for the care of those who have been harmed.

For details 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 immunization 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's website at **www.cdc.gov/flu**

DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION
NATIONAL CENTER FOR IMMUNIZATION AND RESPIRATORY DISEASES

Vaccine Information

Live, Attenuated Intranasal Influenza Vaccine (LAIV) 2006-2007

1. A single **LAIV** is licensed in the U.S.— FluMist® (MedImmune, Inc.). LAIV is a live, trivalent, intranasally-administered vaccine that induces broad mucosal and systemic immune response.
2. **LAIV is an option for vaccinating healthy VHA employees, volunteers, and veterans under the age of 50.** VA health care facilities may use it whether or not there is a shortage of inactivated (injectable) vaccine. But, especially in the event of a shortage of inactivated vaccine, use of LAIV conserves inactivated vaccine for those who are not eligible to receive LAIV.
3. Side effects that may occur after administration of LAIV to adults include runny nose, nasal congestion, headache, sore throat, and cough.
4. **LAIV should <u>NOT</u> be given to:**
   - VHA employees and volunteers who are 50 or over
   - persons who are at high risk of influenza complications (including all persons ≥ 50 years old; pregnant women; the immunocompromised or immunosuppressed; those with chronic disorders of the cardiovascular and pulmonary systems including asthma; those with chronic metabolic disease like diabetes; those with anemia; those with cancer; those with renal disease; or anyone with history of **Guillain-Barre`** syndrome).
   - **Employees and volunteers who work with the severely immunosuppressed in a protective environment** (e.g. patients who are in hospital in a protective environment after a hematopoietic stem cell transplant). Employees and volunteers who receive LAIV should refrain from contact with severely immunosuppressed patients for 7 days after receipt of vaccine. Due to the possible transmission of vaccine virus, vaccine recipients should be advised that vaccine recipients should avoid close contact (e.g., within the same household) with immunocompromised individuals for at least 21 days.
5. **LAIV should <u>NOT</u> be administered by:**
   - severely immunosuppressed persons because of the small risk of acquiring vaccine virus from the environment during administration.
6. **LAIV <u>MAY</u> be administered by:**
   - others considered at high risk of influenza complications (including persons ≥ 65 years old, pregnant women, those who have asthma, cystic fibrosis, or chronic obstructive pulmonary disease; those with chronic metabolic disease like diabetes; those with renal disease, etc.).
7. **Consideration for restrictions at work after receiving LAIV:**
   Shedding of vaccine virus occurs mostly in the first 3 days after administration, but shedding has been noted to occur up to day 7. Adult shed viruses have been analyzed and all have retained the cold-adapted, temperature-sensitive phenotype.[1] *Employees and volunteers who work with <u>severely</u> immunocompromised patients should refrain from contact with that risk group for 7 days after receiving LAIV.*

References:

Package Insert (Circular); Influenza virus Vaccine Live, Intranasal FluMist®, 2005-2006 formula
http://www.flumist.com/pdf/prescribinginfo.pdf

Influenza Vaccination of Health-Care Personnel: Recommendations of the Healthcare Practices Advisory Committee (HICPAC) and the Advisory Committee on Immunization Practices (ACIP), MMWR, Feb 24, 2006. Vol. 55/No RR-2. http://www.cdc.gov/mmwr

Prevention and Control of Influenza: Recommendations of the Advisory Committee on Immunization Practices (ACIP), MMWR, June 28, 2006. Vol. 55. Available at http://www.cdc.gov/mmwr/preview/mmwrhtml/rr55e628a1.htm

LIVE, INTRANASAL INFLUENZA VACCINE

WHAT YOU NEED TO KNOW 2006-07

1 Why get vaccinated?

Influenza ("flu") is a contagious disease.

It is caused by the influenza virus, which spreads from infected persons to the nose or throat of others.

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 get much sicker. Influenza can lead to pneumonia and can be dangerous for people with heart or breathing conditions. It can cause high fever and seizures in children. Influenza kills about 36,000 people each year in the United States.

Influenza vaccine can prevent influenza.

2 Live, attenuated influenza vaccine (nasal spray)

There are two types of influenza vaccine:

Live, attenuated influenza vaccine (LAIV) was licensed in 2003. LAIV contains live but attenuated (weakened) influenza virus. It is sprayed into the nostrils rather than injected into the muscle. It is recommended for healthy children and adults from 5 through 49 years of age, who are not pregnant.

Inactivated influenza vaccine, sometimes called the "flu shot," has been used for many years and is given by injection. *This vaccine is described in a separate Vaccine Information Statement.*

Influenza viruses are constantly changing. Therefore, influenza vaccines are updated every year, and annual vaccination is recommended.

For most people influenza vaccine prevents serious influenza-related illness. It will *not* prevent "influenza-like" illnesses caused by other viruses.

It takes about 2 weeks for protection to develop after vaccination, and protection can last up to a year.

3 Who can get LAIV?

Live, intranasal influenza vaccine is approved for **healthy children and adults from 5 through 49 years of age**, including those who can spread influenza to people at high risk, such as:

- **Household contacts and out-of-home caretakers** of infants from 0-23 months of age.
- Physicians and nurses, and family members or any one else in **close contact with people at risk** of serious influenza.

Influenza vaccine is also recommended for anyone else who wants to **reduce their chance of getting influenza**.

LAIV may be considered for:

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

4 Who should *not* get LAIV?

LAIV is not licensed for everyone. The following people should check with their health-care provider about getting the **inactivated** vaccine (flu shot)**.**

- **Adults 50 years of age or older** or **children younger than 5**.
- People who have **long-term health problems** with:
  - heart disease
  - kidney disease
  - lung disease
  - metabolic disease, such as diabetes
  - asthma
  - anemia, and other blood disorders
- People with a **weakened immune system**.
- Children or adolescents on **long-term aspirin treatment**.
- **Pregnant women**.
- Anyone with a history of **Guillain-Barré syndrome** (a severe paralytic illness, also called GBS).

Inactivated influenza vaccine (the flu shot) is the preferred vaccine for people (including health-care workers, and family members) coming in **close contact with anyone who has a severely weakened immune system** (that is, anyone who requires care in a protected environment).

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

- Anyone who has ever had a serious allergic reaction to **eggs** or to a **previous dose** of influenza vaccine.
- 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?

The best time to get influenza vaccine is in **October** or **November**, but LAIV may be given as soon as it is available. Influenza season usually peaks in February, but it can peak any time from November through May. So getting the vaccine in December, or even later, can 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** should get 2 doses For LAIV, these doses should be given 6-10 weeks apart.

LAIV 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. However, 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 5-17 years of age have reported mild reactions, including:

- runny nose, nasal congestion or cough
- headache and muscle aches
- fever
- 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

These symptoms did not last long and went away on their own. Although they can occur after vaccination, they may not have been caused by the vaccine.

Severe problems:

- Life-threatening allergic reactions from vaccines are very rare. If they do occur, it is within a few minutes to a few hours after the vaccination.
- If rare reactions occur with any new product, they may not be identified until thousands, or millions, of people have used it. Over four million 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 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 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

In the event that you or your child has a serious reaction to a vaccine, a federal program has been created to help pay for the care of those who have been harmed.

For details 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 immunization 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's website at **www.cdc.gov/flu**

DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION
NATIONAL CENTER FOR IMMUNIZATION AND RESPIRATORY DISEASES

Instructions for the Use of
Vaccine Information Statements

Required Use

1. Provide VIS when vaccination is given.

As required under the National Childhood Vaccine Injury Act (42 U.S.C. §300aa-26), all health care providers in the United States who administer **to any child or adult** any vaccine containing diphtheria, tetanus, pertussis, measles, mumps, rubella, polio, hepatitis A (use of hepatitis A VIS required effective July 1, 2006), hepatitis B, *Haemophilus influenzae* type b (Hib), trivalent influenza, pneumococcal conjugate, or varicella (chickenpox) vaccine shall, **prior to administration of each dose of the vaccine**, provide a copy to keep of the relevant current edition vaccine information materials that have been produced by the Centers for Disease Control and Prevention (CDC):

- to the parent or legal representative* of any child to whom the provider intends to administer such vaccine, and
- to any adult to whom the provider intends to administer such vaccine. (In the case of an incompetent adult, relevant VISs shall be provided to the individual's legal representative.* If the incompetent adult is living in a long-term care facility, all relevant VISs may be provided at the time of admission, or at the time of consent if later than admission, rather than prior to each immunization.)

If there is not a single VIS for a combination vaccine, use the VISs for all component vaccines.

The materials shall be supplemented with visual presentations or oral explanations, as appropriate.

*"Legal representative" is defined as a parent or other individual who is qualified under State law to consent to the immunization of a minor child or incompetent adult.

2. Record information for each VIS provided.

Health care providers shall make a notation in each patient's permanent medical record at the time vaccine information materials are provided indicating:
(1) the edition date of the Vaccine Information Statement distributed and
(2) the date the VIS was provided.

This recordkeeping requirement supplements the requirement of 42 U.S.C. §300aa-25 that all health care providers administering these vaccines must record in the patient's permanent medical record (or in a permanent office log):
(3) the name, address and title of the individual who administers the vaccine,
(4) the date of administration and
(5) the vaccine manufacturer and lot number of the vaccine used.

Applicability of State Law

Health care providers should consult their legal counsel to determine additional State requirements pertaining to immunization. The Federal requirement to provide the vaccine information materials supplements any applicable State laws.

Availability of Copies

Single camera-ready copies of the vaccine information materials are available from State health departments. Copies are also available on the Centers for Disease Control and Prevention's website at http://www.cdc.gov/nip/publications/VIS.
Copies are available in English and in other languages.

Current Editions of VISs

Diphtheria, Tetanus, Pertussis (DTaP/DT): 7/30/01
Haemophilus influenzae type b: 12/16/98
Hepatitis A: 3/21/06
Hepatitis B: 7/11/01
Inactivated Influenza: 6/30/06
Live, Intranasal Influenza: 6/30/06
Measles, Mumps, Rubella (MMR): 1/15/03
Pneumococcal conjugate: 9/30/02
Polio: 1/1/00
Tetanus Diphtheria (Td): 6/10/94
Varicella (chickenpox): 12/16/98

Reference 42 U.S.C. §300aa-26

6/30/2006

Section 3
How to Improve VHA Employee and Volunteer Vaccination Rates

VHA employees and volunteers are at an increased risk of acquiring influenza since they are exposed to hospitalized patients and clinic patients who have influenza as well as to infected individuals in the community. Whether infected in the community or on the job, VA employees and volunteers who are infected with influenza can further transmit the virus.

CDC recommends that all health care workers receive an annual influenza vaccination to prevent transmission to patients. The goals of this strategy are to reduce the risk of patient influenza exposure and to ensure that provision of services is not disrupted. Influenza vaccination rates among health care workers remains low, with only 36%-40% of health care workers nationwide reporting influenza vaccination each year. Although the rate for VA employees was slightly higher (52.9%) in 2005-2006, influenza vaccination remains an important patient safety issue because unvaccinated employees and volunteers can transmit influenza to patients, coworkers, and family members, leading to influenza-related illness and death. Employees and volunteers should understand that personal responsibility includes protecting themselves against infectious disease such as influenza and thus protecting their patients. When promoting vaccination among employees and volunteers, emphasize the reasons to get the influenza vaccine:

Protects patients
Protects you and your coworkers
Prevents severe illness
Protects families
Decreases need to use sick leave
Prevents Death

Obstacles – Individual Beliefs

Some employees and volunteers have misperceptions and misunderstandings about influenza vaccine. The scientific literature suggests several reasons for low vaccination rates among employees and volunteers including:

- concern about side effects or vaccine safety,
- perception of low personal risk of illness,
- inconvenience,
- ignorance of CDC recommendations, and
- dislike of needles.

Therefore, there should be continuous and ongoing vaccine education updates emphasizing the seriousness of influenza and addressing employee misconceptions about influenza and the vaccine. Common misconceptions must be addressed (the flu shot does NOT give you influenza). Examples of messages that might be used include:

You know that the influenza shot works, so why don't more people get vaccinated?
Some people are concerned about side effects. They think that the influenza shot will make them sick. However, mild soreness of the arm at the injection site is the most common side effect. The shot itself will NOT give you influenza. Influenza vaccination is the best protection against the influenza. Protect VA patients, yourself, your coworkers and your family. Get vaccinated. Check with Occupational Health for information on how to get your influenza shot.

Why should employees and volunteers be vaccinated against influenza?

There are several reasons why employees and volunteers should be vaccinated against influenza every year:

- Employees and volunteers can get the influenza virus from their patients resulting in absence from their positions.
- Employees and volunteers can acquire influenza infection and not have any symptoms, but still be able to transmit the disease.
- Employees and volunteers who are ill with influenza often continue to work and spread the virus to other employees, volunteers, patients and family members.
- Unvaccinated employees and volunteers have caused influenza outbreaks in health care settings.

Did you get your influenza shot last year?

If you didn't, you may have harmed the health of some of our patients, your coworkers and family members. You can spread influenza to patients, putting them at risk for influenza and its complications. Studies show that vaccination of employees and volunteers is associated with decreased mortality among nursing home patients. Protect yourself and your patients--get a flu shot. Ask Occupational Health about when and where to receive your vaccination.

"I'm healthy. I don't need to get a flu shot." Is this you?

Influenza can cause serious illness and death even in young, healthy people. It's not just a disease that affects the elderly. If you get influenza, you can spread it to your patients, putting them at risk for severe illness and complications from the influenza virus. Protect yourself, your coworkers, and your patients—get an influenza shot. Ask Occupational Health for information on how to get vaccinated.

"The residents in long-term care need the influenza vaccine more than I do."

Wrong. Studies, especially in long-term care, have shown that it is as important for employees and volunteers to receive the vaccine as for residents.

"I don't want to get the vaccine because it has side effects"

Studies have shown that the influenza vaccine is not associated with higher rates of systemic symptoms than are seen with injections of placebos among healthy working adults. The most common side effects influenza vaccination include: soreness, redness or swelling at the injection site, mild or low-grade fever, and aches. The symptoms should only last a day or two. The most common side effects from the nasal influenza vaccine are a runny nose and nasal congestion.

"I got the influenza vaccine before and I still got influenza, so why should I get it now?"

In years when there is a good match between the circulating viruses and the corresponding vaccine strains, vaccine efficacy for reducing illness has generally been between 70%-90%.

"I'm pregnant. Should I get the influenza vaccination?"

Yes. All pregnant women are at risk from influenza and its complications. It is important that pregnant employees and volunteers get the influenza vaccine to protect themselves and their babies. The influenza vaccine can be given any time during the pregnancy. However, pregnant women should get the influenza shot NOT the nasal influenza vaccine.

Strategies for Increasing Employee and Volunteer Influenza Vaccination Rates

1. Use Organizational Approaches

- Make influenza vaccination of employees and volunteers an organizational priority.
- Encourage the facility director, service chiefs, and other managers to lead the way by getting their vaccine and encouraging their employees and volunteers to get vaccinated.
- Provide written policy stressing importance of vaccination for employees and volunteers with clear direction from leadership (i.e., Directive, letter from Facility Director to all employees and volunteers, or Flu Advisory).
- Customize information for local distribution with local leadership buy-in and involvement.
    - Use photos of hospital directors or other opinion leaders getting their influenza shot (newsletters, posters, TV/Monitor displays).
- Enlist peer vaccination champions to encourage employee and volunteer vaccinations.
- Sponsor a kickoff event at the start of influenza season.
- Provide performance feedback:
    - Set goals/benchmarks, encourage friendly competition among employees and volunteers in different clinical settings, provide incentives to employees and volunteers who receive vaccine through worksite or private source.
    - Consider giving incentives such as buttons, stickers, canteen vouchers, movie passes, or raffle tickets for specific items.

2. Employ Systems Strategies

- Provide standing orders/protocols for influenza vaccine.
- Work closely with Pharmacy to get your supply of vaccine for employees and volunteers.
- Develop ways to monitor vaccination rates and provide feedback to specific clinics or settings.
- Consider utilizing FluMist® (nasal or LAIV), as an alternative to influenza shots, for employees and volunteers under age 50 who do not routinely come in close contact with severely immunocompromised patients and have no contradiction.
- Use clinical reminders.

3. Make it Convenient

- Extend Occupational Health hours when vaccine is available to include all shifts and days of the week.
- Increase staffing in Occupational Health during peak hours. Consider using volunteers to sign employees in and nurses with work related injuries to administer the vaccine if it is within their functional abilities. (Check with the workers' compensation specialist and nursing service for who might be able to assist).
- Increase the number of locations where the vaccine is given. Use mobile carts to transport to different clinic areas, service meetings, grand rounds, or cafeteria entrances. This approach can minimize inconvenience as well as advertise the vaccine availability.
- Hold drop-in vaccination days, or "drive-through" vaccination clinics for employees and volunteers.

- Use rolling carts to bring the influenza vaccine directly to the employees' work setting, grand rounds, or canteen entrance and other locations where employee congregate. Sending rolling carts to wards and clinics during each shift and on weekends should also be considered. Carts should be stocked with vaccine, safety syringes, vaccine information statements, sharps disposal containers, alcohol hand rub, alcohol wipes, adhesive bandages, documentation forms, and injectable epinephrine with orders for administration in the event of an acute hypersensitivity reaction.
- Send email messages and post schedules of when the influenza vaccine will be available.
- Authorize nurses on units to give the influenza vaccine to coworkers.
- Be sure documentation of receipt of vaccination gets into the employee's medical record.
- Offer the vaccine to new employees and volunteers during orientation.

4. Communicate, Remind, and Reinforce

- Use multiple message formats, repeat announcements regarding dates, times and locations of vaccination:
  - Provider email, newsletters, posters, buttons, pens, cafeteria table tents
  - Pay check stubs, Web site messages
- Post schedules ahead of time for mobile carts and influenza clinics.
- Work with your unions' leadership; have them promote vaccination of their members and recruit union members who are licensed to vaccinate to immunize their membership.
- Make appointments with departments and services to attend service meetings to educate employees and volunteers about the need to protect employees, volunteers, and patients from influenza.
- If your occupational health unit has a Web site, add information to the Web site regarding influenza vaccination locations and times for employee and volunteer vaccination.
- Send letters, postcards, or email messages to employees and volunteers prior to the start of the vaccine season reminding them of the importance of vaccination and where and when they will be able to get the influenza vaccine.

- Write short items for the employee newsletter or post information in staff bulletin boards.
- Provide factsheets with pay stubs to dispel misconceptions and increase acceptance of influenza vaccination.
- Add an influenza reminder to Occupational Health's telephone recording. When employees and volunteers call they can automatically be reminded about the availability of the vaccine. If the recording capacity exists, add specificinformation regarding dates, times and locations for influenza vaccination as well as any other pertinent information. These reminders can begin in September and conclude after the influenza season has peaked, which usually occurs in February or March.
- In late November/December or later in the season, identify employees and volunteers not yet vaccinated and remind them by email or a phone call that the influenza vaccine is available.

- Keep facility leadership (Directors, Service Chiefs) informed on vaccination rates of their employees and volunteers on a monthly basis. Provide Directors, managers, employees, and volunteers with information of rates by wards, units, services etc.
- Create competition among services/product lines/units. Design a poster of a large syringe that can be used as an indicator of the number of individuals who have been vaccinated.

5. Educate

- Provide training on importance and effectiveness of influenza vaccination (grand rounds, staff meetings). Speak at staff meetings.
- Add to standard curricula of annual employee training session.
- Emphasize high-risk to patients when employees and volunteers are not vaccinated.
- Emphasize low risk of side effects from the vaccine.
- Send a letter, postcard or email to employees and volunteers prior to the start of the vaccine season reminding them of the importance of vaccination, where and when they will be able to get the influenza vaccine.
- Put an article in the employee newsletter or post information on staff bulletin boards.

Additional Measures to Prevent the Spread of Influenza

Remind employees and volunteers that although the influenza vaccination may be the best way to protect against influenza, there are other measures that they should also take to protect themselves, their families, and patients:

- Stay at home when they are sick, especially if running a fever. Not only can employees and volunteers with influenza transmit it to others, but studies have shown that employees and volunteers that return to work before fully recovered have less than optimal work performance.
- Keep tissues at their desks and exercise proper respiratory hygiene.
- Dispose of used tissues properly.
- Frequently wipe down their keyboards, mice, and phones with antimicrobial wipes.
- Wash their hands or wipe with hand sanitizer frequently, especially after using copy machines, fax machines, someone else's computer or phone, or after sneezing or other contact with their own secretions.
- Avoid contact with sick persons, except of course the patients they are here to help.
- Use proper personal protective equipment (PPE) and work practices when caring for ill patients.
- Wash their hands before eating food.
- Wash their hands frequently with water and soap or alcohol-based rubs.

Remember employees and volunteers may also have health problems and conditions that put them at increased risk of complications from influenza. These include:

- Chronic cardiac or pulmonary disorders severe enough to require regular medical follow-up care.
- Being 65 and older.
- Chronic health conditions such as diabetes mellitus and other metabolic diseases, cancer, immunodeficiency, renal disease, anemia and hemoglobinopathy.

- Any conditions that can compromise respiratory function or the handling of respiratory secretions or that can increase the risk of aspiration.
- Being pregnant.

Vaccination is the primary method to prevent influenza, limit transmission, and prevent complications from the influenza virus. Influenza vaccine may be administered to all categories of employees and volunteers unless there is a contraindication for the vaccine. In some cases, live attenuated influenza vaccine (LAIV or FluMist®) may be administered to employees and volunteers. It is a good option for those employees and volunteers who are in good health, are not pregnant, those who have a dislike of needles, and meet the criteria for LAIV.

Key elements of a successful employee & volunteer influenza vaccination campaign

1. Informing employees and volunteers about the free availability of the vaccine and the goals of the campaign (awareness),
2. Educating employees and volunteers about its importance (marketing),
3. Making the vaccine convenient (access),
4. Notifying employees and volunteers regarding the scheduling of administration (awareness), and
5. Keeping track of who has been vaccinated (feedback/evaluation).

Frequently Asked Questions on Influenza Vaccination for Occupational Health

Should we vaccinate volunteers as part of our campaign?

Volunteers provide a vital service to our veterans including the provision of direct patient care. Facilities should offer the influenza vaccine to volunteers.

Should we offer the influenza vaccine to medical residents and other trainees who provide services at the VA during the influenza season through our Occupational Health Department?

The decision with regard to resident and other trainees is an individual VA facility decision and should take into account the contractual agreement with the academic affiliate, the availability of the vaccine, and the potential benefit to the VA. Facilities may want to make the same decisions about providing the influenza vaccine for rotating or temporary trainees (e.g. house staff/medical residents) as they do for volunteers.

Should employees and volunteers who have contact with HIV/AIDS patients and other patients with compromised immune systems be vaccinated?

All employees and volunteers with patient contact should receive annual influenza vaccination unless they have a contraindication to the vaccine. Vaccination is recommended for employees and volunteers for the following three reasons:

- Employees and volunteers can give influenza to patients, coworkers, family members and others;

- Employees and volunteers are at risk of getting influenza from patients with influenza; and
- Preventing influenza by vaccinating keeps employees and volunteers healthy and available to come to work or to take care of patients

Inactivated influenza vaccine (the flu shot) is the preferred vaccine for people coming into close contact with anyone who has a severely weakened immune system.

Is LAIV an option for employees and volunteers?

Yes, LAIV is an option for healthy employees and volunteers up through age 49, especially when there is a shortage of inactivated influenza vaccine. Choosing LAIV, currently available as FluMist®, means you are helping to conserve when there is limited inactivated influenza vaccine for high-risk persons who do not have the option of live attenuated influenza vaccine. It is also a good option for employees and volunteers who may not get the vaccine because they are afraid of needles.

Is shedding the virus a problem for employees and volunteers?

The FluMist® package insert states that a person can shed the virus for up to 3 weeks because that is what the studies in humans showed, but shedding alone should not be equated with person-to-person transmission. In fact, studies have found that person-to-person transmission caused by shedding is very rare. In a study conducted in a Finnish day care center that was designed to maximize the chance of detecting vaccine virus transmission, one child shed the virus for 21 days. Other children in this study shed the virus a mean of 7.6 days. Estimated transmission rates were extremely low (0.6%-2.4%). There was actually only one documented case of LAIV transmission. An additional small study of 40 adults conducted since licensure found that only 50% of the adults were shedding the vaccine influenza virus on day three after vaccination; one adult shed the virus on day seven. That means that half the adults had stopped shedding the virus by day three. These post licensure studies prompted the Advisory Committee on Immunization Practices (ACIP), an independent committee that advises CDC, to reduce the recommended number of days an employee or volunteer should avoid contact with patients requiring protective isolation from three weeks to seven days.

Should employees who have a contraindication to LAIV administer it?

They can. Environmental contamination with LAIV during administration is probably unavoidable. However, because it is an attenuated virus (weakened) that is designed not to replicate at the warm temperatures of the lower respiratory tract, the ACIP does not believe that administration of LAIV by a person with one of the contraindications to it (like asthma, chronic obstructive pulmonary disease, etc.) puts that person at risk from infection or illness from the vaccine virus.

Tracking Employees, Volunteers and Other Workers' Receipt of Vaccine

A key part of the VA seasonal influenza vaccination campaign is for facilities to develop systems to track vaccination rates among employees and volunteers and provide feedback during the influenza vaccination campaign, which allows facilities to better manage information and in turn, increase vaccination rates and improve patient safety. Occupational Health must track who has received the vaccine so that they can send messages to those who have not been vaccinated reminding of the vaccine's availability; and to report to Central Office at the end of the season the number of employees, volunteers, and other personnel who have been vaccinated. Additional information on tracking influenza vaccination will be provided before the beginning of the 2006-2007 vaccination season.

Facilities must identify those individuals who decided not to receive the influenza vaccination and reasons why those individuals chose not to receive the vaccine. This will enable facilities to focus education programs to those individuals/groups in the coming year as a way to increase vaccination rates.

In the 2005-2006 influenza vaccination season, VHA vaccinated an average of 52.9% of its employees. The aim for this year is to increase the influenza vaccination rate of VHA employees to 60% within each VA health care facility.

JCAHO: New Infection Control Requirements for Offering Influenza Vaccination to Staff and Licensed Independent Practitioners

The Joint Commission on Accreditation of Healthcare Operations (JCAHO) 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 January 1, 2007. This standard conforms to recommendations recently made by the Centers for Disease Control and Prevention.

The new JCAHO standard states these requirements:

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 vaccination program.
B 5. The organization implements enhancements to the program to increase participation.

How to Increase Influenza Vaccination Rates in Employees & Volunteers

1. Encourage top management to be active members of the influenza vaccination program.
2. Enlist peer vaccination champions to encourage influenza vaccination
3. Sponsor a kickoff event.
4. Set vaccination rate goals and set up competition among departments/services/units.
5. Make the vaccine accessible by increasing occupational health clinic hours, increasing the locations where vaccination is available and taking the vaccine to employees and volunteers via mobile carts.
6. Advertise the dates, times, locations of influenza vaccination in multiple message formats.
7. Provide training on why it is important for employees and volunteers to get vaccinated.
8. Keep track of who is vaccinated so that targeted reminders can be sent to those who do not get vaccinated.
9. Identify why individuals do not wish to get the influenza vaccine and develop targeted messages to address those concerns.
10. Track and report the number of employees, volunteers, and others who are vaccinated.

Sample Letter to Employees and Volunteers from Facility Director

Date:

VA Employees and Volunteers:

Seasonal influenza is a viral infection that causes more than 200,000 Americans to be hospitalized each year. In addition, it results in approximately 36,000 deaths each year in the United States. The Centers for Disease Control and Prevention (CDC) recommends that all employees and volunteers get the influenza vaccine annually. The National Health Interview Survey of 2003 showed that only about 40% of health care workers received the influenza vaccination. Last year, almost 53% of VHA employees got the flu vaccine, but VA is capable of improving on these results.

By immunizing yourself against influenza, you protect yourself, your family, and the veterans that you care for. Unvaccinated employees and volunteers may transmit influenza in health care settings. They can spread the virus because they often work while ill or just before they become ill. Vaccination of employees and volunteers has been proven to decrease the transmission of influenza and the rate of influenza-related complications such as pneumonia, which may cause complications and death both for employees, volunteers, and the veterans they care for.

If every employee and volunteer would become vaccinated against influenza, we could really make a difference on the burden of this disease in VHA.

Protect yourself, protect your family AND protect the veterans who served our country. Get vaccinated for seasonal influenza and encourage other employees and volunteers to do the same.

Sincerely,

_____
Facility Director

Section 4
Best Strategies for Increasing Veteran Influenza Vaccination Rates

The following strategies have been shown to be effective for increasing veteran influenza vaccination rates. They are most effective when used in conjunction with each other. In the event of a vaccine shortage, it is important that patients at highest risk for complications from influenza and the employees and volunteers who provide direct service to them be vaccinated. Employee and volunteer strategies are described in Section 3.

Getting Veteran Patients Vaccinated

1. Use Organizational Approaches

- Make influenza vaccination an organizational priority.
- Provide written policy stressing importance and effectiveness of patient influenza vaccination with clear direction from VHA leadership (i.e., Directive or Flu Advisory).
- Consider customizing information for local distribution (e.g., bulletins, announcements, email messages).
- Solicit local leadership buy-in and involvement.
    - Use photos of hospital director or other opinion leaders getting their influenza shot in newsletters, VA TV/monitor displays.
- Use performance feedback.
    - Set goals/benchmarks.
    - Monitor and inform providers about number and percent of high-risk patients vaccinated.
    - Encourage friendly competition among providers or clinics.
    - Provide incentives to providers and clinics with high patient vaccination rates.
- Coordinate planned activities appropriate to influenza vaccine delivery schedule.
- Develop a month-by-month calendar of activities to prepare for vaccination campaign.
- Schedule influenza vaccination campaign committee to meet during the vaccination season. Discuss successful strategies and what needs improvement.
- Evaluate your campaign after flu season. Know and document strategies that worked.

2. Employ Systems Strategies

- Use computerized clinical record reminders.
- Remove administrative barriers (e.g. provide easier parking for flu shot clinics).
- Use standing orders or protocols for inpatients (acute as well as long-term care and psychiatric settings), outpatients, and home care patients
- Use patient reminders (postcards/letters) and recall systems.
- Provide updates and information on the facility and VISN Internet Web sites.

3. Make it Convenient

- Expand access/outreach.
    - Extended clinic hours/days.
    - Drop-in vaccination days, ‘drive-through’ vaccination.

- Vaccination in settings previously not used routinely for this purpose (hospital lobbies, Vet Centers, domiciliaries).
- Targeting special populations in clinics where they are likely to be seen (SCI, HIV/ID clinics, Homeless programs).

4. Communicate, Remind, and Reinforce

Use multiple message formats and tools; regularly provide reminders and updates.

- Provider email, email blast to all staff to communicate awareness of influenza campaign and to encourage veterans to get vaccinated.
- Screensavers with messages to providers and staff regarding the phases of the influenza campaign – "get ready" "vaccinations being given date/time" "it's not too late for your patient to get vaccinated."
- "On hold" messages for patient callers.
- Newsletters.
- Posters.
- Buttons.
- Stickers.
- Pens.
- Cafeteria tray liners.
- Table tents.
- Phone calls and/or mailed reminders to outpatients.
- Reminders included with pharmacy refills, appointment letters.
- Influenza vaccination included with home visits.
- Tools to help patients, employees, and volunteers keep track of their vaccinations.
- Use of updates for number of veterans, employees, and volunteers vaccinated on facility and VISN internet Web sites.

5. Educate

- Provide fact sheets to all patients sitting in clinic waiting areas.
- Be direct and straightforward.
- Use appropriate languages and reading levels.
- Give information (e.g., influenza vaccine administration sites/dates/times; facts vs. myths on influenza vaccination) to be broadcast through medical media to inpatients, employees and volunteers or presented on VA TV/monitors throughout the medical center.
- Enlist providers and clinical staff from multiple disciplines as well as pharmacists, students, interns, and residents to assist with inpatient and outpatient education efforts.

Section 5
Tools for Influenza Prevention

The 2006 - 2007 INFLUENZA TOOLKIT includes a manual, buttons, stickers and posters. Three key contact groups at each VA medical facilities were mailed the toolkit. These groups were:

- "Flu" coordinators at medical centers and long-term care facilities
- Occupational health clinicians
- Infection control professionals

What is the VA Influenza Toolkit Manual?

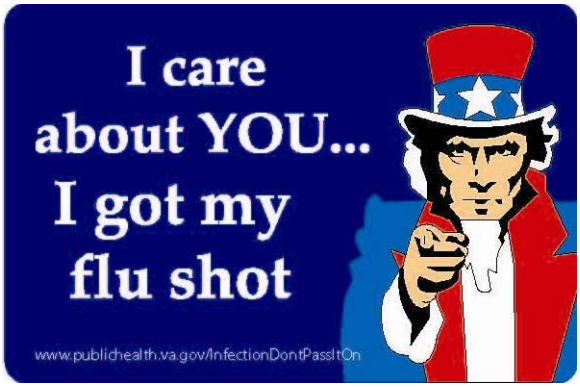
This manual is a resource for VA providers to use during influenza season. It contains information on:

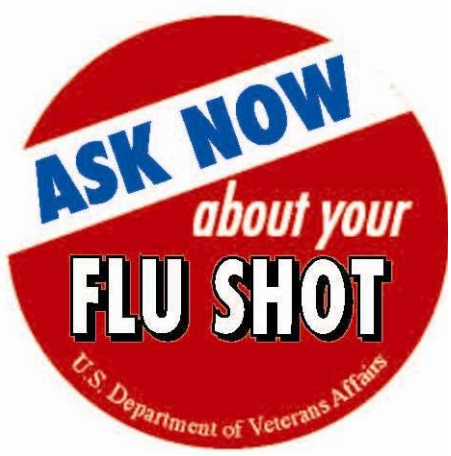
- **Influenza illness**
- **Inactivated influenza vaccine**
- **Live, attenuated intranasal influenza vaccine (LAIV, FluMist®)**
- **How to improve VHA employee & volunteer vaccination rates**
- **Best strategies for increasing veterans influenza vaccination rates**
- **Frequently asked questions**
- **How to order additional influenza vaccination campaign materials**
- **And much more….**

Additional copies can be downloaded from www.publichealth.va.gov/flu.

How can I use the buttons and stickers during influenza season?

Buttons Two buttons were designed. They are to be worn by VA employees and volunteers. These are designed to encourage conversation between employees, volunteers, and patients on influenza vaccinations.

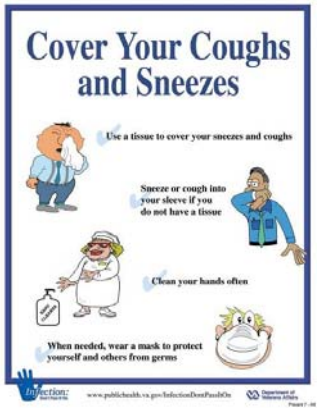




Stickers A sticker was designed to be distributed to employees, volunteers, and patients who have received their influenza shots. Every time someone in VA receives an influenza shot, she/he should get a sticker to wear.

Posters included in the kit

The ***Infection: Don't Pass It On*** (I:DPIO) campaign has produced over 100 posters since fall 2004. These represent hand and respiratory hygiene, hand washing, influenza, and personal protective equipment. The posters included in this year's influenza toolkit include 10 posters targeted for influenza and two others for use as reminders of respiratory and hand etiquette. As a bonus, some of the posters released in 2004 are also included in the kits. All of these posters are available through the Employee Education System (EES) catalog should you want to order additional posters or more of your favorites.



Bonus: We've enlarged (24" x 31") the Get the Flu Shot poster (below) for use during influenza season. You'll find five copies of this poster in the toolkit.

The code in the lower right of each poster includes the target audience with the words "ALL," "STAFF AREAS ONLY" or "CLINICAL." The posters marked:

- **All (General Audience)**: are intended for use anywhere in a hospital or clinic. For example, patient waiting areas, visitor waiting areas, hallways, elevators, outside patient rooms, at the entryways to special areas (like Intensive Care Units or Endoscopy Suites), desktops, etc. These posters have the word "All" next to their number at the bottom of the poster.

- **Clinical:** are often very similar to the "All" posters but use more technical language. In some cases, the difference is just the use of "decontaminate" rather than "wash." These posters can be used anywhere but are intended for areas will they will be seen primarily by employees and volunteers who may appreciate the more technical language and details. These posters have the word "Clinical" next to their number at the bottom of the poster.

- **Staff Areas Only:** have messages that are intended only for employees and volunteers. The points are intended to be thought-provoking and they contain technical (Hands-26) or health-care references (like Hands-27) that most people who don't work in healthcare wouldn't understand or benefit from reading. These posters should not be in view of the patients, and be put only in staff break areas, lockers rooms, etc**.**

Posters included in the 2006-2007 Influenza Toolkit

	Poster Title	Poster Description	Audience	Format
	INFLUENZA			
	Flu 1	Staying Healthy	All	Portrait
	Flu 2	At 65 I'm healthy	All	Portrait
	Flu 3	If You're 65	All	Portrait
	Flu 4	Get the Flu Shot	All	Portrait
	Flu 5	Ask for a Flu Shot	All	Portrait
	Flu 6	Keep Veterans Healthy	All	Portrait
	Flu 7	Do Your Part Keep Veterans Healthy	All	Portrait
	Flu 8	Are You Ready?	Clinical	Portrait
	Flu 11	We're All in This Together	All	Landscape
	Flu 12	Vaccination Time	Clinical	Landscape
	One Set	2004 I:DPIO posters (set of 52)		
	HAND WASHING HYGIENE *using soap & water*			
	Prevent 6	Don't Let Germs Get You Down	All	Portrait
	Prevent 7	Cover Your Coughs and Sneezes	All	Portrait
	Larger Sized Posters			
	Flu 4	Get the Flu Shot	All	Portrait

Note for putting posters in poster holders for rotation: The poster holders supplied in 2004 as part of the ***Infection: Don't Pass it On*** campaign can hold several posters at a time (with only one visible), so if you put six posters that you like in the holder, it will be easier to rotate the posters (for example, from front to back) than if you have to take a new poster from your collection every time you want to rotate posters.

Where do I hang the posters?

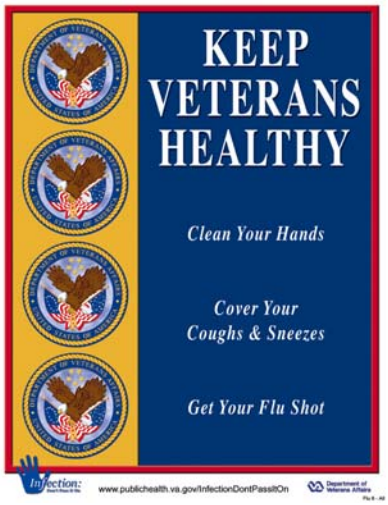
Use the posters in places that will get these messages to the VA community. Place them in multiple sites throughout hospitals, clinics, domiciliaries, Vet Centers, etc. Posters can be hung or placed at reception desks, waiting areas, exam rooms, rest rooms, meeting/conference rooms, cafeterias, established kiosks, and bulletin boards. Rotate them often (weekly or monthly). The "Restroom" and "Wash" posters may be used in restrooms, hung near urinals, in stalls, on mirrors or sinks or soap dispensers. Posters may also be hung on restroom doors, especially so they can be seen upon exiting the restroom. Posters for employees and volunteers can be placed in staff lounges, locker rooms and offices.

How can I print the posters directly from the Web?

The poster number is located on the bottom right corner of the poster. Find the poster you want at the Web site below and right click on it to either print it or save (download) it to print later:
http://www.publichealth.va.gov/InfectionDontPassItOn/

How can I get additional copies of the posters & other materials in the toolkit?

POSTERS - Additional print copies of the posters in the toolkit are available in the EES catalog, and can be ordered by your EES facility contact. An order form is included in this manual. Each poster is available in sets of 10 (except the 2004 IDPIO posters).
The 2004 IDPIO posters contain one copy each of 52 different posters that were printed in 2004.



BUTTONS & STICKERS - All buttons and stickers in the kits can be ordered through your EES facility contact. Buttons contain ten per pack and stickers are packaged in rolls of 100.

MANUAL – This manual is available for order from your EES facility contact.

EES facility contact – Each facility has an EES contact. To find yours, visit this Web site and use the directory to locate your facility:
http://vaww.ees.lrn.va.gov/staff/contacts/contactlist.asp

Infection: Don't Pass It On

Order Form: 2006-2007 VA Influenza Toolkit Materials

NAME: _____ Date: _____
Facility Name: _____ Facility Number: _____
Address: _____ Mail Symbol: _____
Phone: _____ Email: _____
EES Education Contact Name: _____ Location: _____

To order, email or deliver this form to your **education contact** by using the directory at:
http://vaww.ees.lrn.va.gov/staff/contacts/contactlist.asp

POSTER TITLE	NUMBER OF SETS
FLU 1 Staying Healthy (set of 10)	
FLU 2 At 65 I'm Healthy (set of 10)	
FLU 3 If You're 65 (set of 10)	
FLU 4 Get the Flu Shot (set of 10)	
FLU 5 Ask for a Flu Shot (set of 10)	
FLU 6 Keep Veterans Healthy (set of 10)	
FLU 7 Do Your Part: Keep Veterans Healthy (set of 10)	
FLU 8 Are You Ready? (set of 10)	
FLU 11 We're All in This Together (set of 10)	
FLU 12 Employees and Volunteers (set of 10)	
PREVENT 6 Don't Let the Germs Get You Down (set of 10)	
PREVENT 7 Cover Your Coughs and Sneezes (set of 10)	
FLU 4 (Larger size) Get the Flu Shot (set of 5)	
2004 Infection: Don't Pass It On Posters (set of 52)	
2004 Infection: Don't Pass It On Posters in Spanish (set of 10)	

BUTTON	NUMBER OF PACKS
Ask Now about your Flu Shot (10 per pack)	
I Care About You…. (10 pack)	

STICKER	NUMBER OF ROLLS
I Got My Flu Shot (100 per roll)	

MANUAL	NUMBER OF MANUALS
2006 – 2007 VA Influenza Toolkit Manual	

PANDEMIC FLU INFORMATION	NUMBER OF SETS
Pandemic Flu – General Information (set of 10)	
Fact Sheet for VA Health Care Providers - Status and Implications (set of 10)	

POSTER HOLDERS (8 1/2 x 11 inches)	NUMBER OF HOLDERS
Vertical style	
Horizontal style	
Box style (can use for both vertical and horizontal style posters)	

Section 6
Frequently Asked Questions (FAQs) on Influenza and Influenza Vaccination

1. **General Questions about Influenza and Influenza Vaccine**
2. **Employees, Volunteers, and Influenza Vaccine**
3. **Live, Attenuated, Intranasal Influenza Vaccine (LAIV or** FluMist®**)**
4. **Influenza Antiviral Agents**
5. **Pandemic or Avian Influenza**
6. **Eligibility for Influenza Vaccination in VA**
7. **HIV/AIDS and Influenza Vaccination**
8. **Special Considerations for Pregnant Women**
9. **Influenza Vaccine Storage and Prefilled Syringes**

1. General Questions

How is influenza illness defined?

Influenza is a febrile respiratory illness caused by influenza virus that can be prevented by vaccination. The table below differentiates influenza from a 'cold'.

Signs and Symptoms	***Influenza***	***Cold***
Onset	sudden	gradual
Fever	high (over 100°F); lasting 3 to 4 days	less common; usually low-grade
Cough	dry; can become severe	hacking or congested
Headache	common	rare
Muscle aches and pains	usual; often severe	slight
Tiredness and weakness	extreme; can last 2 to 3 weeks	very mild
Extreme exhaustion	early and prominent	rare or never
Chest discomfort	common	mild to moderate
Runny or Stuffy nose	sometimes	common
Sneezing	sometimes	usual
Sore throat	sometimes	common
Stomach symptoms, such as nausea, vomiting, diarrhea	can occur, but more common in children	rare

What are complications of influenza?

- Complications of influenza can include: dehydration, worsening of chronic medical conditions (i.e., asthma, diabetes, congestive heart failure), and bacterial pneumonia. Children may get sinus and ear infections.
- Some people, such as older people, young children, and people with certain health conditions are at higher risk for serious influenza complications. Pregnant women are also more susceptible to serious complications.

What should everyone know about the influenza season?

- The first cases of influenza in the U.S. are usually identified in October and can last as late as May.
- 5%-20% of the population gets the influenza in the U.S. each year.
- Widespread influenza activity appears 6-10 weeks after the first case.
- Influenza kills about 36,000 and hospitalizes over 200,000 persons in the U.S. each year.

What should everyone know about the influenza vaccine?

- The influenza vaccine is changed each year to match the currently circulating type of influenza. The influenza vaccine composition to be used in the 2006-07 season in the U.S. is identical to that recommended by the World Health Organization on February 15, 2006.
- The **2006-07 influenza vaccine** contains the following types:
    - **A/New Caledonia**/20/99 (**H1N1**)-like virus
    - **A/Wisconsin**/67/2005 (**H3N2**) –like virus (A/Wisconsin/67/2005 and A/Hiroshima/52/2005 strains)
    - **B/Malaysia**/2506/2004-like virus (B/Malaysia/2506/2005 and B/Ohio/1/2005 strains)
- One needs an influenza vaccine *each year* to get the latest protection.
- Influenza vaccination usually begins in September (for high-risk patients seeking medical care), per CDC guidelines and if vaccine is available. Usually influenza vaccine campaigns begin in October in the VA health care system, depending on availability of influenza vaccine. October or November is the best time to get vaccinated. You can still get vaccinated in December or later. The influenza vaccine campaign continues through March.

How long does it take for the influenza vaccine to work?

- Influenza vaccine takes about 2 weeks for your body to generate protective immunity. The vaccine stimulates production of antibodies that provide protection against the influenza viruses in the vaccine.
- The ability of the influenza vaccine to protect a person depends on the health status (immune system especially) and age of the individual and the "match" or similarity between the virus strains in the vaccine and the circulating influenza strains. Studies have proven that both the influenza shot and the nasal-spray influenza vaccine are effective in preventing the influenza virus.
- One influenza vaccine shot will protect most people from influenza during the flu season.

What about side effects? Can I get the influenza virus from getting the influenza vaccine?

- **You do not get influenza from the influenza vaccine. Most people will have no side effects from the vaccine.** Some people may have coincidental respiratory illness around the time of receiving the influenza vaccine. This is not due to the influenza vaccine, but due to concurrent exposure to other respiratory illness.
- Today's influenza vaccines cause fewer side effects than those used in the past, if any at all.
- However, some minor side effects can occur: tenderness at the site of the shot may occur and last for several days. Some people (more likely to be people who have not received the influenza shot before or who have had no previous exposure to the influenza antigens in that

season's influenza vaccine) may have low grade fever, chills, headache, malaise, or muscle aches within the first 48 hours. These reactions begin 6-12 hours after vaccination and can persist for 1-2 days. These symptoms are minor compared with influenza and the complications that can accompany influenza. Almost all people who receive influenza vaccine have no serious problems from it.

Does the seasonal influenza vaccine protect me from avian influenza or "bird flu"?

- The seasonal influenza vaccine does not protect against H5N1 avian influenza. However, experts believe it is very important to get the seasonal influenza vaccine in order to prevent additional influenza viruses spreading or combining with the H5N1 avian influenza strain, and to prevent both seasonal and pandemic stains from circulating at the same time which would confuse patients, employees, and volunteers.

Is there anyone who should <u>not</u> get the influenza vaccine?

- In some rare instances people receiving vaccine have had severe allergic reactions. The following precautions should be carefully noted:
    - People with known <u>severe</u> allergy to chicken eggs should receive the vaccine only for specific indications under special medical supervision. Some people say they are allergic to eggs, yet they actually eat products made with eggs (e.g. bread, cake). Be sure the allergy to eggs is accurate information and not just personal food dislike/preference.
    - People with moderate or severe illness with a fever should delay getting vaccinated until the fever is gone.
    - People who have received another type of vaccine in the past 14 days should consult a health care provider before taking the influenza vaccine.
    - Influenza vaccine is not approved for children less than 6 months of age.
    - People who developed Guillain-Barre ' syndrome (GBS) within 6 weeks of getting an influenza vaccine previously should consult a physician first. (Note: At one time, influenza shots were made with live virus. Influenza shots are now made now made with killed/inactivated, so GBS as a side effect is extremely rare.)

What is thimerosal?

- Thimerosal is used as a preservative in some multidose vials of vaccines to prevent contamination. Preservatives are not required for vaccines in single-dose vials. As a preservative, thimerosal is added at the end of the production process to the bulk or final container to prevent contamination after multidose vials are opened. Until 1999, vaccines given to infants to protect them against diphtheria, tetanus, pertussis, *Haemophilus influenzae* type b (Hib), and hepatitis B contained thimerosal as a preservative. Today, with the exception of some influenza vaccines, none of the vaccines used in the U.S. to protect preschool aged children against 12 infectious diseases contain thimerosal as a preservative. Thimerosal still may be used in the early stages of manufacturing of certain vaccines, but is removed through a purification process, with only trace, or insignificant, amounts remaining.

Can people who are allergic to thimerosal get the influenza shot?

- Yes. Thimerosal free influenza vaccine is available. Check with your pharmacy concerning availability at your facility

How will we know whom to vaccinate when? For example, early in the 2004-2005 season, employees and volunteers not involved in direct care were not supposed to be vaccinated by VA even if the individual employee was over 65 and/or had medical risks from consequences of influenza. Will this be the correct approach this year?

- For the 2006-07 season, there is no expected shortage of influenza vaccine, based on public statements by influenza vaccine manufacturers. The CDC and the VA Undersecretary for Health will issue regular advisories and updates to define the timing of priority groups for vaccination. Watch for VA Influenza Updates sent out broadly by email and posted on http://www.publichealth.va.gov/flu/

What else (besides vaccine) can one do to protect oneself and others from influenza illness?

- Cover your nose and mouth with a tissue when you cough or sneeze, and dispose of the tissue afterward.
- If you don't have a tissue, cough or sneeze into your sleeve.
- Clean your hands after you cough or sneeze with soap and warm water or an alcohol-based hand cleaner, if your hands are not visibly soiled.
- Educate yourself and others. This VA Web site includes posters, information, and links about hand and respiratory hygiene: http://www.publichealth.va.gov/infectiondontpassiton/
- If you get sick from the influenza virus, avoid exposing others. Stay home from work or school until your fever is gone and you feel ready to resume normal activities.
- Get the pneumococcal vaccine if you're age 65 or older or have a chronic health condition. (See the Pneumococcal Vaccine Information Statement, Appendix C in this document.)

2. Employees, Volunteers, and Influenza Vaccine

(For additional information, also see Frequently Asked Questions on Influenza Vaccination for Occupational Health in Section 3: "How to Improve VHA Employee and Volunteer Vaccination Rates")

What are the recommendations for vaccination of employees and volunteers against influenza?

- All employees and volunteers should receive annual influenza vaccination unless they have a medical contraindication to the vaccine. Influenza is spread primarily by droplets in the air that can travel about 3 feet. If an employee or volunteer has the influenza virus and comes within 3 feet of a patient, the influenza virus can be transmitted to the patient. If the infected worker coughs or sneezes, the influenza virus droplets can be propelled beyond 3 feet.
- Vaccination is recommended for employees and volunteers for the following reasons:
    - employees and volunteers can give influenza to their patients, coworkers, family members, and others;

  - employees and volunteers are at risk of getting influenza from patients with influenza; and
  - preventing influenza by vaccinating keeps employees and volunteers healthy and available to come to work to take care of patients.
- As of July 2005, seven states had legislation requiring annual influenza vaccination or the signing of an informed declination. Fifteen states have regulations regarding vaccination of employees and volunteers in long-term care settings.
- The CDC Healthcare Infection Control Practices Advisory Committee (HICPAC) and the Advisory Committee on Immunization Practices (ACIP) recommends: "Obtain a signed declination from health care professionals who decline influenza vaccination for reasons other than medical contraindications (category II)."
- The entire text for the CDC MMWR Report 55(RR02; 1-16, "Influenza Vaccination of Health-Care Personnel," published 2/24/06 is available via the Internet at: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr55e209a1.htm
- VHA is not mandating the use of declination forms. Within VA, it is a local facility decision whether or not to implement a signed declination form for employees and volunteers who decline influenza vaccination for reasons other than medical contraindications. All employees and volunteers should be offered the influenza vaccine, free of charge.

3. Live, Attenuated, Intranasal Influenza Vaccine (LAIV or FluMist®)

(For additional information, also see Frequently Asked Questions on Influenza Vaccination for Occupational Health in Section 3, "How to Improve VHA Employee and Volunteer Vaccination Rates")

LAIV is new. Is it a safe vaccine?

- The development of the live attenuated influenza vaccine has been going on since the 1960s. Prior to licensure, the safety of LAIV was studied in 20 clinical trials. More than 6,000 clinical trial participants were in the approved age range of 5-49 years. In healthy children there were no significant differences between vaccine and placebo recipients. Serious adverse reactions have been identified in less than 1% of LAIV recipients, either children or adults, since licensure.

How is LAIV given?

- 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.

4. Influenza Antiviral Agents

(See Appendix E for prescribing and dosage information)

What are influenza antiviral medications*?*

- Antiviral medications are an adjunct to influenza vaccine for preventing the spread and controlling influenza. They work to prevent the influenza virus from replicating (reproducing) or making more copies of the influenza virus in the body. ***These agents are not a substitute for receiving the influenza vaccine each year.***
- Four antiviral medications are licensed in the United States and approved for prevention and/or treatment of the influenza virus: **amantadine** (Symmetrel®), **rimantadine** (Flumadine®), **oseltamivir** (Tamiflu®) and **zanamavir** (Relenza®). At the time of this printing, three antiviral medications: amantadine, oseltamivir, and rimantadine, are on the VA National Formulary. Only oseltamivir (and zanamivir) are recommended for use during the 2006-2007 influenza season, as of August 2006.

How do influenza antiviral agents work?

- They work by preventing the influenza virus from replicating (reproducing) or from making more copies of the influenza virus in the body.

How do the influenza antiviral agents differ? Do they work against both influenza A & B?

- **Amantadine** and **rimantadine** are chemically related antiviral drugs known as adamantanes. They have known effect against influenza A viruses, but **not** influenza B viruses. During the 2005-06 influenza season, the prevalent influenza strains in the U.S. were resistant to amantadine and rimantadine. The CDC updated recommendations for antiviral therapy for influenza in January 2006 due to this development. At that time, it was recommended to prescribe the influenza antiviral medications oseltamivir (Tamiflu®) or zanamivir (Relenza®). For details, see the January 14, 2006 CDC Health Alert Notice [HAN] at http://www.cdc.gov/flu/han011406.htm.
- Amantadine is approved for treatment *and* chemoprophylaxis (prevention) of influenza A among adults and children ≥ 1 year of age, however, the CDC Advisory Committee on Influenza Practices (ACIP) recommends that neither amantadine nor rimantadine be used for the treatment or chemoprophylaxis of influenza A in the United States because of recent data indicating widespread resistance of influenza virus to these medications. Until susceptibility to adamantanes has been re-established among circulating influenza A viruses, oseltamivir or zanamivir may be prescribed if antiviral treatment or chemoprophylaxis of influenza is indicated (see Appendix E for additional information concerning use of Antiviral Agents for Influenza).
- Rimantadine is approved for treatment and chemoprophylaxis of influenza A in *adults only* and *chemoprophylaxis* only (not treatment) of influenza A in *children.* Some specialists believe it is acceptable to use rimantadine to treat influenza A in children, however.
- Until susceptibility to adamantanes has been re-established among circulating influenza A viruses, oseltamivir or zanamivir may be prescribed if antiviral treatment or chemoprophylaxis of influenza is indicated.

- Oseltamivir and zanamivir are chemically related antiviral drugs known as neuraminidase inhibitors with known effect against *both* influenza A and B viruses. Both are approved for treating uncomplicated influenza infections. Oseltamavir is approved for treatment and chemoprophylaxis (prevention) of influenza A and B in people ≥ 1 year of age. Zanamivir is approved for treatment and chemoprophylaxis of influenza A & B in people ≥ 5 yrs of age.
- Oseltamivir, amantadine, and ramantadine are administered orally in tablet form. Zanamivir is administered by an inhaler. Zanamivir is contraindicated for some people with breathing problems such as asthma or chronic obstructive pulmonary disease and other serious medical problems, such as heart disease. A possible side effect is bronchospasm. It has not been studied in pregnant women, so zanamivir should not be used with pregnant women.
- It is VERY important that patients take antiviral medications as prescribed, for the duration of treatment.

What else do I need to know about influenza antiviral medications?

- Check for updated reports from the CDC concerning the appropriate antiviral medications to use for the influenza strains in the 2006-07 seasonal influenza season (www.cdc.gov).
- Antiviral medications are most often used to help contain influenza outbreaks in settings such as nursing homes or to protect a high-risk person who is in direct contact with someone who has influenza.
- Antiviral treatment for people who have the influenza virus lasts for 5 days and must be started within 2 days of illness. Therefore, people who get flu-like symptoms should seek medical care early.
- **To be effective, antivirals should be taken within 24-48 hours of being exposed to influenza or onset of symptoms**.
- Employees and volunteers working in nursing homes with influenza cases may be on antiviral medications longer than 5 days (up to 14 days), as preventive treatment in response to an outbreak or case of influenza in the nursing home. Check the CDC Web site: www.cdc.go/flu for current treatment guidelines.
- A supply of oseltamivir is maintained in a national VA stockpile for outbreaks of a very serious nature.
- There are some risks in taking antivirals. A few people have serious side effects from them.

Can I give LAIV influenza vaccine with 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.

Can I give inactivated influenza vaccine injection (the flu shot) with influenza antiviral medications?

- Yes. It contains only influenza virus subunits and no live virus, no contraindication exists to the coadministration of the flu shot and influenza antivirals.

5. Pandemic or Avian influenza

(For more information on this topic see www.pandemicflu.gov.)

What is the difference between regular (seasonal) influenza that is around every year and novel pandemic or avian influenza?

- Influenza virus circulates in humans every year, usually in winter. Several times each century, a strain that is new to humans originates from the reassortment of a human and animal (sometimes bird or avian) strains. These new or novel strains cause pandemics that can be very serious, because humans have little pre-existing immunity to them and vaccines and antiviral medications take time to develop, supply, and distribute.
- The 1918-19 pandemic caused as many as 500,000 deaths in the U.S. and 50 million globally. Public health experts around the world and within VA are taking steps to prepare for a pandemic of novel influenza.

What is the difference between low pathogenic avian influenza (LPAI) and high pathogenic avian influenza (HPAI) in birds?

- Avian influenza viruses are classified as LPAI and HPAI based upon the severity of illness for birds. Most avian influenza strains are classified as LPAI since they cause little or no clinical signs of illness in infected birds. LPAI viruses pose little risk to humans.
- HPAI causes severe illness and death in poultry. Some HPAI viruses, especially the H5N1 viruses, also cause severe illness and death in humans.
- The rapid spread of H5N1 HPAI is of growing concern for human health, as well as animal health. There is a concern this strain in birds may re-assort with human strains and cause a novel virus that could be extremely virulent and spread around the world.

6. Eligibility for Influenza Vaccination in VA

(For additional information concerning volunteers, medical residents, etc., also see Frequently Asked Questions on Influenza Vaccination for Occupational Health in Section 3, "How to Improve VHA Employee and Volunteer Vaccination Rates")

Many wives and children of selected veterans are eligible for CHAMPVA (Civilian Health and Medical Program of the Department of Veterans Affairs) and use VA medical facilities for their care. Where the VAMC sees CHAMPVA beneficiaries, are they eligible for vaccinations if they meet criteria for the vaccine?

- Yes, CHAMPVA beneficiaries and beneficiaries under the Spina Bifida Healthcare Program who are seen in a VAMC, may be provided the vaccination if they meet the criteria. VAMCs can be reimbursed for this service through the VA Health Administration Center (HAC). VAMC's CHAMPVA In House Treatment Initiative (CITI) Coordinators can provide specifics on how to bill the HAC.

Can veterans who are not currently enrolled in VA health care receive flu shots? If so, what is the proper procedure for processing such requests.

- As long as a supply of vaccine is available, vaccine may be provided to any enrolled veteran. Veterans who are not enrolled may apply for enrollment. If veterans meet current requirements for enrollment they may be provided a flu shot. Guidelines for administrating flu vaccine may be found in the Under Secretary for Health's Annual Influenza Directive or by a current Influenza Vaccine Advisory. These documents are posted on the Web and may be found at: http://www.publichealth.va.gov/flu/

Our state Soldiers Homes and Nursing Homes that house VA patients are requesting influenza vaccine from us. It is difficult to control the supply in these locations; especially in nursing homes where there are only a few VA patients.

- Generally VA only provides medications, including flu vaccine, to State Soldiers Homes' supplies when a VA facility has established a contract to provide such services. Unless a VA facility has an agreement to vaccinate enrolled veterans residing in a State Soldiers Home or Nursing Home, patients must visit a VA facility to receive their flu shots. The State Soldiers Home or Nursing Home administrator should provide names and social security numbers of enrolled veterans residing in their facility to VA so that VA can verify eligibility, assure adequate vaccine supply, and coordinate plans for providing flu vaccine to this veteran population.

Is VA mandated to provide vaccine for employees in Soldier's Homes and Nursing Homes?

- VA is not mandated to provide flu vaccine to state Soldiers Homes or Nursing Homes. VA may provide flu vaccine if an existing contract has been negotiated for VA to supply such medication to the state Soldiers Home or Nursing Home the State Home whether to be used for its residents or employees.

Are homeless veterans who attend stand-downs eligible for influenza vaccine?

- Influenza vaccine given by VA is for veterans who are enrolled for VA health care and who meet current tiered vaccination timing plans (if any). VA staff should have access to VistA to facilitate determination of enrollment status. A very large percentage of homeless veterans are likely to have qualifying medical conditions that meet CDC criteria.

7. HIV/AIDS and Influenza Vaccination

Are there people with HIV/AIDS who should NOT receive influenza shots?

- Contraindications to the use of the influenza shot in persons with HIV/AIDS are the same as those for uninfected persons: a history of severe allergy (i.e., anaphylactic allergic reaction) to hens' eggs, or a history of onset of Guillain-Barre' syndrome during the 6 weeks after vaccination.

Can people with HIV/AIDS receive the live attenuated influenza vaccine (LAIV), sold commercially as FluMist®?

- No. Persons with HIV/AIDS are not recommended to receive the live influenza vaccine. LAIV is approved for use only among healthy persons between the ages of 5 and 49 years.

When should people with HIV/AIDS be prescribed antiviral medications for chemoprophylaxis (prevention)?

- Persons with advanced HIV disease may have difficulty developing the desired immune response from the influenza vaccine. Therefore, chemoprophylaxis (use of influenza antiviral medications for prevention) should also be considered for these patients, if they are likely to be exposed to people with influenza. (For example, when a family or household member is diagnosed with influenza, the exposed person with HIV/AIDS should be given chemoprophylaxis).
- People with advanced HIV disease who are not expected to mount an adequate antibody response to influenza vaccination should be considered for chemoprophylaxis with influenza antiviral medications for the duration of influenza activity in the community, if antiviral medications are available in adequate supply. Check current CDC guidelines for influenza antiviral treatment of persons with HIV at www.cdc.gov/flu.
- Vaccinated and unvaccinated HIV-infected persons who are residents of institutions experiencing an influenza outbreak should be given chemoprophylaxis for the duration of the outbreak or until discharge.
- There are no published data on interactions between anti-influenza agents such as amantadine and rimantadine and drugs used in the management of HIV-infected persons. Patients should be observed for adverse drug reactions to anti-influenza chemoprophylaxis agents, especially when neurologic conditions or renal insufficiency are present.

Should employees and volunteers who have contact with HIV/AIDS patients be vaccinated?

- Definitely!

8. Special Considerations for Pregnant Women

What special things do I need to know about the influenza virus and pregnant women?

- Pregnant women are at increased risk for influenza-related complications and hospitalizations.

Should pregnant women get the influenza shot?

- YES. Women who are pregnant or plan to become pregnant during the influenza season should be vaccinated against influenza. They should receive only inactivated influenza vaccine (influenza vaccine by injection). Inactivated influenza vaccine may be administered in any trimester.
- Check for other conditions that might require additional medical evaluation for the flu shot for all persons, regardless if pregnant or not. (See General Questions of this section under, "*Is there anyone who should not get the influenza vaccine?")*

Should pregnant women get the live attenuated intranasal influenza vaccine (LAIV), intranasal spray, as their seasonal influenza vaccine?

- No. Pregnant women should receive the inactivated influenza vaccine by injection; not the LAIV intranasal spray route. Check for other conditions that might require additional medical evaluation for the influenza shot for all persons, regardless if pregnant or not.

Can pregnant employees administer the LAIV intranasal spray to patients?

- Yes.

Can pregnant women receive influenza antiviral agents?

- This is not known. No clinical studies have been conducted regarding the safety or efficacy of zanamivir or oseltamivir for pregnant women. Because of the unknown effects of influenza antiviral drugs on pregnant women and their fetuses, these two drugs should be used during pregnancy only if the potential benefit justifies the potential risk to the embryo or fetus. Oseltamivir and zanamivir are both "Pregnancy Category C" medications (see manufacturers' package inserts).

Can breastfeeding mothers get the influenza vaccine?

- Yes. Inactivated influenza vaccine is safe for mothers who are breastfeeding and their infants. However, because excretion of LAIV in human milk is unknown and because of the possibility of shedding vaccine virus given the close proximity of a nursing mother and her infant, caution should be exercised if LAIV is administered to nursing mothers. Breastfeeding does not adversely affect the immune response and is not a contraindication for vaccination.

9. Influenza Vaccine Storage and Prefilled Syringes

(See additional information on "Inactivated Influenza Vaccine Administration" and "Live Attenuated Influenza Vaccine Administration" in Appendix A)

Would prefilling syringes of influenza vaccine from a multidose vial and leaving them out of the refrigerator for use during high volume vaccination efforts affect the potency of the vaccine?

- There is no known data on vaccine stability once the vaccine is drawn from a multidose vial. When creating "prefilled" syringes, consider the following::
  - Be sure to vigorously shake multidose vial before drawing up influenza vaccine from multidose vial (as recommended by influenza vaccine manufacturers).
  - Be sure to maintain temperature of syringes/vaccine at 35º to 46º F (2º to 8º C) via use of an insulated container; check temperature with thermometer. Do not place directly on ice or ice packs due to risk of freezing vaccine.
  - Do not store in the door of the refrigerator. Place in the center of refrigerator for consistent temperature exposure. Check temperature of refrigerator twice a day.
  - **Do not freeze or expose to freezing temperatures**.
  - Do not prefill a large number of syringes from a multidose vial due to:
    (a) Increased risk for administration errors.
    (b) Chance of wasting vaccine.

(c) Risk of inappropriate storage conditions.
(d) Potential for bacterial overgrowth in vaccines that do not contain a preservative.
(e) Reduced vaccine potency.

- Prefill the smallest logical number of syringes, according to your patient flow.
  (a) Try to fill no more than 10 prefilled syringes at a time (one multidose vial) per person vaccinating.
  (b) Discard any prefilled syringes remaining at the end of the clinic session.
  (c) Mark the container of prefilled syringes with the date and time of filling.
  (d) Label each prefilled syringe with medication and dose. The date does not need to be on the label since the vaccine should be administered shortly after withdrawal from the vial, due to concerns about length of time vaccine would be stable.
- In setting up a mass vaccination clinic
  (a) Administer only one type of vaccine per station (keep influenza and pneumococcal vaccines separate).
  (b) Transport the vaccine to the clinic in the manufacturer-supplied packaging at the recommended temperatures.
  (c) Keep vaccine vials and prefilled syringes in a cooler (but not in direct contact with ice).

What about storage and handling of prefilled influenza vaccine in glass syringes supplied by the influenza vaccine manufacturer?

- Vaccine that is packaged in prefilled glass syringes by the manufacturer should be kept at the same storage temperatures as the multidose vial preparation and handled in the same manner.

How is LAIV influenza vaccine intranasal spray stored?

- LAIV must be stored at 5° F (-15° C) or colder. LAIV may be stored in frost-free or manual defrost freezers without using a freezer-box. LAIV can be thawed in a refrigerator and stored at 36° F to 46° F (2° C to 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.

Section 7
Influenza Vaccine Documentation in the VA Computerized Patient Record System (CPRS)

Flu vaccinations for patients are an important priority in VA and we have been successful in accomplishing this goal. However, we want to continue to place special emphasis on improving flu vaccination rates for employees and volunteers that is paramount in preventing transmission of flu to our patients.

We also want to encourage appropriate documentation of flu vaccine whenever possible to provide an accurate record of the patients' immunization history. Documentation during mass flu vaccination clinics can be a challenge, but a process should be in place to ensure documentation.

Although a national clinical reminder for flu vaccine is currently not available, individual facilities should implement a clinical reminder locally to assist in tracking flu vaccine immunizations. In April 2006, the National Clinical Reminders Group recommended each VA build a uniform health summary which should include any local reminders for influenza immunization. This health summary will facilitate the ability of one VA site to view any immunizations given at another VA site. This health summary can be accessed from the Reports Tab of CPRS under Health Summaries and will also be available in the next version of VistA Web.

1. On the inpatient side**,** all influenza immunizations should be entered on the patient's immunization list (i.e. entered in the V IMMUNIZATION file). This can be done in a number of different ways depending on your site and the location of the patient but the maintenance of an accurate and up to date immunization list is critical.

2. Outpatient immunizations can be entered via a reminder dialog template or a clinical reminder dialog.

3. Entry of the Current Procedural Terminology (CPT) code for an immunization will result in the automatic update of the patient's immunization list if the Patient Care Encounter (PCE) CODE MAPPING file contains a link from that CPT code to the correct immunization.

4. Direct entry of the immunization into PCE after administration can be done.

5. Entry of the administration of an immunization into the Bar Code Medication Administration (BCMA) system on inpatients does not result in the entry of the immunization onto the patient's immunization list unless local programming has been accomplished. If no local programming exists to perform this function, then the site needs to define a process to ensure that ALL immunizations administered to inpatients are appropriately recorded on the immunization list.

Doing it this way documents the administration of the vaccine CPT Code for Administration as well as the CPT code for the specific vaccine right into the **PCE** Visit files…in the CPT Code section as well as the Immunization section of the encounter. The documentation can then be viewed by looking at the progress notes within CPRS. The actual immunizations and CPT codes related to them display at the bottom of the Progress Notes in the Encounter Section.

The CPT code for inactivated (injectable) influenza vaccine is 90658. The CPT code for LAIV is 90660. See Appendix D for additional information.

This guidance is a recommendation only and is not mandated by VA policy for 2006-2007.

Section 8
Appendices

A. How to Administer Influenza Vaccines

B. Prevention and Control of Influenza: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR. June 28, 2006/55/Early Release.

C. Pneumococcal Vaccine Information

D. Computerized Patient Record System (CPRS) Influenza Documentation

E. Prevention and Treatment of Influenza with Antiviral Drugs

F. Resources, References, and Web sites

G. Acknowledgements

Appendix A
How to Administer Influenza Vaccines

Note that the inactivated influenza vaccine MUST be administered intramuscularly with a 1"-2" 22-25 gauge needle. Shorter needles should not be used.

Inactivated Influenza Vaccine Administration

1. **Provide the vaccine recipient with the CDC Vaccine Information Statement (VIS).** The recipient must be given a copy of the vaccine's VIS prior to vaccine administration. This must be a print copy that the patient may read and take home. A copy of the CDC influenza VISs are included in Section 2 of this manual. VA staff may also provide patients with other information or educational material in addition to the CDC VIS.

2. **Ensure the patient has no known contraindications to receive the vaccine.**
   - In some rare instances people receiving vaccine have had severe allergic reactions. The following precautions should be carefully noted:
     - People with known severe allergy to chicken eggs should receive the vaccine only for specific indications under special medical supervision. Some people say they are allergic to eggs, yet they actually eat products made with eggs (e.g. bread, cake). Be sure the allergy to eggs is accurate information and not just personal food dislike/preference.
     - People with moderate or severe illness with a fever should delay getting vaccinated until the fever is gone.
     - People who have received another type of vaccine in the past 14 days should consult a health care provider before taking the influenza vaccine.
     - Influenza vaccine is not approved for children less than 6 months of age.
     - People who developed Guillain-Barre ' syndrome (GBS) within 6 weeks of getting an influenza vaccine previously should consult a physician first. (Note: In previous years influenza shots were made with live virus. Influenza shots are now made now made with killed/inactivated, so GBS as a side effect is extremely rare.)

3. **Administer the vaccine properly.**
   - **Examine and prepare the vaccine.** Always double check the vial label to make sure that you have the vaccine you want to administer. Shake the vial and visually inspect it for particulate matter. If you cannot shake the vaccine into a relatively even suspension, do not use it. After wiping the rubber stopper with an alcohol swab, load the syringe by injecting air into the vial, the same volume of air as the dose of vaccine to be drawn. **Prefilled syringes** should be shaken well before administration.

Inactivated influenza vaccine should never be frozen.

   - **Site and route of administration:** Inactivated influenza vaccines are administered intramuscularly (IM). IM injections should be injected directly into the deltoid muscle, below the shoulder on the upper arm.

- **Proper needle gauge and length:** The proper needle length for IM injections is a 1"-2" 22-25 gauge needle.
- **Proper documentation of influenza vaccination:** It is important to keep organized and accurate records. (For employee and volunteer vaccination, see Section 3, and for patients see Section 7).

4. **Safely dispose of the needle and syringe.** Use a safety needle product and activate the safety mechanism before discarding syringe with needle into the sharps container. If a nonsafety needle must be used, do ***not*** recap the needle after use. Discard the uncapped used needle into a sharps container keeping your eyes on the needle continuously until it is inside the container.

5. **Prepare and watch for an allergic reaction (anaphylaxis).** Acute anaphylactic reactions are very rare, occurring after approximately 1 out of every 500,000 doses of vaccine. When they occur, however, you must take immediate action. No vaccine should ever be administered unless epinephrine, diphenhydramine, adult airways, and blood pressure cuffs are on hand. Employees and volunteers should be familiar with an anaphylaxis protocol and with cardiopulmonary resuscitation (CPR).
   After you have administered a vaccine to the vaccine recipient, instruct the recipient to report any itching, redness (with or without hives), difficulty breathing, or abdominal pain within several minutes of injection. Having the vaccine recipient wait 20 minutes in a postinjection area is suggested but is not officially recommended.

Content adapted from (1) "Adults Only Vaccination: A Step-By-Step Guide," Immunization Action Coalition (IAC), 2004, and from "Influenza Virus Vaccine: Fluzone® (Aventis Pasteur Inc.) (2) Influenza Virus Vaccine: Fluarix® (GlaxoSmithKline Vaccines) (3) Prevention and Control of Influenza: Recommendations of the Advisory Committee on Immunization Practices (ACIP), MMWR, June 28, 2006. Vol. 55. Available at http://www.cdc.gov/mmwr/preview/mmwrhtml/rr55e628a1.htm

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Live Attenuated Influenza Vaccine Administration

1. **Provide the vaccine recipient with the CDC Vaccine Information Statement (VIS).** The patient must be given a copy of the vaccine's VIS prior to vaccine administration. This must be a copy that the patient can read and take home. Copies of CDC influenza VIS are included in this toolkit. Other educational material can be provided as well.

2. **Ensure vaccine recipient meets criteria to receive LAIV.** (See the CDC Vaccine Information Sheet or Section 2). LAIV vaccine comes from the manufacturer in a frozen state and is thawed before use. Do not refreeze once thawed.

3. **Administer vaccine intranasally only, one dose of 0.5 ml per season for adults**. Have recipient hold individual sprayer in palm of hand until thawed. Administer immediately. While the recipient is in upright position, spray first nostril. Remove the dose divider clip from sprayer and administer vaccine to second nostril. If sneezing occurs, do not repeat dose. If nasal congestion that impedes delivery of vaccine is present, defer administration of vaccine until resolution of illness.

4. **Disposal of sprayer.** Once LAIV has been administered, the sprayer should be disposed of according to the standard procedures for medical waste.

5. **Vaccine reaction:** As with any vaccine, post vaccination reactions can occur. Follow institution protocol for management of allergic reaction.

Note the live attenuated influenza vaccine (LAIV) should only be given to a healthy, non pregnant population within a specific age group (5-49 years of age). It can be given to VHA employees and volunteers.

Content for Live Attenuated Influenza Vaccine (LAIV) information obtained from MMWR, Influenza Vaccination of Health-Care Personnel; Recommendations of the Healthcare Infection Control Practices Advisory Committee (HICPAC) and the Advisory Committee on Immunization Practices (ACIP); Feb 24, 2006/Vol.55/No. RR-2 and Package Insert (Circular); Influenza virus Vaccine Live, Intranasal FluMist®, 2005-2006 formula

Related Resources

Instruction sheets on vaccine administration are also available from the Immunization Action Coalition (IAC):

1. "How to administer IM and SC injections to adults," available at: http://www.immunize.org/catg.d/p2020A.pdf
2. "Administering vaccines to adults: Dose, route, site, needle size, and preparation," available at: http://www.immunize.org/catg.d/p3084.pdf
3. Instructions for administration of LAIV http://www.flumist.com/professional/admin/admin.asp

For a detailed explanation and demonstration of immunization techniques, the 35-minute video "Immunization Techniques: Safe, Effective, Caring," can be ordered through the IAC at http://www.immunize.org, click the link for Video: IZ Techniques.

Appendix B
Prevention and Control of Influenza: Recommendations of the Advisory Committee on Immunization Practices (ACIP). June 28, 2006/55/Early Release

For published updates during the influenza season visit: http://www.cdc.gov/mmwr/

Infection: Don't Pass It On

MMWR™

Morbidity and Mortality Weekly Report

Early Release June 28, 2006 / Vol. 55

Prevention and Control of Influenza

Recommendations of the Advisory Committee on Immunization Practices (ACIP)

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

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Prevention and Control of Influenza

Recommendations of the Advisory Committee on Immunization Practices (ACIP)

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Summary

This report updates the 2005 recommendations by the Advisory Committee on Immunization Practices (ACIP) regarding the use of influenza vaccine and antiviral agents (CDC. Prevention and control of influenza: recommendations of the Advisory Committee on Immunization Practices [ACIP]. MMWR 2005;54[No. RR-8]:1–44). *The 2006 recommendations include new and updated information. Principal changes include 1) recommending vaccination of children aged 24–59 months and their household contacts and out-of-home caregivers against influenza; 2) highlighting the importance of administering 2 doses of influenza vaccine for children aged 6 months–<9 years who were previously unvaccinated; 3) advising health-care providers, those planning organized campaigns, and state and local public health agencies to a) develop plans for expanding outreach and infrastructure to vaccinate more persons than the previous year and b) develop contingency plans for the timing and prioritization of administering influenza vaccine, if the supply of vaccine is delayed and/or reduced; 4) reminding providers that they should routinely offer influenza vaccine to patients throughout the influenza season; 5) recommending that neither amantadine nor rimantadine be used for the treatment or chemoprophylaxis of influenza A in the United States until evidence of susceptibility to these antiviral medications has been re-established among circulating influenza A viruses; and 6) using the 2006–07 trivalent influenza vaccine virus strains: A/New Caledonia/20/1999 (H1N1)-like, A/Wisconsin/67/2005 (H3N2)-like, and B/Malaysia/2506/2004-like antigens. For the A/Wisconsin/67/2005 (H3N2)-like antigen, manufacturers may use the antigenically equivalent A/Hiroshima/52/2005 virus; for the B/Malaysia/2506/2004-like antigen, manufacturers may use the antigenically equivalent B/Ohio/1/2005 virus. A link to this report and other information can be accessed at http://www.cdc.gov/flu.*

Introduction

In the United States, epidemics of influenza typically occur during the winter months and have been associated with an average of approximately 36,000 deaths per year in the United States during 1990–1999 (*1*). Influenza viruses cause disease among all age groups (*2–4*). Rates of infection are highest among children, but 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 (*2,5–7*).

The material in this report originated in the National Center for Immunization and Respiratory Diseases (proposed), Anne Schuchat, MD, Director; Influenza Division (proposed), Nancy Cox, PhD, (Acting) Director; and Immunization Services Division, Lance Rodewald, Director.
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Influenza vaccination is the primary method for preventing influenza and its severe complications. As indicated in this report from the Advisory Committee on Immunization Practices (ACIP), annual influenza vaccination is now recommended for the following groups (Box):

- persons at high risk for influenza-related complications and severe disease, including
  - — children aged 6–59 months,
  - — pregnant women,
  - — persons aged ≥50 years,
  - — persons of any age with certain chronic medical conditions; and
- persons who live with or care for persons at high risk, including
  - — household contacts who have frequent contact with persons at high risk and who can transmit influenza to those persons at high risk and
  - — health-care workers.

BOX. Persons for whom annual vaccination is recommended

- Children aged 6–59 months;
- Women who will be pregnant during the influenza season;
- Persons aged ≥50 years;
- Children and adolescents (aged 6 months–18 years) who are receiving long-term aspirin therapy and, therefore, might be at risk for experiencing Reye syndrome after influenza infection;
- Adults and children who have chronic disorders of the pulmonary or cardiovascular systems, including asthma (hypertension is not considered a high-risk condition);
- Adults and children who have required regular medical follow-up or hospitalization during the preceding year because of chronic metabolic diseases (including diabetes mellitus), renal dysfunction, hemoglobinopathies, or immunodeficiency (including immunodeficiency caused by medications or by human immunodeficiency virus);
- Adults and children who have any condition (e.g., cognitive dysfunction, spinal cord injuries, seizure disorders, or other neuromuscular disorders) that can compromise respiratory function or the handling of respiratory secretions, or that can increase the risk for aspiration;
- Residents of nursing homes and other chronic-care facilities that house persons of any age who have chronic medical conditions;
- Persons who live with or care for persons at high risk for influenza-related complications, including healthy household contacts and caregivers of children aged 0–59 months; and
- Health-care workers.

Vaccination might prevent hospitalization and death among persons at high risk and might also reduce influenza-related respiratory illnesses and physician visits among all age groups, prevent otitis media among children, and decrease work absenteeism among adults (*8–18*). Although influenza vaccination levels increased substantially during the 1990s, further improvements in vaccination coverage levels are needed, especially among persons aged <65 years with known risk factors for influenza complications; among blacks and Hispanics aged ≥65 years; among children aged 6–23 months; and among health-care workers. ACIP recommends using strategies to improve vaccination levels, including using reminder/recall systems and standing orders programs (*19–22*). Although influenza vaccination remains the cornerstone for the control of influenza, information on antiviral medications also is presented in this report because these agents are an important adjunct to vaccine.

Primary Changes and Updates in the Recommendations

The 2006 recommendations include six principal changes or updates:

- ACIP recommends that healthy children aged 24–59 months and their household contacts and out-of-home caregivers be vaccinated against influenza (see Target Groups for Vaccination). This change extends the recommendations for vaccination of children so that all children aged 6–≤59 months receive annual vaccination.
- ACIP emphasizes that all children aged 6 months–<9 years who have not been previously vaccinated at any time with either live, attenuated influenza vaccine (LAIV) or trivalent inactivated influenza vaccine (TIV) should receive 2 doses of vaccine. Those children aged 6 months–<9 years who receive TIV should have a booster dose of TIV administered ≥1 month after the initial dose, before the onset of influenza season, if possible. Those children aged 5–<9 years who receive LAIV should have a second dose of LAIV 6–10 weeks after the initial dose, before the influenza season, if possible. If a child aged 6 months–<9 years received influenza vaccine for the first time during a previous season but did not receive a second dose of vaccine within the same season, only 1 dose of vaccine should be administered this season (see Efficacy and Effectiveness of Inactivated Influenza Vaccine, Children; TIV Dosage; and LAIV Dosage and Administration).
- To ensure optimal use of available doses of influenza vaccine, projected to be approximately 100 million doses, health-care providers, those planning organized campaigns, and state and local public health agencies should 1) develop plans for expanding outreach and infrastructure to vaccinate more persons than during the previous year and 2) develop contingency plans for the timing and prioritization of administering influenza vaccine, if the supply of vaccine is delayed and/or reduced because of the complexity of the production process (see Influenza Vaccine Supply and Timing of Annual Influenza Vaccination).
- ACIP emphasizes that influenza vaccine should continue to be offered throughout the influenza season even after influenza activity has been documented in a community. In addition, ACIP encourages all community vaccinators and public health agencies to schedule clinics that serve target groups and to help extend the routine vaccination season by offering at least one vaccination clinic in December (see Influenza Vaccine Supply and Timing of Annual Influenza Vaccination).
- ACIP recommends that neither amantadine nor rimantadine be used for the treatment or chemoprophy-

laxis of influenza A in the United States because of recent data indicating widespread resistance of influenza virus to these medications (*23,24*). Until susceptibility to adamantanes has been re-established among circulating influenza A viruses, oseltamivir or zanamivir may be prescribed if antiviral treatment or chemoprophylaxis of influenza is indicated (see Recommendations for Using Antiviral Agents for Influenza).

- The 2006–07 trivalent vaccine virus strains are A/New Caledonia/20/1999 (H1N1)-like, A/Wisconsin/67/2005 (H3N2)-like, and B/Malaysia/2506/2004-like antigens. For the A/Wisconsin/67/2005 (H3N2)-like antigen, manufacturers may use the antigenically equivalent A/Hiroshima/52/2005 virus; for the B/Malaysia/2506/2004-like antigen, manufacturers may use the antigenically equivalent B/Ohio/1/2005 virus (see Influenza Vaccine Composition).

Influenza and Its Burden

Biology of Influenza

Influenza A and B are the two types of influenza viruses that cause epidemic human disease (*25*). Influenza A viruses are further categorized into subtypes on the basis of two surface antigens: hemagglutinin and neuraminidase. Influenza B viruses are not categorized into subtypes. Since 1977, influenza A (H1N1) viruses, influenza A (H3N2) viruses, and influenza B viruses have circulated globally. In 2001, influenza A (H1N2) viruses that probably emerged after genetic reassortment between human A (H1N1) and A (H3N2) viruses began circulating widely. Both influenza A and B viruses are further separated into groups on the basis of antigenic characteristics. New influenza virus variants result from frequent antigenic change (i.e., antigenic drift) resulting from point mutations that occur during viral replication. Influenza B viruses undergo antigenic drift less rapidly than influenza A viruses.

Immunity to the surface antigens, particularly the hemagglutinin, reduces the likelihood of infection and severity of disease if infection occurs (*26*). Antibody against one influenza virus type or subtype confers limited or no protection against another type or subtype of influenza. Furthermore, antibody to one antigenic variant of influenza virus might not completely protect against a new antigenic variant of the same type or subtype (*27*). Frequent development of antigenic variants through antigenic drift is the virologic basis for seasonal epidemics and the reason for the usual incorporation of one or more new strains in each year's influenza vaccine. More dramatic antigenic changes, or shifts, occur less frequently and can result in the emergence of a novel influenza virus with the potential to cause a pandemic.

Clinical Signs and Symptoms of Influenza

Influenza viruses are spread from person to person, primarily through respiratory droplet transmission (e.g., when an infected person coughs or sneezes in close proximity to an uninfected person) (*25*). The typical incubation period for influenza is 1–4 days, with an average of 2 days (*28*). Adults can be infectious from the day before symptoms begin through approximately 5 days after illness onset. Children can be infectious for ≥10 days after the onset of symptoms, and young children also can shed virus before their illness onset. Severely immunocompromised persons can shed virus for weeks or months (*29–32*).

Uncomplicated influenza illness is characterized by the abrupt onset of constitutional and respiratory signs and symptoms (e.g., fever, myalgia, headache, malaise, nonproductive cough, sore throat, and rhinitis) (*33*). Among children, otitis media, nausea, and vomiting also are commonly reported with influenza illness (*34–36*). Uncomplicated influenza illness typically resolves after 3–7 days for the majority of persons, although cough and malaise can persist for >2 weeks. However, among certain persons, influenza can exacerbate underlying medical conditions (e.g., pulmonary or cardiac disease), lead to secondary bacterial pneumonia or primary influenza viral pneumonia, or occur as part of a coinfection with other viral or bacterial pathogens (*37*). Young children with influenza virus infection can have initial symptoms mimicking bacterial sepsis with high fevers (*37,38*), and febrile seizures have been reported in up to 20% of children hospitalized with influenza virus infection (*35,39*). Influenza virus infection also has been uncommonly associated with encephalopathy, transverse myelitis, myositis, myocarditis, pericarditis, and Reye syndrome (*35,37,40,41*).

Respiratory illnesses caused by influenza viruses are difficult to distinguish from illnesses caused by other respiratory pathogens on the basis of signs and symptoms alone (see Role of Laboratory Diagnosis). Reported sensitivities and specificities of clinical definitions of influenza infection that include fever and cough in studies primarily among adults have ranged from 63% to 78% and 55% to 71%, respectively, compared with viral culture (*42,43*). Sensitivity and predictive value of clinical definitions can vary, depending on the degree of co-circulation of other respiratory pathogens and the level of influenza activity (*44*). A study of older nonhospitalized patients determined that the presence of fever, cough, and acute onset had a positive predictive value of only 30% for influenza (*45*), whereas a study of hospitalized older patients with chronic cardiopulmonary disease deter-

mined that a combination of fever, cough, and illness of <7 days was 78% sensitive and 73% specific for influenza (*46*). A study of vaccinated older persons with chronic lung disease indicated that cough was not predictive of influenza virus infection, although having a fever or feverishness was 68% sensitive and 54% specific for influenza virus infection (*47*). These results highlight the challenges of identifying influenza illness in the absence of laboratory confirmation.

Hospitalizations and Deaths from Influenza

The risks for complications, hospitalizations, and deaths from influenza are higher among persons aged ≥65 years, young children, and persons of any age with certain underlying health conditions (see Persons at Increased Risk for Complications) than among healthy older children and younger adults (*1,6,8,48–56*). Estimated rates of influenza-associated hospitalizations have varied substantially by age group in studies conducted during different influenza epidemics (Table 1).

Among children aged <5 years, hospitalization rates have ranged from approximately 500/100,000 children for those with high-risk medical conditions to 100/100,000 children for those without high-risk medical conditions (*57–60*). Hospitalization rates among children aged <24 months are comparable to rates reported among persons aged ≥65 years (*59,60*) (Table 1).

During seasonal influenza epidemics from 1979–80 through 2000–01, the estimated overall number of influenza-associated hospitalizations in the United States ranged from approximately 54,000 to 430,000/epidemic. An average of approximately 226,000 influenza-related excess hospitalizations occurred per year, and 63% of all hospitalizations occurred among persons aged ≥65 years (*61*). Since the 1968 influenza A (H3N2) virus pandemic, the number of influenza-associated hospitalizations is generally greater during seasonal influenza epidemics caused by type A (H3N2) viruses than seasons in which other influenza virus types predominate (*62*).

Influenza-related deaths can result from pneumonia and from exacerbations of cardiopulmonary conditions and other chronic diseases. Deaths of adults aged ≥65 years account for ≥90% of deaths attributed to pneumonia and influenza (*1,54*). In one study, approximately 19,000 influenza-associated pulmonary and circulatory deaths per influenza season occurred during 1976–1990, compared with approximately 36,000 deaths during 1990–1999 (*1*). Estimated rates of influenza-associated pulmonary and circulatory deaths/100,000 persons were 0.4–0.6 among persons aged 0–49 years, 7.5 among persons aged 50–64 years, and 98.3 among persons aged ≥65 years. In the United States, the number of influenza-associated deaths has increased in part because the number of older persons is increasing, particularly persons aged ≥85 years (*63*). In addition, influenza seasons in which influenza A (H3N2) viruses predominate are associated with higher mortality (*64*); influenza A (H3N2) viruses predominated in 90% of influenza seasons during 1990–1999, compared with 57% of influenza seasons during 1976–1990 (*1*).

Deaths from influenza are uncommon among children both with and without high-risk conditions, but do occur (*65,66*). A study that modeled influenza-related deaths estimated that an average of 92 deaths (0.4 deaths per 100,000) occurred among children aged <5 years annually during the 1990s, compared with 32,651 deaths (98.3 per 100,000) among adults aged ≥65 years (*1*). Of 153 laboratory-confirmed influenza-related pediatric deaths reported from 40 states during the 2003–04 influenza season, 96 (63%) were among children aged <5 years. Sixty-four (70%) of the 92 children aged 2–17 years with influenza who died had no underlying medical condition previously associated with an increased risk for influenza-related complications (*67*).

Options for Controlling Influenza

In the United States, the primary option for reducing the effect of influenza is through annual vaccination. Inactivated (i.e., killed virus) influenza vaccines and LAIV are licensed and available for use in the United States (see Recommendations for Using Inactivated and Live, Attenuated Influenza Vaccines). Vaccination coverage can be increased by administering vaccine to persons during hospitalizations or routine health-care visits, as well as at pharmacies, grocery stores, workplaces, or other locations in the community before the influenza season, therefore making special visits to physicians' offices or clinics unnecessary. 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 (*13*), especially when vaccine and circulating strains are well-matched. Vaccination of health-care workers and other persons in close contact with persons at increased risk for severe influenza illness also can reduce transmission of influenza and subsequent influenza-related complications. Antiviral drugs used for chemoprophylaxis or treatment of influenza are adjuncts to vaccine (see Recommendations for Using Antiviral Agents for Influenza) but are not substitutes for annual vaccination.

Influenza Vaccine Composition

Both the inactivated and live, attenuated vaccines prepared for the 2006–07 season will include A/New Caledonia/20/1999 (H1N1)-like, A/Wisconsin/67/2005 (H3N2)-like, and B/Malaysia/2506/2004-like antigens (for the A/Wisconsin/67/2005 [H3N2]-like antigen, manufacturers may use the

TABLE 1. Estimated rates of influenza-associated hospitalization, by age group and risk group for selected studies* — United States

Study years	Population	Age group	Hospitalizations/ 100,000 persons with high-risk conditions	Hospitalizations/ 100,000 persons without high-risk conditions
1973–1993†§¶	Tennessee Medicaid	0–11 mos	1,900	496–1,038**
		1–2 yrs	800	186
		3–4 yrs	320	86
		5–14 yrs	92	41
1992–1997††§§	Two health maintenance organizations	0–23 mos		144–187
		2–4 yrs		0–25
		5–17 yrs		8–12
1968–1969	Health maintenance organization	15–44 yrs	56–110	23–25
1970–1971		45–64 yrs	392–635	13–23
1972–1973¶¶***		≥65 yrs	399–518	—
1969–1995***†††	National Hospital Discharge Data	<65 yrs	—	20–42§§§¶¶¶
1969–1995***†††		≥65 yrs	—	125–228¶¶¶
1979–2001****††††	National Hospital Discharge Data	All ages	—	88§§§§

* Rates were estimated in years and populations with low vaccination levels. Hospitalization rates can be expected to decrease as vaccination levels increase. Vaccination can be expected to reduce influenza-related hospitalizations by 30%–70% among older persons and likely by even higher percentages among younger age groups when vaccine and circulating influenza virus strains are antigenically similar.

† **Source:** Neuzil KM, Mellen BG, Wright PF, Mitchel EF, Griffin MR. Effect of influenza on hospitalizations, outpatient visits, and courses of antibiotics in children. N Engl J Med 2000;342:225–31.

§ Outcomes were for acute cardiac or pulmonary conditions.

¶ **Source:** Neuzil KM, Wright PF, Mitchel EF, Griffin MR. Burden of influenza illness in children with asthma and other chronic medical conditions. J Pediatr 2000;137:856–64.

** The low estimate is for infants aged 6–11 months, and the high estimate is for infants aged 0–5 months.

†† **Source:** Izurieta HA, Thompson WW, Kramarz P, et al. Influenza and the rates of hospitalization for respiratory disease among infants and young children. N Engl J Med 2000;342:232–9.

§§ Outcomes were for acute pulmonary conditions. Influenza-attributable hospitalization rates for children at high risk were not included in this study.

¶¶ **Source:** Barker WH, Mullooly JP. Impact of epidemic type A influenza in a defined adult population. Am J Epidemiol 1980;112:798–811.

*** Outcomes were limited to hospitalizations in which either pneumonia or influenza was listed as the first condition on discharge records (Simonsen) or included anywhere in the list of discharge diagnoses (Barker).

††† **Source:** Simonsen L, Fukuda K, Schonberger LB, Cox NJ. Impact of influenza epidemics on hospitalizations. J Infect Dis 2000;181:831–7.

§§§ Persons at high risk and not at high risk for influenza-related complications are combined.

¶¶¶ The low estimate is the average during influenza A (H1N1) or influenza B-predominant seasons, and the high estimate is the average during influenza A (H3N2)-predominant seasons.

**** Outcomes were for rate of primary respiratory and circulatory hospitalizations.

†††† **Source:** Thompson WW, Shay DK, Weintraub E, et al. Influenza-associated hospitalizations in the United States. JAMA 2004;292:1333–40.

§§§§ Rate for all ages of persons, both with and without high-risk conditions.

antigenically equivalent A/Hiroshima/52/2005 virus, and for the B/Malaysia/2506/2004-like antigen, manufacturers may use the antigenically equivalent B/Ohio/1/2005 virus). These viruses will be used because they are representative of influenza viruses that are anticipated to circulate in the United States during the 2006–07 influenza season and have favorable growth properties in eggs. Because circulating influenza A (H1N2) viruses are reassortants of influenza A (H1N1) and A (H3N2) viruses, antibodies directed against influenza A (H1N1) and influenza (H3N2) vaccine strains should provide protection against the circulating influenza A (H1N2) viruses. Influenza viruses for both TIV and LAIV are initially grown in embryonated hens eggs, and, therefore, might contain limited amounts of residual egg protein. Therefore, persons with a history of severe hypersensitivity, such as anaphylaxis, to eggs should not receive influenza vaccine.

For the inactivated vaccines, the vaccine viruses are made noninfectious (i.e., inactivated or killed) (*68*). Only subvirion and purified surface antigen preparations of the inactivated vaccine are available. Manufacturing processes vary by manufacturer. Manufacturers might use different compounds to inactivate influenza viruses and add antibiotics to prevent bacterial contamination. Package inserts should be consulted for additional information.

Comparison of LAIV with Inactivated Influenza Vaccine

Both inactivated influenza vaccine and LAIV are available. Although both types of vaccines are effective, the vaccines differ in several aspects (Table 2).

Major Similarities

Both LAIV and inactivated influenza vaccines contain strains of influenza viruses that are antigenically equivalent to the annually recommended strains: one influenza A (H3N2) virus, one A (H1N1) virus, and one B virus. Each year, one or more virus strains might be changed on the basis of global surveillance for influenza viruses and the emergence and spread of new strains. Viruses for both vaccines are grown in eggs. Both vaccines are administered annually to provide optimal protection against influenza virus infection (Table 2).

Major Differences

Inactivated influenza vaccine contains killed viruses, and thus cannot produce signs or symptoms of influenza virus infection. In contrast, LAIV contains live, attenuated viruses and, therefore, has a potential to produce mild signs or symptoms related to influenza virus infection. LAIV is administered intranasally by sprayer, whereas inactivated influenza vaccine is administered intramuscularly by injection. LAIV is more expensive than inactivated influenza vaccine, although the price differential between inactivated vaccine and LAIV has decreased for the 2006–07 season. LAIV is approved only for use among healthy persons aged 5–49 years; inactivated influenza vaccine is approved for use among persons aged ≥6 months, including those who are healthy and those with chronic medical conditions (Table 2).

Efficacy and Effectiveness of Inactivated Influenza Vaccine

The effectiveness of inactivated influenza vaccine depends primarily on the age and immunocompetence of the vaccine recipient, the degree of similarity between the viruses in the vaccine and those in circulation, and the outcome being measured. Vaccine efficacy and effectiveness studies might have various endpoints, including the prevention of medically attended acute respiratory illness (MAARI), prevention of culture-positive influenza virus illness, prevention of influenza or pneumonia-associated hospitalizations or deaths, seroconversion to vaccine serotypes, or prevention of seroconversion to circulating influenza virus subtypes. High

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

Factor	LAIV	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)	3 (2 influenza A, 1 influenza B)
Vaccine virus strains updated	Annually	Annually
Frequency of administration	Annually	Annually
Approved age and risk groups*	Healthy persons aged 5–49 yrs	Persons aged ≥6 mos
Interval between two doses recommended for children aged 6 mos–<9 yrs who are receiving influenza vaccine for the first time	6–10 wks	4 weeks
Can be administered to family members or close contacts of immunocompromised persons not requiring a protected environment	Yes	Yes
Can be administered to family members or close contacts of immunocompromised persons requiring a protected environment (e.g., hematopoietic stem cell transplant recipient)	Inactivated influenza vaccine preferred	Yes
Can be administered to family members or close contacts of persons at high risk but not severely immunocompromised	Yes	Yes
Can be simultaneously administered with other vaccines	Yes†	Yes§
If not simultaneously administered, can be administered within 4 wks of another live vaccine	Prudent to space 4 wks apart	Yes
If not simultaneously administered, can be administered within 4 wks of an inactivated vaccine	Yes	Yes

* Populations at high risk for 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 immunnosuppression; children and adolescents receiving long-term aspirin therapy (at risk for Reye syndrome after wild-type influenza infection); pregnant women; and children aged 6–59 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.

postvaccination hemagglutination inhibition antibody titers develop in the majority of vaccinated children and young adults (*69–71*). These antibodies are protective against illness caused by strains that are antigenically similar to those strains of the same type or subtype included in the vaccine (*70–73*).

Children. Children aged ≥6 months usually acquire protective levels of anti-influenza antibody against specific influenza virus strains after influenza vaccination (*69,70,74–79*), although the antibody response among children at high risk for influenza-related complications might be lower than among healthy children (*80,81*). A 2-year randomized study of children aged 6–24 months determined that 89% of children seroconverted to all three vaccine strains during both years (*82*). During year 1, among 411 children, vaccine efficacy was 66% (95% confidence interval [CI] = 34%–82%) against culture-confirmed influenza (attack rates: 5.5% and 15.9% among vaccine and placebo groups, respectively). During year 2, among 375 children, vaccine efficacy was -7% (CI = -247%–67%; attack rates: 3.6% and 3.3% among vaccine and placebo groups, respectively); the second year exhibited lower attack rates overall and was considered a mild season. In both years of this study, the vaccine strains were well-matched to the circulating influenza virus strains.

A randomized study among children aged 1–15 years also demonstrated that inactivated influenza vaccine was 77% and 91% effective against influenza respiratory illness during H3N2 and H1N1 years, respectively (*71*). One study documented a vaccine efficacy of 56% against influenza illness among healthy children aged 3–9 years (*83*), and another study determined vaccine efficacy against influenza type B infection and influenza type A infection of 22%–54% and 60%–78% among children with asthma aged 2–6 years and 7–14 years, respectively (*84*). Two studies have documented that TIV vaccine decreases the incidence of influenza-associated otitis media among young children by approximately 30% (*16,17*), whereas a third study determined that vaccination did not reduce the burden of acute otitis media (*82*).

Effectiveness of One Dose versus Two Doses of Influenza Vaccine Among Previously Unvaccinated Children Aged <9 Years. Vaccine effectiveness is lower among previously unvaccinated children aged <9 years if they have only received 1 dose of influenza vaccine, compared with children who have received 2 doses. A retrospective study among approximately 5,000 children aged 6–23 months conducted during a year with a suboptimal vaccine match indicated vaccine effectiveness of 49% against medically attended, clinically diagnosed pneumonia or influenza among children who had received 2 doses of influenza vaccine. No effectiveness was demonstrated among children who had received only 1 dose of influenza vaccine, illustrating the importance of administering 2 doses of vaccine to previously unvaccinated children aged <9 years (*85*). Similar results were observed in a case-control study of children aged 6–59 months with laboratory-confirmed influenza (*86*). A study assessing protective antibody responses after 1 and 2 doses of vaccine among vaccine-naive children aged 5–8 years also demonstrated the importance of compliance with the 2-dose recommendation (*87*). When the vaccine antigens do *not* change from one season to the next, priming with a single dose of vaccine in the spring, followed by a dose in the fall might result in similar antibody responses to a 2-dose regimen in the fall (*88,89*).

Adults Aged <65 Years. When the vaccine and circulating viruses are antigenically similar, influenza vaccine typically prevents influenza illness among approximately 70%–90% of healthy adults aged <65 years (*9,12,90,91*). Vaccination of healthy adults also has resulted in decreased work absenteeism and decreased use of health-care resources, including use of antibiotics, when the vaccine and circulating viruses are well-matched (*9–12,91,92*). In a case-control study of adults aged 50–64 years with laboratory-confirmed influenza during the 2003–04 season when the vaccine and circulating viruses were not well-matched, vaccine effectiveness was estimated to be 52% among healthy persons and 38% among those with one or more high-risk conditions (*93*).

Adults Aged ≥65 Years. An important benefit of the influenza vaccine is its ability to help prevent secondary complications and reduce 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) (*13–15,18,94,95*). Older persons and persons with certain chronic diseases might have lower postvaccination antibody titers than healthy young adults and can remain susceptible to influenza virus infection and influenza-related upper respiratory tract illness (*96–98*). A randomized trial among noninstitutionalized persons aged ≥60 years reported a vaccine efficacy of 58% against influenza respiratory illness but indicated that efficacy might be lower among those aged ≥70 years (*99*). However, among older persons not living in nursing homes or similar chronic-care facilities, influenza vaccine is 30%–70% effective in preventing hospitalization for pneumonia and influenza (*15,100*). Among older persons who reside in nursing homes, influenza vaccine is most effective in preventing severe illness, secondary complications, and deaths. In this population, the vaccine can be 50%–60% effective in preventing influenza-related hospitalization or pneumonia and 80% effective in preventing influenza-related death, although the effectiveness in preventing influenza illness often ranges from 30% to 40% (*101–103*).

Efficacy and Effectiveness of LAIV

The immunogenicity of the approved LAIV has been assessed in multiple studies (*104–110*), which included approximately 100 children aged 5–17 years and approximately 300 adults aged 18–49 years. 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.

Healthy Children. A randomized, double-blind, placebo-controlled trial among 1,602 healthy children initially aged 15–71 months assessed the efficacy of trivalent LAIV against culture-confirmed influenza during two seasons (*111,112*). This trial included subsets of 238 healthy children (163 vaccinees and 75 placebo recipients) aged 60–71 months who received 2 doses and 74 children (54 vaccinees and 20 placebo recipients) aged 60–71 months who received a single dose during season one, and a subset of 544 children (375 vaccinees and 169 placebo recipients) aged 60–84 months during season two. Children who continued in the study remained in the same study group. In season one, when vaccine and circulating virus strains were well-matched, efficacy was 93% for participants who received 2 doses of LAIV. In season two, when the A (H3N2) component was not well-matched between vaccine and circulating virus strains, efficacy was 86% overall. The vaccine was 92% efficacious in preventing culture-confirmed influenza during the two-season study. Other results included a 27% reduction in febrile otitis media and a 28% reduction in otitis media with concomitant antibiotic use. Receipt of LAIV also resulted in 21% fewer febrile illnesses. A review of LAIV effectiveness in children aged 18 months–18 years found effectiveness against MAARI of 18% but greater estimated efficacy levels: 92% against influenza A (H1N1) and 66% against an influenza B drift variant (*113*).

Healthy Adults. A randomized, double-blind, placebo-controlled trial among 4,561 healthy working adults aged 18–64 years assessed multiple endpoints, including reductions in self-reported respiratory tract illness without laboratory confirmation, absenteeism, health-care visits, and medication use during peak and total influenza outbreak periods (*114*). The study was conducted during the 1997–98 influenza season, when the vaccine and circulating A (H3N2) strains were not well-matched. During peak outbreak periods, no difference in febrile illnesses between LAIV and placebo recipients was observed. However, vaccination was associated with reductions in severe febrile illnesses of 19% and febrile upper respiratory tract illnesses of 24%. Vaccination also was associated with fewer days of illness, fewer days of work lost, fewer days with health-care–provider visits, and reduced use of prescription antibiotics and over-the-counter medications. Among a subset of 3,637 healthy adults aged 18–49 years, LAIV recipients (n = 2,411) had 26% fewer febrile upper-respiratory illness episodes; 27% fewer lost work days as a result of febrile upper respiratory illness; and 18%–37% fewer days of health-care–provider visits caused by febrile illness, compared with placebo recipients (n = 1,226). Days of antibiotic use were reduced by 41%–45% in this age subset.

A randomized, double-blind, placebo-controlled challenge study among 92 healthy adults (LAIV, n = 29; placebo, n = 31; inactivated influenza vaccine, n = 32) aged 18–41 years assessed the efficacy of both LAIV and inactivated vaccine (*115*). The overall efficacy of LAIV and inactivated influenza vaccine in preventing laboratory-documented influenza from all three influenza strains combined was 85% and 71%, respectively, on the basis of experimental challenge by viruses to which study participants were susceptible before vaccination. The difference in efficacy between the two vaccines was not statistically significant.

Cost-Effectiveness of Influenza Vaccine

Influenza vaccination can reduce both health-care costs and productivity losses associated with influenza illness. Studies of influenza vaccination of persons aged ≥65 years conducted in the United States have reported substantial reductions in hospitalizations and deaths and overall societal costs savings (*15,100,104*). Studies of adults aged <65 years have indicated that vaccination can reduce both direct medical costs and indirect costs from work absenteeism (*8,10–12,91,116*). Reductions of 13%–44% in health-care–provider visits, 18%–45% in lost workdays, 18%–28% in days working with reduced effectiveness, and 25% in antibiotic use for influenza-associated illnesses have been reported (*10,12,117,118*). One cost-effectiveness analysis estimated a cost of approximately $60–$4,000/illness averted among healthy persons aged 18–64 years, depending on the cost of vaccination, the influenza attack rate, and vaccine effectiveness against influenza-like illness (ILI) (*91*). Another cost-benefit economic study estimated an average annual savings of $13.66/person vaccinated (*119*). In the second study, 78% of all costs prevented were costs from lost work productivity, whereas the first study did not include productivity losses from influenza illness.

Economic studies specifically evaluating the cost-effectiveness of vaccinating persons aged 50–64 years are not available, and the number of studies that examine the economics of routinely vaccinating children with TIV or LAIV are limited (*8,120–123*). However, in a study of inactivated vaccine that included all age groups, cost utility (i.e., cost per

year of healthy life gained) improved with increasing age and among those with chronic medical conditions (*8*). Among persons aged ≥65 years, vaccination resulted in a net savings per quality-adjusted life year (QALY) gained, whereas among younger age groups, vaccination resulted in costs of $23–$256/QALY.

In addition to estimating the economic cost associated with influenza disease, studies have assessed the public's perception of preventing influenza morbidity. Less than half of respondents to a survey on public perception of the value of preventing influenza morbidity reported that they would trade any time from their own life to prevent a case of uncomplicated influenza in a hypothetical child (*124*). When asked about their willingness to pay to prevent a hypothetical child from having an uncomplicated case of influenza, the median willingness-to-pay amount was $100 for a child aged 14 years and $175 for a child aged 1 year (*124*).

Vaccination Coverage Levels

One of the national health objectives for 2010 is to achieve an influenza vaccination coverage level of 90% for persons aged ≥65 years (objective no. 14-29a) (*125*). Among persons aged ≥65 years, influenza vaccination levels increased from 33% in 1989 (*126*) to 66% in 1999 (*127*), surpassing the *Healthy People 2000* objective of 60% (*128*). Vaccination coverage in this group reached the highest levels recorded (68%) during the 1999–00 influenza season. This estimate was made using the percentage of adults reporting influenza vaccination during the previous 12 months in the National Health Interview Survey (NHIS). The NHIS administered during the first and second quarters of each calendar year was used as a proxy measure of influenza vaccination coverage for the previous influenza season (*127*). Possible reasons for increases in influenza vaccination levels among persons aged ≥65 years include 1) greater acceptance of preventive medical services by practitioners; 2) increased delivery and administration of vaccine by health-care providers and sources other than physicians; 3) new information regarding influenza vaccine effectiveness, cost-effectiveness, and safety; and 4) initiation of Medicare reimbursement for influenza vaccination in 1993 (*8,14,15,101,102,129,130*). Since 1997, influenza vaccination levels have increased more slowly, with an average annual percentage increase of 4% from 1988–89 to 1996–97 versus 1% from 1996–97 to 1998–99. In 2000, a substantial delay in influenza vaccine availability and distribution, followed by a less severe delay in 2001 likely contributed to the lack of progress. However, the slowing of the increase in vaccination levels began before 2000 and is not fully understood.

Estimated national influenza vaccine coverage in 2004 among persons aged ≥65 years and 50–64 years was 65% and 36%, respectively, based on 2004 NHIS data (Table 3). The estimated vaccination coverage among adults with high-risk conditions aged 18–49 years and 50–64 years was 26% and 46%, respectively, substantially lower than the *Healthy People 2000* and *2010* objective of 60% (*125,128*). Continued annual monitoring is needed to determine the effects of vaccine supply delays and shortages, changes in influenza vaccination recommendations and target groups for vaccination, reimbursement rates for vaccine and vaccine administration, and other factors related to vaccination coverage among adults and children. New strategies to improve coverage will be needed to achieve the *Healthy People 2010* objective (*21,22*).

Reducing racial and ethnic health disparities, including disparities in vaccination coverage, is an overarching national goal (*125*). Although estimated influenza vaccination coverage for the 1999–00 season reached the highest levels recorded among older black, Hispanic, and white populations, vaccination levels among blacks and Hispanics continue to lag behind those among whites (*127,131*). Estimated vaccination coverage levels based on 2004 NHIS data among persons aged ≥65 years were 67% among non-Hispanic whites, 45% among non-Hispanic blacks, and 55% among Hispanics (CDC, unpublished data, 2006). Among Medicare beneficiaries, unequal access to care might not be the only factor in contributing toward disparity levels in influenza vaccination; other key factors include having patients that actively seek vaccination and providers that recommend vaccination (*132,133*).

In 1997 and 1998, vaccination coverage estimates among nursing home residents were 64%–82% and 83%, respectively (*134,135*). The *Healthy People 2010* goal is to achieve influenza vaccination of 90% among nursing home residents, an increase from the *Healthy People 2000* goal of 80% (*125,128*).

Reported vaccination levels are low among children at increased risk for influenza complications. One study conducted among patients in health maintenance organizations (HMOs) documented influenza vaccination percentages ranging from 9% to 10% among children with asthma (*136*). A 25% vaccination level was reported among children with severe to moderate asthma who attended an allergy and immunology clinic (*137*). However, a study conducted in a pediatric clinic demonstrated an increase in the vaccination percentage of children with asthma or reactive airways disease from 5% to 32% after implementing a reminder/recall system (*138*). One study documented 79% vaccination coverage among children attending a cystic fibrosis treatment center (*139*). According to

TABLE 3. Influenza vaccination coverage levels among adult target* population groups — National Health Interview Survey (NHIS), United States, 2004

Population group	Crude sample size	Weighted sample size	Influenza vaccination level	
			%	(95% CI†)
All aged 18–49 yrs	18,039	130,493,300	17.9	(17.2–18.6)
All aged 50–64 yrs	6,933	47,757,000	35.9	(34.5–37.3)
All aged ≥65 yrs	5,922	34,019,100	64.6	(63.2–66.0)
Persons with high-risk conditions§				
Aged 18–49 yrs	2,555	17,599,700	26.0	(23.9–28.1)
Aged 50–64 yrs	2,104	14,126,700	45.5	(43.0–48.0)
Aged 18–64 yrs	4,659	31,726,500	34.6	(33.0–36.4)
Persons without high-risk conditions§				
Aged 18–49 yrs	15,442	112,574,500	16.6	(15.9–17.3)
Aged 50–64 yrs	4,807	33,498,900	32.1	(30.5–33.7)
Pregnant women¶	263	1,967,400	12.9	(7.9–17.9)
Health-care workers**	2,031	14,376,900	41.9	(39.4–44.4)
Household contacts of persons at high risk, including children aged <2 yrs††				
Aged 18–49 yrs	2,365	19,212,100	15.4	(13.8–17.2)
Aged 50–64 yrs	480	4,202,500	33.2	(28.8–37.8)

* As recommended by the Advisory Committee on Immunization Practices.

† Confidence interval.

§ Persons categorized as being at high risk for influenza-related complications self-reported one or more of the following: 1) ever being told by a physician they had diabetes, emphysema, coronary heart disease, angina, heart attack, or other heart condition; 2) having a diagnosis of cancer during the previous 12 months (excluding nonmelanoma skin cancer) or ever being told by a physician they have lymphoma, leukemia, or blood cancer during the previous 12 months; 3) being told by a physician they have chronic bronchitis or weak or failing kidneys; or 4) reporting an asthma episode or attack during the preceding 12 months.

¶ Aged 18–44 years, pregnant at the time of the survey, and without high-risk conditions.

** Adults were classified as health-care workers if they were currently employed in a health-care occupation or in a health-care–industry setting, on the basis of standard occupation and industry categories recoded in groups by CDC's National Center for Health Statistics.

†† Interviewed adult in each household containing at least one of the following: a child aged <2 years, an adult aged ≥65 years, or any person aged 2–17 years at high risk (see previous § footnote). To obtain information on household composition and high-risk status of household members, the sampled adult, child, and person files from NHIS were merged. Interviewed adults who were health-care workers or who had high-risk conditions were excluded. Information could not be assessed regarding high-risk status of other adults aged 18–64 years in the household, thus, certain adults 18–64 years who live with an adult aged 18–64 years at high risk were not included in the analysis.

2004 National Immunization Survey data, during the second year of the encouragement for vaccination of children aged 6–23 months, 18% received one or more influenza vaccinations and 8.4% received 2 doses if they were previously unvaccinated (*140*). A rapid analysis of influenza vaccination coverage levels among members of an HMO in Northern California determined that in 2004–05, the first year of the recommendation for vaccination of children aged 6–23 months, their coverage level reached 57% (*141*). Data from the Behavioral Risk Factor Surveillance System (BRFSS) collected in February 2005 indicated a national estimate of 48% vaccination coverage for 1 or more doses among children aged 6–23 months and 35% coverage among children aged 2–17 years who had one or more high-risk medical conditions during the 2004–05 season (*142*). Increasing vaccination coverage among persons who have high-risk conditions and are aged <65 years, including children at high risk, is the highest priority for expanding influenza vaccine use. As has been observed for older adults, a physician recommendation for vaccination and the perception that getting a child vaccinated "is a smart idea" were positively associated with likelihood of vaccination of children aged 6–23 months (*143*).

Annual vaccination is recommended for health-care workers. Nonetheless, NHIS 2004 survey data indicated a vaccination coverage level of only 42% among health-care workers (CDC, unpublished data, 2006). Vaccination of health-care workers has been associated with reduced work absenteeism (*9*) and fewer deaths among nursing home patients (*144,145*) and is a high priority for reducing the effect of influenza in health-care settings and for expanding influenza vaccine use (*146,147*).

Limited information is available regarding use of influenza vaccine among pregnant women. Among women aged 18–44 years without diabetes responding to the 2001 BRFSS, those who were pregnant were less likely to report influenza vaccination during the previous 12 months (13.7%) than those women who were not pregnant (16.8%); these differences were statistically significant (*148*). Only 13% of pregnant women reported vaccination according to 2004 NHIS data, excluding pregnant women who reported diabetes, heart disease,

lung disease, and other selected high-risk conditions (CDC, unpublished data, 2006) (Table 3). These data indicate low compliance with the ACIP recommendations for pregnant women. In a study of influenza vaccine acceptance by pregnant women, 71% who were offered the vaccine chose to be vaccinated (*149*). However, a 1999 survey of obstetricians and gynecologists determined that only 39% administered influenza vaccine to obstetric patients, although 86% agreed that pregnant women's risk for influenza-related morbidity and mortality increases during the last two trimesters (*150*).

Data indicate that self-report of influenza vaccination among adults, compared with extraction from the medical record, is both a sensitive and specific source of information (*151*). Patient self-reports should be accepted as evidence of influenza vaccination in clinical practice (*151*). However, information on the validity of parents' reports of pediatric influenza vaccination is not yet available.

Recommendations for Using Inactivated and Live, Attenuated Influenza Vaccines

The inactivated influenza vaccine and LAIV can be used to reduce the risk for influenza virus infection and its complications. TIV is Food and Drug Administration (FDA)-approved for persons aged ≥6 months, including those with high-risk conditions, whereas LAIV is approved only for use among healthy persons aged 5–49 years (see Inactivated Influenza Vaccine Recommendations; and Live, Attenuated Influenza Vaccine Recommendations).

Target Groups for Vaccination

Annual influenza vaccination is recommended for the following groups:

Persons at Increased Risk for Complications

Vaccination with **inactivated influenza vaccine** is recommended for the following persons who are at increased risk for severe complications from influenza:

- children aged 6–23 months;
- children and adolescents (aged 6 months–18 years) who are receiving long-term aspirin therapy and, therefore, might be at risk for experiencing Reye syndrome after influenza virus infection;
- women who will be pregnant during the influenza season;
- adults and children who have chronic disorders of the pulmonary or cardiovascular systems, including asthma (hypertension is not considered a high-risk condition);
- adults and children who have required regular medical follow-up or hospitalization during the preceding year because of chronic metabolic diseases (including diabetes mellitus), renal dysfunction, hemoglobinopathies, or immunodeficiency (including immunodeficiency caused by medications or by human immunodeficiency virus [HIV]);
- adults and children who have any condition (e.g., cognitive dysfunction, spinal cord injuries, seizure disorders, or other neuromuscular disorders) that can compromise respiratory function or the handling of respiratory secretions or that can increase the risk for aspiration;
- residents of nursing homes and other chronic-care facilities that house persons of any age who have chronic medical conditions; and
- persons aged ≥65 years.

Vaccination with **inactivated influenza vaccine** also is recommended for the following persons because of an increased risk for influenza-associated clinic, emergency department, or hospital visits, particularly if they have a high-risk medical condition:

- children aged 24–59 months and
- persons aged 50–64 years.

Persons Who Live With or Care for Persons at High Risk for Influenza-Related Complications

In addition, to prevent transmission to persons identified above, vaccination with TIV or LAIV is recommended for the following persons, unless contraindicated:

- healthy household contacts and caregivers of children aged 0–59 months and persons at high risk for severe complications from influenza and
- health-care workers.

In 2006, approximately 218.1 million persons in the United States will be included in one or more of these target groups, including 6.0 million children aged 6–23 months, 10.6 million healthy children aged 24–59 months, 44.0 million persons aged 2–64 years with one or more conditions associated with an increased risk for influenza-related complications, 4.0 million pregnant women, 33.0 million healthy persons aged 50–64 years, approximately 2 million nursing home residents, 37.2 million persons aged ≥65 years, 94.8 million healthy household contacts, and 7.0 million health-care workers aged <65 years (CDC, unpublished data, 2006).

Additional Information Regarding Vaccination of Specific Populations

Healthy Young Children Aged 6–59 Months

Because children aged 6–23 months are at substantially increased risk for influenza-related hospitalizations and because children aged 24–59 months are at increased risk for influenza-related clinic and emergency department visits (*152*), ACIP recommends vaccination of children aged 6–59 months. The current LAIV and inactivated influenza vaccines are not approved by FDA for use among children aged <6 months, the pediatric group at greatest risk for influenza-related complications (*58,153,154*). Vaccination of their household contacts and out-of-home caregivers also is recommended because it might decrease the probability of influenza virus infection among these children.

Studies indicate that rates of hospitalization are higher among young children than older children when influenza viruses are in circulation (*57,59–61,62,155–157*). The increased rates of hospitalization are comparable with rates for other groups considered at high risk for influenza-related complications. However, the interpretation of these findings has been confounded by cocirculation of respiratory syncytial virus that causes serious respiratory viral illness among children and that frequently circulates during the same time as influenza viruses (*158–160*). One study assessed rates of influenza-associated hospitalizations among the entire U.S. population during 1979–2001 and calculated an average rate of approximately 108 hospitalizations per 100,000 person-years in children aged <5 years (*48*). Two studies have attempted to separate the impact of respiratory syncytial viruses and influenza viruses on rates of hospitalization among children who do not have high-risk conditions (*58,59*). Both studies indicated that otherwise healthy children aged <2 years and possibly children aged 2–4 years are at increased risk for influenza-related hospitalization compared with older healthy children (Table 1). Among the Tennessee Medicaid population during 1973–1993, healthy children aged 6 months–2 years had rates of influenza-associated hospitalization comparable with or higher than rates among children aged 3–14 years with high-risk conditions (*58,60*). Another Tennessee study indicated a hospitalization rate per year of 3–4/1,000 healthy children aged <2 years for laboratory-confirmed influenza (*36*).

The ability of providers to implement the recommendation to vaccinate all children aged 24–59 months during the 2006–07 season, the first year the recommendation will be in place, might vary depending upon vaccine supply (See Influenza Vaccine Supply and Timing of Annual Influenza Vaccination; and http://www.cdc.gov/nip/news/shortages/default.htm).

Pregnant Women

Influenza-associated excess deaths among pregnant women were documented during the pandemics of 1918–19 and 1957–58 (*51,161–163*). Case reports and limited studies also indicate that pregnancy can increase the risk for serious medical complications of influenza (*164–169*). One study of influenza vaccination of approximately 2,000 pregnant women demonstrated no adverse fetal effects associated with inactivated influenza vaccine (*170*); similar results were observed in a study of 252 pregnant women who received inactivated influenza vaccine within 6 months of delivery (*171*). No such data exist on the safety of LAIV when administered during pregnancy.

Breastfeeding Mothers

TIV is safe for mothers who are breastfeeding and their infants. Because excretion of LAIV in human milk is unknown and because of the possibility of shedding vaccine virus given the close proximity of a nursing mother and her infant, caution should be exercised if LAIV is administered to nursing mothers. Breastfeeding does not adversely affect the immune response and is not a contraindication for vaccination.

Persons Aged 50–64 Years

Vaccination is recommended for persons aged 50–64 years because this group has an increased prevalence of persons with high-risk conditions. In 2002, approximately 43.6 million persons in the United States were aged 50–64 years, of whom 13.5 million (34%) had one or more high-risk medical conditions (*172*). Influenza vaccine has been recommended for this entire age group to increase the low vaccination levels among persons in this age group with high-risk conditions (see Persons at Increased Risk for Complications). Age-based strategies are more successful in increasing vaccine coverage than patient-selection strategies based on medical conditions. Persons aged 50–64 years without high-risk conditions also receive benefit from vaccination in the form of decreased rates of influenza illness, decreased work absenteeism, and decreased need for medical visits and medication, including antibiotics (*9–12*). Furthermore, 50 years is an age when other preventive services begin and when routine assessment of vaccination and other preventive services has been recommended (*173,174*).

Health-Care Workers and Other Persons Who Can Transmit Influenza to Those at High Risk

Persons who are clinically or asymptomatically infected can transmit influenza virus to persons at high risk for complications from influenza. Decreasing transmission of influenza from caregivers and household contacts to persons at high

risk might reduce influenza-related deaths among persons at high risk. In two studies, vaccination of health-care workers was associated with decreased deaths among nursing home patients (*144,145*), and hospital-based influenza outbreaks frequently occur where unvaccinated health-care workers are employed. Administration of LAIV has been demonstrated to reduce MAARI in contacts of vaccine recipients (*175,176*) and to reduce ILI-related economic and medical consequences (such as work days lost and number of health-care provider visits). In addition to health-care workers, additional groups that can transmit influenza to persons at high risk and that should be vaccinated include the following:

- 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 (including children) of persons in groups at high risk.

In addition, because children aged 0–23 months are at increased risk for influenza-related hospitalization (*58–60*), vaccination is recommended for their household contacts and out-of-home caregivers, particularly for contacts of children aged 0–5 months, because influenza vaccines have not been approved by FDA for use among children aged <6 months (see Healthy Young Children Aged 6–59 Months).

Healthy persons aged 5–49 years in these groups who are not contacts of severely immunocompromised persons (see Live, Attenuated Influenza Vaccine Recommendations) can receive either LAIV or inactivated influenza vaccine. All other persons in this group should receive inactivated influenza vaccine.

All health-care workers should be vaccinated against influenza annually (*147,177,178*). Facilities that employ health-care workers are strongly encouraged to provide vaccine to workers by using approaches that maximize vaccination levels. An improvement in vaccination coverage levels might help to protect health-care workers, their patients, and communities; improve prevention of influenza-associated disease and patient safety; and reduce disease burden. Influenza vaccination levels among health-care workers should be regularly measured and reported. Although vaccination levels for health-care workers are typically <40%, with moderate effort, organized campaigns can attain higher levels of vaccination among this population (*146,179*). In 2005, seven states had legislation requiring annual influenza vaccination of health-care workers or the signing of an informed declination (*147*), and 15 states had regulations regarding vaccination of health-care workers in long-term–care facilities (*180*). Physicians, nurses, and other workers in both hospital and outpatient-care settings, including medical emergency-response workers (e.g., paramedics and emergency medical technicians), should be vaccinated, as should employees of nursing home and chronic-care facilities who have contact with patients or residents.

Persons Infected with HIV

Limited information is available regarding the frequency and severity of influenza illness or the benefits of influenza vaccination among persons with HIV infection (*181,182*). However, a retrospective study of young and middle-aged women enrolled in Tennessee's Medicaid program determined that the risk for cardiopulmonary hospitalizations among women with HIV infection was higher during influenza seasons than during the peri-influenza periods. The risk for hospitalization was higher for HIV-infected women than for women with other well-recognized high-risk conditions, including chronic heart and lung diseases (*183*). Another study estimated that the risk for influenza-related death was 9.4–14.6/10,000 persons with acquired immunodeficiency syndrome (AIDS), compared with 0.09–0.10/10,000 among all persons aged 25–54 years and 6.4–7.0/10,000 among persons aged ≥65 years (*184*). Other reports indicate that influenza symptoms might be prolonged and the risk for complications from influenza increased for certain HIV-infected persons (*185–187*).

Vaccination has been demonstrated to produce substantial antibody titers against influenza among vaccinated HIV-infected persons who have minimal AIDS-related symptoms and high CD4+ T-lymphocyte cell counts (*188–191*). A limited, randomized, placebo-controlled trial determined that inactivated influenza vaccine was highly effective in preventing symptomatic, laboratory-confirmed influenza virus infection among HIV-infected persons with a mean of 400 CD4+ T-lymphocyte cells/mm^3; a limited number of persons with CD4+ T-lymphocyte cell counts of <200 were included in that study (*192*). A nonrandomized study among HIV-infected persons determined that influenza vaccination was most effective among persons with >100 CD4+ cells and among those with <30,000 viral copies of HIV type-1/mL (*187*). Among persons who have advanced HIV disease and low CD4+ T-lymphocyte cell counts, inactivated influenza vaccine might not induce protective antibody titers (*190,191*); a second dose of vaccine does not improve the immune response in these persons (*191,192*).

One case study determined that HIV RNA (ribonucleic acid) levels increased transiently in one HIV-infected person after influenza virus infection (*193*). Studies have demonstrated a transient (i.e., 2–4 week) increase in replication of HIV-1 in the plasma or peripheral blood mononuclear cells of HIV-infected persons after vaccine administration (*190,194*). Other studies using similar laboratory techniques

have not documented a substantial increase in the replication of HIV (*195–198*). Deterioration of CD4+ T-lymphocyte cell counts or progression of HIV disease has not been demonstrated among HIV-infected persons after influenza vaccination compared with unvaccinated persons (*191,199*). Limited information is available concerning the effect of antiretroviral therapy on increases in HIV RNA levels after either natural influenza virus infection or influenza vaccination (*181,200*). Because influenza can result in serious illness and because vaccination with inactivated influenza vaccine might result in the production of protective antibody titers, vaccination might benefit HIV-infected persons, including HIV-infected pregnant women. Therefore, influenza vaccination is recommended.

Travelers

The risk for exposure to influenza during travel depends on the time of year and destination. In the tropics, influenza can occur throughout the year. In the temperate regions of the Southern Hemisphere, the majority of influenza activity occurs during April–September. In temperate climate zones of the Northern and Southern Hemispheres, travelers also can be exposed to influenza during the summer, especially when traveling as part of large organized tourist groups (e.g., on cruise ships) that include persons from areas of the world where influenza viruses are circulating (*201,202*). Persons at high risk for complications of influenza and who were not vaccinated with influenza vaccine during the preceding fall or winter should consider receiving influenza vaccine before travel if they plan to

- travel to the tropics,
- travel with organized tourist groups at any time of year, or
- travel to the Southern Hemisphere during April–September.

No information is available regarding the benefits of revaccinating persons before summer travel who were already vaccinated during the preceding fall. Persons at high risk who received the previous season's vaccine before travel should be revaccinated with the current vaccine the following fall or winter. Persons aged ≥50 years and persons at high risk should consult with their health-care provider before embarking on travel during the summer to discuss the symptoms and risks for influenza and other travel-related diseases.

General Population

In addition to the groups for which annual influenza vaccination is recommended, vaccination providers should administer influenza vaccine to any person who wishes to reduce the likelihood of becoming ill with influenza or transmitting influenza to others should they become infected (the vaccine can be administered to children aged ≥6 months), depending on vaccine availability (see Influenza Vaccine Supply and Timing of Annual Influenza Vaccination). A strategy of universal influenza vaccination is being assessed by ACIP.

Persons who provide essential community services should be considered for vaccination to minimize disruption of essential activities during influenza outbreaks. Students or other persons in institutional settings (e.g., those who reside in dormitories) should be encouraged to receive vaccine to minimize the disruption of routine activities during epidemics (*203*).

Inactivated Influenza Vaccine Recommendations

TIV Dosage

Dosage recommendations vary according to age group (Table 4). Among previously unvaccinated children aged 6 months–<9 years, 2 doses of inactivated vaccine administered ≥1 month apart are recommended for eliciting satisfactory antibody responses (*85–88*). If possible, the second dose should be administered before the onset of influenza season. If a child aged 6 months–<9 years receiving influenza vaccine for the first time does not receive a second dose of vaccine within the same season, only 1 dose of vaccine should be administered the following season. Two doses are not required at that time. ACIP does not recommend that a child receiving influenza vaccine for the first time be administered the first dose of vaccine in the spring as a priming dose for the following season (*86,88*).

Among adults, studies have indicated limited or no improvement in antibody response when a second dose is administered during the same season (*204–206*). Even when the current influenza vaccine contains one or more antigens administered in previous years, annual vaccination with the vaccine is necessary because immunity declines during the year after vaccination (*207,208*). Vaccine prepared for a previous influenza season should not be administered to provide protection for the current season (see Persons Who Should Not Be Vaccinated with Inactivated Influenza Vaccine).

TIV Route

The intramuscular route is recommended for inactivated influenza vaccine. Adults and older children should be vaccinated in the deltoid muscle. A needle length ≥1 inch should be considered for these age groups because needles <1 inch might be of insufficient length to penetrate muscle tissue in certain adults and older children (*209*).

Infants and young children should be vaccinated in the anterolateral aspect of the thigh (*210*). ACIP recommends a needle length of 7/8–1 inch for children aged <12 months for

TABLE 4. Approved influenza vaccines for different age groups — United States, 2006–07 season

Vaccine*	Trade name	Manufacturer	Dose/ Presentation	Thimerosal mercury content (mcg Hg/0.5-mL dose)	Age group	No. of doses	Route
Inactivated							
TIV	Fluzone®	sanofi pasteur	0.25-mL prefilled syringe	0	6–35 mos	1 or 2†	Intramuscular§
			0.5-mL prefilled syringe	0	≥36 mos	1 or 2†	Intramuscular§
			0.5-mL vial	0	≥36 mos	1 or 2†	Intramuscular§
			5.0-mL multi-dose vial	25	≥6 mos	1 or 2†	Intramuscular§
TIV	Fluvirin™	Novartis Vaccine (formerly Chiron Corporation)	0.5-mL prefilled syringe	<1.0	≥4 yrs	1 or 2†	Intramuscular§
			5.0-mL multi-dose vial	24.5	≥4 yrs	1 or 2†	Intramuscular§
TIV	FLUARIX™	GlaxoSmithKline	0.5-mL prefilled syringe	<1.25	≥18 yrs	1	Intramuscular§
Live, attenuated							
LAIV	FluMist™	MedImmune	0.5-mL sprayer	0	5–49 yrs	1 or 2¶	Intranasal**

* A 0.5-mL dose contains 15 mcg each of A/New Caledonia/20/1999 (H1N1)-like, A/Wisconsin/67/2005 (H3N2)-like, and B/Malaysia/2506/2004-like antigens. For the A/Wisconsin/67/2005 (H3N2)-like antigen, manufacturers may use the antigenically equivalent A/Hiroshima/52/2005 virus, and for the B/Malaysia/2506/2004-like antigen, manufacturers may use the antigenically equivalent B/Ohio/1/2005 virus.

† Two doses administered at least 1 month apart are recommended for children aged 6 months–<9 years who are receiving influenza vaccine for the first time.

§ For adults and older children, the recommended site of vaccination is the deltoid muscle. The preferred site for infants and young children is the anterolateral aspect of the thigh.

¶ Two doses administered at least 6 weeks apart are recommended for children aged 5–<9 years who are receiving influenza vaccine for the first time.

** One dose equals 0.5 mL, divided equally between each nostril.

intramuscular vaccination into the anterolateral thigh. When injecting into the deltoid muscle among children with adequate deltoid muscle mass, a needle length of 7/8–1.25 inches is recommended (*210*).

TIV Side Effects and Adverse Reactions

When educating patients regarding potential side effects, clinicians 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.

TIV Local Reactions

In placebo-controlled studies among adults, the most frequent side effect of vaccination is soreness at the vaccination site (affecting 10%–64% of patients) that lasts <2 days (*12,211–213*). These local reactions typically are mild and rarely interfere with the person's ability to conduct usual daily activities. One blinded, randomized, cross-over study among 1,952 adults and children with asthma demonstrated that only body aches were reported more frequently after inactivated influenza vaccine (25.1%) than placebo-injection (20.8%) (*214*). One study reported 20%–28% of children with asthma aged 9 months–18 years experienced local pain and swelling (*81*), and another study reported 23% of children aged 6 months–4 years with chronic heart or lung disease had local reactions (*76*). A different study reported no difference in local reactions among 53 children aged 6 months–6 years with high-risk medical conditions or among 305 healthy children aged 3–12 years in a placebo-controlled trial of inactivated influenza vaccine (*77*). In a study of 12 children aged 5–32 months, no substantial local or systemic reactions were noted (*215*). The interpretation of these findings should be made with caution given the small number of children studied.

TIV Systemic Reactions

Fever, malaise, myalgia, and other systemic symptoms can occur after vaccination with inactivated vaccine and most often affect persons who have had no previous exposure to the influenza virus antigens in the vaccine (e.g., young children) (*216,217*). These reactions begin 6–12 hours after vaccination and can persist for 1–2 days. Placebo-controlled trials demonstrate that among older persons and healthy young adults, administration of split-virus influenza vaccine is not associated with higher rates of systemic symptoms (e.g., fever, malaise, myalgia, and headache) when compared with placebo injections (*12,211–213*).

In a randomized cross-over study among both children and adults with asthma, no increase in asthma exacerbations was reported for either age group (*214*). An analysis of 215,600

children aged <18 years and 8,476 children aged 6–23 months enrolled in one of five HMOs reported no increase in biologically plausible medically attended events during the 2 weeks after inactivated influenza vaccination, compared with control periods 3–4 weeks before and after vaccination (*218*). In a study of 791 healthy children (*71*), postvaccination fever was noted among 11.5% of children aged 1–5 years, among 4.6% of children aged 6–10 years, and among 5.1% of children aged 11–15 years. Among children with high-risk medical conditions, one study of 52 children aged 6 months–4 years indicated that 27% had fever and 25% had irritability and insomnia (*76*); another study among 33 children aged 6–18 months indicated that one child had irritability and one had a fever and seizure after vaccination (*219*). No placebo comparison group was used in these studies.

A published review of the Vaccine Adverse Event Reporting System (VAERS) reports of TIV in children aged 6–23 months documented that the most frequently reported adverse events were fever, rash, injection-site reactions, and seizures. The majority of the small total number of reported seizures appeared to be febrile (*220*). Because of the limitations of passive reporting systems, determining causality for specific types of adverse events, with the exception of injection-site reactions, is usually not possible using VAERS data alone. A population-based study of TIV safety in children aged 6–23 months who were vaccinated during 1993–1999 indicated no vaccine-associated adverse events that had a plausible relationship to vaccination (*221*).

Health-care professionals should promptly report to VAERS all clinically significant adverse events after influenza vaccination, even if the health-care professional is not certain that the vaccine caused the event. The Institute of Medicine has specifically recommended reporting of potential neurologic complications (e.g., demyelinating disorders such as Guillain-Barré syndrome [GBS]), although no evidence exists of a causal relation between influenza vaccine and neurologic disorders in children.

Immediate, presumably allergic, reactions (e.g., hives, angioedema, allergic asthma, and systemic anaphylaxis) rarely occur after influenza vaccination (*222*). 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 (*223–225*). Persons with a history of severe hypersensitivity (e.g., anaphylaxis) to eggs should not receive influenza vaccine.

Hypersensitivity reactions to any vaccine component can occur theoretically. 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 indicate hypersensitivity (*226,227*). When reported, hypersensitivity to thimerosal usually has consisted of local, delayed hypersensitivity reactions (*226*).

GBS and TIV

The 1976 swine influenza vaccine was associated with an increased frequency of GBS (*228,229*). Among persons who received the swine influenza vaccine in 1976, the rate of GBS was <10 cases/1 million persons vaccinated. The risk for influenza vaccine-associated GBS was higher among persons aged ≥25 years than persons aged <25 years (*228*). Evidence for a causal relation of GBS with subsequent vaccines prepared from other influenza viruses is unclear. Obtaining strong epidemiologic evidence for a possible limited increase in risk is difficult for such a rare condition as GBS, which has an estimated annual incidence of 10–20 cases/1 million adults (*230*).

Investigations to date have not documented a substantial increase in GBS associated with influenza vaccines (other than the swine influenza vaccine in 1976), and suggest that, if influenza vaccine does pose a risk, it is probably slightly more than one additional case/1 million persons vaccinated. During three of four influenza seasons studied during 1977–1991, the overall relative risk estimates for GBS after influenza vaccination were slightly elevated, but they were not statistically significant in any of these studies (*231–233*). However, in a study of the 1992–93 and 1993–94 influenza seasons, the overall relative risk for GBS was 1.7 (CI = 1.0–2.8; p = 0.04) during the 6 weeks after vaccination, representing approximately 1 additional case of GBS/1 million persons vaccinated; the combined number of GBS cases peaked 2 weeks after vaccination (*234*). VAERS has documented decreased reporting of postinfluenza vaccine GBS across age groups, despite overall increased reporting of other, non-GBS conditions occurring after influenza vaccination (*235*). Cases of GBS after influenza infection have been reported, but no other epidemiologic studies have documented such an association (*236,237*). Substantial

evidence exists that several infectious illnesses, most notably *Campylobacter jejuni* and upper respiratory tract infections are associated with GBS (*230,238–240*).

Even if GBS were a true side effect of vaccination in the years other than 1976, the estimated risk for GBS of approximately 1 additional case/1 million persons vaccinated 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 (Table 1) (see Hospitalizations and Deaths from Influenza). 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 (*230,241*). No evidence indicates that the case fatality ratio for GBS differs among vaccinated persons and those not vaccinated.

The 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 (*231,242*). Thus, the likelihood of coincidentally experiencing GBS after influenza vaccination is expected to be greater among persons with a history of GBS than among persons with no history of this syndrome. Whether influenza vaccination specifically might increase the risk for recurrence of GBS is unknown. However, avoiding vaccinating 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 is prudent. As an alternative, physicians might consider using influenza antiviral chemoprophylaxis for these 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.

Thimerosal and Inactivated Influenza Vaccine

Thimerosal, a mercury-containing compound, has been used as a preservative in vaccines since the 1930s and is used in multidose vials of inactivated influenza vaccine to reduce the likelihood of bacterial contamination (*243*). Many of the single-dose syringes and vials of TIV are thimerosal-free or contain only trace amounts of thimerosal (Table 4). No scientific evidence indicates that thimerosal in vaccines, including influenza vaccines, leads to serious adverse events in vaccine recipients (*244*). However, in 1999, the U.S. Public Health Service and other organizations recommended that efforts be made to eliminate or reduce the thimerosal content in vaccines to decrease total mercury exposure, chiefly among infants (*243–245*). Since mid-2001, vaccines routinely recommended for infants in the United States have been manufactured either without or with only trace amounts of thimerosal, resulting in a substantial reduction in the total mercury exposure from vaccines for children (*210*). Vaccines containing trace amounts of thimerosal have <1 mcg mercury/dose.

The risks for severe illness from influenza virus infection are elevated among both young children and pregnant women, and persons in both groups benefit from vaccination. In contrast, no scientifically conclusive evidence exists of harm from exposure to thimerosal preservative-containing vaccine. In fact, evidence is accumulating that supports the absence of any harm resulting from exposure to such vaccines (*243,246–248*). Therefore, the benefits of influenza vaccination outweigh the theoretical risk, if any, from thimerosal exposure through vaccination. Nonetheless, certain persons remain concerned regarding exposure to thimerosal. As of February 2006, six states had enacted legislation banning the administration of vaccines containing mercury; the provisions defining mercury content vary. These laws might present a barrier to vaccination until sufficient numbers of doses of influenza vaccines without thimerosal as a preservative or in trace amounts are available.

The U.S. vaccine supply for infants and pregnant women is in a period of transition; the availability of thimerosal-reduced or thimerosal-free vaccine intended for these groups is being expanded by manufacturers as a feasible means of reducing an infant's total exposure to mercury, because other environmental sources of exposure are more difficult or impossible to eliminate. Reductions in thimerosal in other vaccines have been achieved already and have resulted in substantially lowered cumulative exposure to thimerosal from vaccination among infants and children. For all of those reasons, persons for whom inactivated influenza vaccine is recommended may receive vaccine with or without thimerosal, depending on availability.

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). Chemoprophylactic use of antiviral agents is an option for preventing influenza among such persons. However, persons who have a history of anaphylactic hypersensitivity to vaccine components but who also are at high risk for complications from influenza can benefit from vaccine after appropriate allergy evaluation and desensitization. Information regarding vaccine components is located in package inserts from each manufacturer. Persons with moderate-to-severe

acute febrile illness usually should not be vaccinated until their symptoms have abated. However, minor illnesses with or without fever do not contraindicate use of influenza vaccine, particularly among children with mild upper-respiratory tract infection or allergic rhinitis.

TIV and Use of Influenza Antiviral Medications

As TIV contains only influenza virus subunits and no live virus, no contraindication exists to the coadministration of TIV and influenza antivirals (see sections on Chemoprophylaxis; and Control of Influenza Outbreaks in Institutions).

Live, Attenuated Influenza Vaccine Recommendations

Using LAIV

LAIV is an option for vaccination of healthy, nonpregnant persons aged 5–49 years who want to avoid influenza, and those who might be in close contact with persons at high risk for severe complications, including health-care workers. During periods when inactivated vaccine is in short supply, use of LAIV is encouraged when feasible for eligible persons (including health-care workers) because use of LAIV by these persons might increase availability of inactivated vaccine for persons in groups at high risk. Possible advantages of LAIV include its potential to induce a broad mucosal and systemic immune response, its ease of administration, and the acceptability of an intranasal rather than intramuscular route of administration.

LAIV Dosage and Administration

LAIV is intended for intranasal administration only and should not be administered by the intramuscular, intradermal, or intravenous route. LAIV must be thawed before administration. This 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 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 (i.e., half of the total sprayer contents) 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 should be administered annually according to the following schedule:

- Children aged 5–<9 years previously unvaccinated at any time with either LAIV or inactivated influenza vaccine should receive 2 doses* of LAIV separated by 6–10 weeks; if possible, the second dose of vaccine should be administered before the onset of influenza season.
- Children aged 5–<9 years previously vaccinated at any time with either LAIV or inactivated influenza vaccine should receive 1 dose of LAIV. They do not require a second dose.
- Persons aged 9–49 years should receive 1 dose of LAIV.

LAIV can 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 nasal congestion is present that might impede delivery of the 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, following the ACIP general recommendations for immunization is prudent (*210*). Inactivated vaccines do not interfere with the immune response to other inactivated vaccines or to live vaccines. Inactivated or live vaccines can be administered simultaneously with LAIV. However, after administration of a live vaccine, at least 4 weeks should pass before another live vaccine is administered (see Persons Who Should Not Be Vaccinated with LAIV).

LAIV and Use of Influenza Antiviral Medications

The effect on safety and efficacy of LAIV coadministration with influenza antiviral medications 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 -15°C or colder. A manufacturer-supplied freezer box was formerly required for storage of LAIV in a frost-free freezer; however, the freezer box is now optional, and LAIV may now be stored in frost-free freezers without using a freezer box. LAIV can be thawed in a refrigerator and stored at 2°C–8°C for ≤60 hours before use. It should not be refrozen after thawing because of decreased vaccine potency.

* One dose equals 0.5 mL, divided equally between each nostril.

Shedding, Transmission, and Stability of Vaccine Viruses

Available data indicate that both 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, in rare instances, shed vaccine viruses can be transmitted from vaccinees to nonvaccinated persons.

One unpublished study of a child care center setting assessed transmissibility of vaccine viruses from 98 vaccinated to 99 unvaccinated children, all aged 8–36 months. Eighty percent of vaccine recipients shed one or more virus strains, with a mean of 7.6 days' duration (*249*). One vaccine type influenza type B isolate was recovered from a placebo recipient and was confirmed to be vaccine-type virus. The type B isolate retained the cold-adapted, temperature-sensitive, attenuated phenotype, and it 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 did not exhibit symptoms that were different from 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 0.58%–2.4%.

One study assessing shedding of vaccine viruses in 20 healthy vaccinated adults aged 18–49 years demonstrated that the majority of shedding occurred within the first 3 days after vaccination, although one participant was noted to shed virus on day 7 after vaccine receipt. No study participants shed vaccine viruses ≥10 days after vaccination. Duration or type of symptoms associated with receipt of LAIV did not correlate with duration of shedding vaccine viruses. Person-to-person transmission of vaccine viruses was not assessed in this study (*250*).

Another study assessing shedding of vaccine viruses in 14 healthy adults aged 18–49 years indicated that 50% of these adults 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. Person-to-person transmission of vaccine viruses was not assessed in this study (*251*).

In clinical trials, viruses shed by vaccine recipients have been phenotypically stable. In one study, nasal and throat swab specimens were collected from 17 study participants for 2 weeks after vaccine receipt (*252*). Virus isolates were analyzed by multiple genetic techniques. All isolates retained the LAIV genotype after replication in the human host, and all retained the cold-adapted and temperature-sensitive phenotypes. A study conducted in a day care setting found that limited genetic change occurred in the LAIV strains after replication in the vaccine recipients (*253*).

LAIV Side Effects and Adverse Reactions

Twenty prelicensure clinical trials assessed the safety of the approved LAIV. In these combined studies, approximately 28,000 doses of the vaccine were administered to approximately 20,000 persons. A subset of these trials were randomized, placebo-controlled studies in which an estimated 4,000 healthy children aged 5–17 years and 2,000 healthy adults aged 18–49 years were vaccinated. The incidence of adverse events possibly complicating influenza (e.g., pneumonia, bronchitis, bronchiolitis, or central nervous system events) was not statistically different among LAIV and placebo recipients aged 5–49 years. LAIV is made from attenuated viruses and does not cause influenza in vaccine recipients.

Children. In a subset of healthy children aged 60–71 months from one clinical trial (*111,112*), certain signs and symptoms were reported more often among LAIV recipients after the first dose (n = 214) than placebo recipients (n = 95) (e.g., runny nose, 48.1% versus 44.2%; headache, 17.8% versus 11.6%; vomiting, 4.7% versus 3.2%; and myalgias, 6.1% versus 4.2%), but these differences were not statistically significant. In other trials, signs and symptoms reported after LAIV administration have included runny nose or nasal congestion (20%–75%), headache (2%–46%), fever (0–26%), vomiting (3%–13%), abdominal pain (2%), and myalgias (0–21%) (*105,108,110,254–256*). These symptoms were associated more often with the first dose and were self-limited. Data from a study of children aged 1–17 years indicated an increase in asthma or reactive airways disease in the subset aged 1–<5 years (*257,258*). Because of these data, LAIV is not approved for use among children aged <5 years. Another study was conducted among more than 11,000 children aged 18 months–18 years in which 18,780 doses of vaccine were administered over a 4-year period. This study did not observe an increase in asthma visits 0–15 days after vaccination for children who were aged 18 months–4 years compared with the prevaccination period; however, a significant increase in asthma events was observed 15–42 days after vaccination but only in vaccine year 1 (*259*).

Adults. 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 (*114,260,261*). In one clinical trial (*114*) 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% versus

10.8%), runny nose (44.5% versus 27.1%), sore throat (27.8% versus 17.1%), chills (8.6% versus 6.0%), and tiredness/weakness (25.7% versus 21.6%).

Safety Among Groups at High Risk from Influenza-Related Morbidity. Until additional data are acquired and analyzed, persons at high risk for experiencing complications from influenza virus 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 using inactivated influenza vaccine.

Serious Adverse Events. Serious adverse events requiring medical attention among healthy children aged 5–17 years or healthy adults aged 18–49 years occurred at a rate of <1%. Surveillance will continue for adverse events that might not have been detected in previous studies. Reviews of reports to VAERS after vaccination of approximately 2,500,000 persons during the 2003–04 and 2004–05 influenza seasons did not reveal any substantial new safety concerns (*262,263*). Health-care professionals should promptly report all clinically significant adverse events after LAIV administration to VAERS, as recommended for inactivated influenza vaccine.

Persons Who Should Not Be Vaccinated with LAIV

The following populations should not be vaccinated with LAIV:

- persons aged <5 years or those aged ≥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 such metabolic diseases 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 virus infection);†
- persons with a history of GBS;
- pregnant women;† or
- persons with a history of hypersensitivity, including anaphylaxis, to any of the components of LAIV or to eggs.

Vaccination of Close Contacts of Persons at High Risk for Complications from Influenza

Close contacts of persons at high risk for complications from influenza should receive influenza vaccine to reduce transmission of wild-type influenza viruses to persons at high risk. Use of inactivated influenza vaccine is preferred for vaccinating household members, health-care workers, and others who have close contact with severely immunocompromised persons (e.g., patients with hematopoietic stem cell transplants) during those periods in which the immunocompromised person requires care in a protective environment. The rationale for not using LAIV among health-care workers caring for such patients is the theoretical risk that a live, attenuated vaccine virus could be transmitted to the severely immunocompromised person. If a health-care worker receives LAIV, that worker should refrain from contact with severely immunocompromised patients for 7 days after vaccine receipt. Hospital visitors who have received LAIV should refrain from contact with severely immunocompromised persons for 7 days after vaccination; however, such persons need not be excluded from visitation of patients who are not severely immunocompromised. ACIP has not indicated a preference for inactivated influenza vaccine use by health-care workers or other persons who have close contact with persons with *lesser degrees* of immunodeficiency (e.g., persons with diabetes, persons with asthma taking corticosteroids, or persons infected with HIV) or for inactivated influenza vaccine use by health-care workers or other healthy persons aged 5–49 years in close contact with all other groups at high risk.

Personnel Who May Administer LAIV

Low-level introduction of vaccine viruses into the environment is likely unavoidable when administering LAIV. The risk for acquiring vaccine viruses from the environment is unknown but likely to be limited. Severely immunocompromised persons should not administer LAIV. However, other persons at high risk for influenza complications may administer LAIV. These include persons with underlying medical conditions placing them at high risk or who are likely to be at risk, including pregnant women, persons with asthma, and persons aged ≥50 years.

Recommended Vaccines for Different Age Groups

When vaccinating children aged 6 months–3 years, health-care providers should use inactivated influenza vaccine that has been approved by FDA for this age group. Inactivated influenza vaccine from sanofi pasteur (Fluzone) is approved for use among persons aged ≥6 months. Inactivated influenza vaccine from Novartis, formerly Chiron (Fluvirin), is labeled in the United States for use among persons aged ≥4 years because data to demonstrate efficacy among younger persons

† These persons should receive inactivated influenza vaccine.

have not been provided to FDA, whereas inactivated influenza vaccine from GlaxoSmithKline (FLUARIX) is labeled for use in persons aged ≥18 years. LAIV from MedImmune (FluMist) is approved for use by healthy persons aged 5–49 years (Table 4).

Influenza Vaccine Supply and Timing of Annual Influenza Vaccination

The annual supply of influenza vaccine and the timing of its distribution cannot be guaranteed in any year. Currently, influenza vaccine manufacturers are projecting that approximately 100 million doses of influenza vaccine will be available in the United States for the 2006–07 influenza season, an amount that is approximately 16% more doses than were available for the 2005–06 season. An additional 15 million–20 million doses might be available if a new vaccine is licensed in 2006. (Information about the status of licensure of new vaccines is available at http://aapredbook.aappublications.org/news/vaccstatus.pdf.) However, influenza vaccine distribution delays or vaccine shortages remain possible in part because of the inherent critical time constraints in manufacturing the vaccine given the annual updating of the influenza vaccine strains. To ensure optimal use of available doses of influenza vaccine, health-care providers, those planning organized campaigns, and state and local public health agencies should

1) develop plans for expanding outreach and infrastructure to vaccinate more persons than last year and
2) develop contingency plans for the timing and prioritization of administering influenza vaccine, if the supply of vaccine is delayed and/or reduced.

CDC and other public health agencies will assess the vaccine supply on a continuing basis throughout the manufacturing period and will inform both providers and the general public if a substantial delay or an inadequate supply occurs. Because LAIV is approved for use in healthy persons aged 5–49 years, no recommendations exist for limiting the timing and prioritization of administering LAIV. Administration of LAIV is encouraged as soon as it is available and throughout the season.

If the supply of inactivated influenza vaccine is adequate and a sufficient number of doses will be available beginning in September, vaccination efforts should be structured to ensure the vaccination of as many persons as possible over the course of several months. Even if vaccine distribution begins in September, distribution probably will not be completed until December or January; therefore, the following recommendations reflect this phased distribution during the months of October, November, and December, and possibly later. The prioritized (tiered) use of influenza vaccine during inactivated influenza vaccine shortages applies only to the use of inactivated vaccine and not to LAIV. When feasible, during shortages of inactivated influenza vaccine, LAIV should be used preferentially for all healthy persons aged 5–49 years (including health-care workers) to increase the availability of inactivated vaccine for groups at high risk.

The following section provides guidance regarding the timing of vaccination under two scenarios: 1) if the supply of inactivated influenza vaccine is adequate, and 2) if a reduced or delayed supply of inactivated vaccine occurs.

Materials to assist providers are available at http://www.cdc.gov/flu/professionals/vaccination/index.htm (see also Travelers section).

Vaccination Before October

To avoid missed opportunities for vaccination of persons at increased risk for serious complications and their household contacts (including out-of-home caregivers and household contacts of children aged 0–59 months), such persons should be offered vaccine beginning in September during routine health-care visits or during hospitalizations, if vaccine is available. However, in facilities housing older persons (e.g., nursing homes), vaccination before October typically should be avoided because antibody levels in such persons can begin to decline more rapidly after vaccination (*264*). If vaccine supplies are sufficient, vaccination of other persons also may begin before October.

In addition, because children aged 6 months–<9 years who have not been previously vaccinated need 2 doses of vaccine, they should receive their first dose in September, if vaccine is available, so that both doses can be administered before the onset of influenza activity. For previously vaccinated children, only 1 dose is needed.

Vaccination in October and November

The optimal time for vaccination efforts is usually during October–November. In October, vaccination in provider-based settings should start or continue for all patients—both high risk and healthy—and extend throughout November. Vaccination of children aged 6 months–<9 years who are receiving vaccine for the first time should also begin in October, if not done earlier, because those children need a booster dose 4–10 weeks after the initial dose, depending upon whether they are receiving inactivated influenza vaccine or LAIV.

If supplies of inactivated influenza vaccine are not adequate, ACIP recommends that vaccine providers focus their vaccination efforts in October, primarily on persons aged ≥50 years, persons aged <50 years at increased risk for influenza-related complications (including children aged 6–59 months), house-

hold contacts of persons at high risk (including out-of-home caregivers and household contacts of children aged 0–59 months), and health-care workers (*178*). Efforts to vaccinate other persons who wish to decrease their risk for influenza virus infection should not begin until November; however, if such persons request vaccination in October, vaccination should not be deferred, unless vaccine supplies dictate otherwise.

Vaccination in December and Later

When inactivated vaccine is delayed, a substantial proportion of doses often do not become available until December or later. Nevertheless, even when supply is not delayed or reduced, as demonstrated by the relatively low vaccination coverage levels among persons in the defined priority groups, many persons who should receive influenza vaccine remain unvaccinated (Table 3).

Providers should routinely offer influenza vaccine throughout the influenza season even after influenza activity has been documented in the community. In the United States, seasonal influenza activity can begin to increase as early as October or November, but influenza activity has not reached peak levels until late December–early March in the majority of recent seasons (Table 5). 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 have peak antibody protection against influenza virus infection 2 weeks after vaccination (*265,266*).

Timing of Organized Vaccination Campaigns

Persons and institutions planning substantial organized vaccination campaigns (e.g., health departments, occupational health clinics, and community vaccinators) should consider scheduling these events after at least mid-October because the availability of vaccine in any location cannot be ensured consistently in early fall. Scheduling campaigns after mid-October will minimize the need for cancellations because vaccine is unavailable. These vaccination clinics should be scheduled through November, with attention to settings that serve children aged 6–59 months, pregnant women, other persons aged <50 years at increased risk for influenza-related complications, persons aged ≥50 years, health-care workers, and household contacts and out-of-home caregivers of persons at high risk (including children aged 0–59 months) to the extent feasible. Planners are encouraged to schedule at least one vaccination clinic in December.

During a vaccine shortage or delay, substantial proportions of inactivated influenza vaccine doses may not be released until November and December or later. Beginning in November, vaccination campaigns can be broadened to include healthy persons who wish to reduce their risk for influenza virus infection. ACIP recommends organizers schedule these vaccination clinics throughout November and December. When the vaccine is significantly delayed, agencies should consider offering vaccination clinics into January as long as vaccine supplies are available. Campaigns using LAIV are optimally conducted in October and November but can also extend into January.

Strategies for Implementing Vaccination Recommendations in Health-Care Settings

Successful vaccination programs combine publicity and education for health-care workers and other potential vaccine recipients, a plan for identifying persons at high risk, use of reminder/recall systems, assessment of practice-level vaccination rates with feedback to staff, and efforts to remove administrative and financial barriers that prevent persons from receiving the vaccine, including use of standing orders programs (*19,267*). Since October 2005, the Centers for Medicare and Medicaid Services (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 it is medically contraindicated or the resident or his/her legal representative refuses vaccination. This information is to be reported as part of the CMS Minimum Data Set, which tracks nursing home health parameters (*268*).

The use of standing orders programs by long-term–care facilities (e.g., nursing homes and skilled nursing facilities), hospitals, and home health agencies might help to ensure the administration of recommended vaccinations for adults (*269*). Standing orders programs for both influenza and pneumococcal vaccination should be conducted under the supervision of a licensed practitioner according to a

TABLE 5. Month of peak influenza activity* during 30 influenza seasons — United States, 1976–2006

	Month						
	Nov	Dec	Jan	Feb	Mar	Apr	May
No. (%) of years with peak influenza activity	1 (3)	4 (13)	6 (20)	13 (43)	4 (13)	1 (3)	1 (3)

* The peak week of activity was defined as the week with the greatest percentage of respiratory specimens testing positive for influenza on the basis of a 3-week moving average. Laboratory data were provided by U.S. World Health Organization Collaborating Centers (CDC, unpublished data, 1976–2006).

physician-approved facility or agency policy by health-care workers trained to screen patients for contraindications to vaccination, administer vaccine, and monitor for adverse events. CMS has removed the physician signature requirement for the administration of influenza and pneumococcal vaccines to Medicare and Medicaid patients in hospitals, long-term–care facilities, and home health agencies (*269*). To the extent allowed by local and state law, these facilities and agencies may implement standing orders for influenza and pneumococcal vaccination of Medicare- and Medicaid-eligible patients. Other settings (e.g., outpatient facilities, managed care organizations, assisted living facilities, correctional facilities, pharmacies, and adult workplaces) are encouraged to introduce standing orders programs as well (*20*). In addition, physician reminders (e.g., flagging charts) and patient reminders are recognized strategies for increasing rates of influenza vaccination. Persons for whom influenza vaccine is recommended can be identified and vaccinated in the settings described in the following sections.

Outpatient Facilities Providing Ongoing Care

Staff in facilities providing ongoing medical care (e.g., physicians' offices, public health clinics, employee health clinics, hemodialysis centers, hospital specialty-care clinics, and outpatient rehabilitation programs) should identify and label the medical records of patients who should receive vaccination. Vaccine should be offered during visits beginning in September (if vaccine is available) and throughout the influenza season. The offer of vaccination and its receipt or refusal should be documented in the medical record. Patients for whom vaccination is recommended and who do not have regularly scheduled visits during the fall should be reminded by mail, telephone, or other means of the need for vaccination.

Outpatient Facilities Providing Episodic or Acute Care

Beginning each September, acute health-care facilities (e.g., emergency departments and walk-in clinics) should offer vaccinations 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 Residential Long-Term–Care Facilities

During October and November each year, vaccination should be routinely provided to all residents of chronic-care facilities with the concurrence of attending physicians. Consent for vaccination should be obtained from the resident or a family member at the time of admission to the facility or anytime afterwards. Ideally, all residents should be vaccinated at one time, before influenza season. Residents admitted through March after completion of the vaccination program at the facility should be vaccinated at the time of admission.

Acute-Care Hospitals

Persons of all ages (including children) with high-risk conditions and persons aged ≥50 years who are hospitalized at any time during September–March should be offered and strongly encouraged to receive influenza vaccine before they are discharged if they have not already received the vaccine during that season. In one study, 39%–46% of adult patients hospitalized during the winter with influenza-related diagnoses had been hospitalized during the preceding fall (*270*). Thus, the hospital serves as a setting in which persons at increased risk for subsequent hospitalization can be identified and vaccinated. However, vaccination of persons at high risk during or after their hospitalizations is often not done. In a study of hospitalized Medicare patients, only 31.6% were vaccinated before admission, 1.9% during admission, and 10.6% after admission (*271*). Using standing orders in hospitals increases vaccination rates among hospitalized persons (*272*).

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

Beginning in September, nursing-care plans should identify patients for whom vaccination is recommended, and vaccine should be administered in the home, if necessary. Caregivers and other persons in the household (including children) should be referred for vaccination.

Other Facilities Providing Services to Persons Aged ≥50 Years

Beginning in October, such facilities as assisted living housing, retirement communities, and recreation centers should offer unvaccinated residents and attendees vaccination onsite before the start of the influenza season. Staff education should emphasize the need for influenza vaccine.

Health-Care Workers

Beginning in October each year, health-care facilities should offer influenza vaccinations to all workers, including night and weekend staff. Particular emphasis should be placed on providing vaccinations to persons who care for members of groups at high risk. Efforts should be made to educate health-care workers regarding the benefits of vaccination and the potential health consequences of influenza illness for their patients, themselves, and their family members. All health-

care workers should be provided convenient access to influenza vaccine at the work site, free of charge, as part of employee health programs (*146,177,179*).

Future Directions for Research and Recommendations Related to Influenza Vaccine

The relatively low effectiveness of influenza vaccine administered to older adults highlights the need for more immunogenic influenza vaccines for the elderly (*273*) and the need for additional research to understand potential biases in estimating the benefits of vaccination among older adults in reducing hospitalizations and deaths (*274–276*). 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 (*277*). Additional data also are needed to quantify the benefits of influenza vaccination of health-care workers in protecting their patients (*278*). Furthermore, larger consortia of networks are needed that are able to assess rare events that occur after vaccination, including GBS.

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 greatly reduce or prevent the transmission of influenza (*279–282*). In addition, as noted by the National Vaccine Advisory Committee, strengthening the U.S. influenza vaccination system will require improving vaccine financing, increasing demand, and implementing systems to help better understand the burden of influenza in the United States (*283*). Strategies to evaluate the effect of vaccination recommendations remain critical.

Recommendations for Using Antiviral Agents for Influenza

Although annual vaccination is the primary strategy for preventing complications of influenza virus infections, antiviral medications with activity against influenza viruses can be effective for the chemoprophylaxis and treatment of influenza. Four licensed influenza antiviral agents are available in the United States: amantadine, rimantadine, zanamivir, and oseltamivir. Influenza A virus resistance to amantadine and rimantadine can emerge rapidly during treatment. On the basis of antiviral testing results conducted at CDC and in Canada indicating high levels of resistance (*23,24,284*), ACIP recommends that neither amantadine nor rimantadine be used for the treatment or chemoprophylaxis of influenza A in the United States until susceptibility to these antiviral medications has been re-established among circulating influenza A viruses. Oseltamivir or zanamivir can be prescribed if antiviral treatment of influenza is indicated. Oseltamivir is approved for treatment of persons aged ≥1 year, and zanamivir is approved for treatment of persons aged ≥7 years. Oseltamivir and zanamivir can be used for chemoprophylaxis of influenza; oseltamivir is licensed for use in persons aged ≥1 year, and zanamivir is licensed for use in persons aged ≥5 years.

Antiviral Agents for Influenza

Zanamivir and oseltamivir are chemically related antiviral drugs known as neuraminidase inhibitors that have activity against both influenza A and B viruses. Both zanamivir and oseltamivir were approved in 1999 for treatment of uncomplicated influenza virus infections. In 2000, oseltamivir was approved for chemoprophylaxis of influenza among persons aged ≥13 years and was approved for chemoprophylaxis of children aged ≥1 year in 2005. In 2006, zanamivir was approved for chemoprophylaxis of children aged ≥5 years.

The two drugs differ in pharmacokinetics, side effects, routes of administration, approved age groups, dosages, and costs. An overview of the indications, use, administration, and known primary side effects of these medications is presented in the following sections. Package inserts should be consulted for additional information. Detailed information regarding amantadine and rimantadine is available in the previous publication of the ACIP influenza recommendations (*285*).

Role of Laboratory Diagnosis

Appropriate treatment of patients with respiratory illness depends on accurate and timely diagnosis. Influenza surveillance information and diagnostic testing can aid clinical judgment and help guide treatment decisions. For example, early diagnosis of influenza can reduce the inappropriate use of antibiotics and provide the option of using antiviral therapy. However, because certain bacterial infections can produce symptoms similar to influenza, bacterial infections should be considered and appropriately treated, if suspected. In addition, bacterial infections can occur as a complication of influenza.

The accuracy of clinical diagnosis of influenza on the basis of symptoms alone is limited because symptoms from illness caused by other pathogens can overlap considerably with influenza (*33,42,43*). Because testing all patients who might have influenza is not feasible, influenza surveillance by state and local health departments and CDC can provide information regarding the presence of influenza viruses in the com-

munity. Surveillance also can identify the predominant circulating types, influenza A subtypes, and strains of influenza viruses.

Diagnostic tests available for influenza include viral culture, serology, rapid antigen testing, polymerase chain reaction (PCR), and immunofluorescence assays (*28*). The sensitivity and specificity of any test for influenza can vary by the laboratory that performs the test, the type of test used, the type of specimen tested, and the timing of specimen collection. Among respiratory specimens for viral isolation or rapid detection, nasopharyngeal specimens are typically more effective than throat swab specimens (*286*). As with any diagnostic test, results should be evaluated in the context of other clinical and epidemiologic information available to healthcare providers.

Commercial rapid diagnostic tests are available that can detect influenza viruses in 30 minutes (*28,287*). Some tests are approved for use in any outpatient setting, whereas others must be used in a moderately complex clinical laboratory. These rapid tests differ in the types of influenza viruses they can detect and whether they can distinguish between influenza types. Different tests can detect 1) only influenza A viruses; 2) both influenza A and B viruses, but not distinguish between the two types; or 3) both influenza A and B and distinguish between the two.

None of the rapid tests provide any information regarding influenza A subtypes. The types of specimens acceptable for use (i.e., throat, nasopharyngeal, or nasal; and aspirates, swabs, or washes) also vary by test. The specificity and, in particular, the sensitivity of rapid tests are lower than for viral culture and vary by test (*288,289*). Because of the lower sensitivity of the rapid tests, physicians should consider confirming negative tests with viral culture or other means because of the possibility of false-negative rapid test results, especially during periods of peak community influenza activity. In contrast, false-positive rapid test results are less likely but can occur during periods of low influenza activity. Therefore, when interpreting results of a rapid influenza test, physicians should consider the positive and negative predictive values of the test in the context of the level of influenza activity in their community. Package inserts and the laboratory performing the test should be consulted for more details regarding use of rapid diagnostic tests. Additional information concerning diagnostic testing is available at http://www.cdc.gov/flu/professionals/labdiagnosis.htm.

Despite the availability of rapid diagnostic tests, collecting clinical specimens for viral culture is critical because only culture isolates can provide specific information regarding circulating strains and subtypes of influenza viruses. This information is needed to compare current circulating influenza strains with vaccine strains, to guide decisions regarding influenza treatment and chemoprophylaxis, and to formulate vaccine for the coming year. Virus isolates also are needed to monitor the emergence of antiviral resistance and the emergence of novel influenza A subtypes that might pose a pandemic threat.

Antiviral Drug-Resistant Strains of Influenza Virus

CDC recently reported that 193 (92%) of 209 influenza A (H3N2) viruses isolated from patients in 26 states demonstrated a change at amino acid 31 in the M2 gene that confers resistance to adamantanes (*23,24*). In addition, two of eight influenza A (H1N1) viruses tested were resistant (*24*). Canadian health authorities also have reported the same mutation in a comparable proportion of isolates recently tested (*284*). Until these findings, previous screenings of epidemic strains of influenza A viruses found few amantadine- and rimantadine-resistant viruses (*290–292*).

Viral resistance to adamantanes can emerge rapidly during treatment because a single point mutation at amino acid positions 26, 27, 30, 31, or 34 of the M2 protein can confer cross resistance to both amantadine and rimantadine (*293,294*). Drug-resistant viruses can emerge in approximately one third of patients when either amantadine or rimantadine is used for therapy (*293,295,296*). During the course of amantadine or rimantadine therapy, resistant influenza strains can replace susceptible strains within 2–3 days of starting therapy (*290,297*). Resistant viruses have been isolated from persons who live at home or in an institution in which other residents are taking or have taken amantadine or rimantadine as therapy (*298,299*); however, the frequency with which resistant viruses are transmitted and their effect on efforts to control influenza are unknown.

Persons who have influenza A virus infection and who are treated with either amantadine or rimantadine can shed susceptible viruses early in the course of treatment and later shed drug-resistant viruses, including after 5–7 days of therapy (*295*).

Resistance to zanamivir and oseltamivir can be induced in influenza A and B viruses in vitro (*300–307*), but induction of resistance usually requires multiple passages in cell culture. By contrast, resistance to amantadine and rimantadine in vitro can be induced with fewer passages in cell culture (*308,309*). Development of viral resistance to zanamivir and oseltamivir during treatment has been identified but does not appear to be frequent (*310–314*). In one pediatric study, 5.5% of patients treated with oseltamivir had posttreatment isolates that were resistant to neuraminidase inhibitors. One small study of Japanese children treated with oseltamivir reported a high

frequency of resistant viruses (*315*). However, no transmission of neuraminidase inhibitor-resistant viruses in humans has been documented to date. No isolates with reduced susceptibility to zanamivir have been reported from clinical trials, although the number of posttreatment isolates tested is limited (*316*), and the risk for emergence of zanamivir-resistant isolates cannot be quantified (*317*). Only one clinical isolate with reduced susceptibility to zanamivir, obtained from an immunocompromised child on prolonged therapy, has been reported (*312*). Available diagnostic tests are not optimal for detecting clinical resistance to the neuraminidase inhibitor antiviral drugs, and additional tests are being developed (*316,318*). Postmarketing surveillance for neuraminidase inhibitor-resistant influenza viruses is being conducted (*319*).

Indications for Use of Antivirals When Susceptibility Exists

Treatment

When administered within 2 days of illness onset to otherwise healthy adults, zanamivir and oseltamivir can reduce the duration of uncomplicated influenza A and B illness by approximately 1 day compared with placebo (*91,320–334*). More clinical data are available concerning the efficacy of zanamivir and oseltamivir for treatment of influenza A virus infection than for treatment of influenza B virus infection (*324,335–344*). However, in vitro data and studies of treatment among mice and ferrets (*345–352*), in addition to clinical studies, have documented that zanamivir and oseltamivir have activity against influenza B viruses (*310,317,325,329,353,354*).

Data are limited regarding the effectiveness of the antiviral agents in preventing serious influenza-related complications (e.g., bacterial or viral pneumonia or exacerbation of chronic diseases). Evidence for the effectiveness of these antiviral drugs is principally based on studies of patients with uncomplicated influenza (*355*). Data are limited concerning the effectiveness of zanamivir and oseltamivir for treatment of influenza among persons at high risk for serious complications of influenza (*31,321,322,324,325,330–338*). Among influenza virus infected participants in 10 clinical trials, the risk for pneumonia among those participants receiving oseltamivir was approximately 50% lower than among those persons receiving a placebo (*339*). A similar significant reduction was also found for hospital admissions; a 50% reduction was observed in the small subset of high-risk participants, although this reduction was not statistically significant. Fewer studies of the efficacy of influenza antivirals have been conducted among pediatric populations (*295,322,328,329*). One study of oseltamivir treatment documented a decreased incidence of otitis media among children (*323*). Inadequate data exist regarding the safety and efficacy of any of the influenza antiviral drugs for use among children aged <1 year (*289*).

Initiation of antiviral treatment within 2 days of illness onset is recommended. The recommended duration of treatment with either zanamivir or oseltamivir is 5 days.

Chemoprophylaxis

Chemoprophylactic drugs are not a substitute for vaccination, although they are critical adjuncts in preventing and controlling influenza. In community studies of healthy adults, both oseltamivir and zanamivir are similarly effective in preventing febrile, laboratory-confirmed influenza illness (efficacy: zanamivir, 84%; oseltamivir, 82%) (*324,340,356*). Both antiviral agents also have been reported to prevent influenza illness among persons administered chemoprophylaxis after a household member had influenza diagnosed (*341,353,356*). Experience with chemoprophylactic use of these agents in institutional settings or among patients with chronic medical conditions is limited in comparison with the adamantanes (*310,337,338,342–344*). One 6-week study of oseltamivir chemoprophylaxis among nursing home residents reported a 92% reduction in influenza illness (*310,357*). Use of zanamivir has not been reported to impair the immunologic response to influenza vaccine *(317,358)*. Data are not available regarding the efficacy of any of the four antiviral agents in preventing influenza among severely immunocompromised persons.

When determining the timing and duration for administering influenza antiviral medications for chemoprophylaxis, factors related to cost, compliance, and potential side effects should be considered. To be maximally effective as chemoprophylaxis, the drug must be taken each day for the duration of influenza activity in the community.

Persons at High Risk Who Are Vaccinated After Influenza Activity Has Begun. Persons at high risk for complications of influenza still can be vaccinated after an outbreak of influenza has begun in a community. However, development of antibodies in adults after vaccination takes approximately 2 weeks (*265,266*). When influenza vaccine is administered while influenza viruses are circulating, chemoprophylaxis should be considered for persons at high risk during the time from vaccination until immunity has developed. Children aged <9 years who receive influenza vaccine for the first time can require 6 weeks of chemoprophylaxis (i.e., chemoprophylaxis for 4 weeks after the first dose of vaccine and an additional 2 weeks of chemoprophylaxis after the second dose).

Persons Who Provide Care to Those at High Risk. To reduce the spread of virus to persons at high risk during community or institutional outbreaks, chemoprophylaxis during peak influenza activity can be considered for unvaccinated

persons who have frequent contact with persons at high risk. Persons with frequent contact include employees of hospitals, clinics, and chronic-care facilities; household members; visiting nurses; and volunteer workers. If an outbreak is caused by a strain of influenza that might not be covered by the vaccine, chemoprophylaxis should be considered for all such persons, regardless of their vaccination status.

Persons Who Have Immune Deficiencies. Chemoprophylaxis can be considered for persons at high risk who are expected to have an inadequate antibody response to influenza vaccine. This category includes persons infected with HIV, chiefly those with advanced HIV disease. No published data are available concerning possible efficacy of chemoprophylaxis among persons with HIV infection or interactions with other drugs used to manage HIV infection. Such patients should be monitored closely if chemoprophylaxis is administered.

Other Persons. Chemoprophylaxis throughout the influenza season or during peak influenza activity might be appropriate for persons at high risk who should not be vaccinated. Chemoprophylaxis also can be offered to persons who wish to avoid influenza illness. Health-care providers and patients should make this decision on an individual basis.

Control of Influenza Outbreaks in Institutions

Using antiviral drugs for treatment and chemoprophylaxis of influenza is a key component of influenza outbreak control in institutions. In addition to antiviral medications, other outbreak-control measures include instituting droplet precautions and establishing cohorts of patients with confirmed or suspected influenza, reoffering influenza vaccinations to unvaccinated staff and patients, restricting staff movement between wards or buildings, and restricting contact between ill staff or visitors and patients (*359–361*) (see Additional Information Regarding Influenza Virus Infection Control Among Specific Populations).

The majority of published reports concerning use of antiviral agents to control influenza outbreaks in institutions are based on studies of influenza A outbreaks among nursing home populations that received amantadine or rimantadine (*335,362–366*). Less information is available concerning use of neuraminidase inhibitors in influenza A or B institutional outbreaks (*337,338,344,357,367*). When confirmed or suspected outbreaks of influenza occur in institutions that house persons at high risk, chemoprophylaxis should be started as early as possible to reduce the spread of the virus. In these situations, having preapproved orders from physicians or plans to obtain orders for antiviral medications on short notice can substantially expedite administration of antiviral medications.

When outbreaks occur in institutions, chemoprophylaxis should be administered to all residents, regardless of whether they received influenza vaccinations during the previous fall, and should continue for a minimum of 2 weeks. If surveillance indicates that new cases continue to occur, chemoprophylaxis should be continued until approximately 1 week after the end of the outbreak. The dosage for each resident should be determined individually. Chemoprophylaxis also can be offered to unvaccinated staff members who provide care to persons at high risk. Chemoprophylaxis should be considered for all employees, regardless of their vaccination status, if the outbreak is suspected to be caused by a strain of influenza virus that is not well-matched to the vaccine.

In addition to nursing homes, chemoprophylaxis also can be considered for controlling influenza outbreaks in other closed or semiclosed settings (e.g., dormitories or other settings in which persons live in close proximity).

To limit the potential transmission of drug-resistant virus during outbreaks in institutions, whether in chronic or acute-care settings or other closed settings, measures should be taken to reduce contact as much as possible between persons taking antiviral drugs for treatment and other persons, including those taking chemoprophylaxis (see Antiviral Drug-Resistant Strains of Influenza Virus).

Dosage

Dosage recommendations vary by age group and medical conditions (Table 6).

Children

Zanamivir. Zanamivir is approved for treatment of influenza among children aged ≥7 years. The recommended dosage of zanamivir for treatment of influenza is two inhalations (one 5-mg blister per inhalation for a total dose of 10 mg) twice daily (approximately 12 hours apart); the chemoprophylaxis dosage of zanamivir for children aged ≥5 years is 10 mg (two inhalations) once a day (*317*).

Oseltamivir. Oseltamivir is approved for treatment and chemoprophylaxis among persons aged ≥1 year. Recommended treatment and chemoprophylaxis dosages of oseltamivir for children vary by the weight of the child. The treatment dosage recommendation of oseltamivir for children who weigh ≤15 kg is 30 mg twice a day; for children weighing >15–23 kg, 45 mg twice a day; for those weighing >23–40 kg, 60 mg twice a day; and for children weighing >40 kg, 75 mg twice a day (*310*). The chemoprophylaxis recommended dosage of oseltamivir for children weighing ≤15 kg is 30 mg once a day; for those weighing >15–23 kg, 45 mg

TABLE 6. Recommended daily dosage of influenza antiviral medications for treatment and chemoprophylaxis — United States

Antiviral agent	Age group (yrs) 1–6	7–9	10–12	13–64	≥65
Zanamivir*					
Treatment, influenza A and B	N/A†	10 mg (two inhalations) twice daily	10 mg (two inhalations) twice twice daily	10 mg (two inhalations) twice daily	10 mg (two inhalations) twice daily
Chemoprophylaxis, influenza A and B	**Ages 1–4** N/A†	**Ages 5–9** 10 mg (two inhalations) once daily	10 mg (two inhalations) once daily	10 mg (two inhalations) once daily	10 mg (two inhalations) once daily
Oseltamivir					
Treatment,§ influenza A and B	Dose varies by child's weight¶	Dose varies by child's weight¶	Dose varies by child's weight¶	75 mg twice daily	75 mg twice daily
Chemoprophylaxis, influenza A and B	Dose varies by child's weight**	Dose varies by child's weight**	Dose varies by child's weight**	75 mg once daily	75 mg once daily

NOTE: Zanamivir is manufactured by GlaxoSmithKline (Relenza® — inhaled powder). Oseltamivir is manufactured by Roche Pharmaceuticals (Tamiflu® — tablet). This information is based on data published by the Food and Drug Administration (FDA), which is available at http://www.fda.gov.

* Zanamivir is administered through oral inhalation by using a plastic device included in the medication package. Patients will benefit from instruction and demonstration of the correct use of the device. Zanamivir is not recommended for those persons with underlying airway disease.

† Not applicable.

§ A reduction in the dose of oseltamivir is recommended for persons with creatinine clearance <30 mL/min.

¶ The treatment dosing recommendations of oseltamivir for children weighing ≤15 kg is 30 mg twice a day; for children weighing >15–23 kg, the dose is 45 mg twice a day; for children weighing >23–40 kg, the dose is 60 mg twice a day; and for children weighing >40 kg, the dose is 75 mg twice a day.

**The chemoprophylaxis dosing recommendations of oseltamivir for children weighing ≤15 kg is 30 mg once a day; for children weighing >15–23 kg, the dose is 45 mg once a day; for children weighing >23–40 kg, the dose is 60 mg once a day; and for children >40 kg, the dose is 75 mg once a day.

once a day; for those weighing >23–40 kg, 60 mg once a day; and for those weighing >40 kg, 75 mg once a day.

Persons Aged ≥65 Years

Zanamivir and Oseltamivir. No reduction in dosage is recommended on the basis of age alone.

Persons with Impaired Renal Function

Zanamivir. Limited data are available regarding the safety and efficacy of zanamivir for patients with impaired renal function. Among patients with renal failure who were administered a single intravenous dose of zanamivir, decreases in renal clearance, increases in half-life, and increased systemic exposure to zanamivir were observed (*317,368*). However, a limited number of healthy volunteers who received high doses of zanamivir intravenously tolerated systemic levels of zanamivir that were substantially higher than those resulting from administration of zanamivir by oral inhalation at the recommended dose (*369,370*). On the basis of these considerations, the manufacturer recommends no dose adjustment for inhaled zanamivir for a 5-day course of treatment for patients with either mild-to-moderate or severe impairment in renal function (*317*).

Oseltamivir. Serum concentrations of oseltamivir carboxylate, the active metabolite of oseltamivir, increase with declining renal function (*310,371*). For patients with creatinine clearance of 10–30 mL/min (*310*), a reduction of the treatment dosage of oseltamivir to 75 mg once daily and in the chemoprophylaxis dosage to 75 mg every other day is recommended. No treatment or chemoprophylaxis dosing recommendations are available for patients undergoing routine renal dialysis treatment.

Persons with Liver Disease

Zanamivir and Oseltamivir. Neither of these medications has been studied among persons with hepatic dysfunction.

Persons with Seizure Disorders

Zanamivir and Oseltamivir. Seizure events have been reported during postmarketing use of zanamivir and oseltamivir, although no epidemiologic studies have reported any increased risk for seizures with either zanamivir or oseltamivir use.

Route

Oseltamivir is administered orally in capsule or oral suspension form. Zanamivir is available as a dry powder that is self-administered via oral inhalation by using a plastic device included in the package with the medication. Patients will benefit from instruction and demonstration of correct use of this device.

Pharmacokinetics

Zanamivir

In studies of healthy volunteers, approximately 7%–21% of the orally inhaled zanamivir dose reached the lungs, and 70%–87% was deposited in the oropharynx (*317,372*). Approximately 4%–17% of the total amount of orally inhaled zanamivir is systemically absorbed. Systemically absorbed zanamivir has a half-life of 2.5–5.1 hours and is excreted unchanged in the urine. Unabsorbed drug is excreted in the feces (*317,370*).

Oseltamivir

Approximately 80% of orally administered oseltamivir is absorbed systemically (*371*). Absorbed oseltamivir is metabolized to oseltamivir carboxylate, the active neuraminidase inhibitor, primarily by hepatic esterases. Oseltamivir carboxylate has a half-life of 6–10 hours and is excreted in the urine by glomerular filtration and tubular secretion via the anionic pathway (*310,373*). Unmetabolized oseltamivir also is excreted in the urine by glomerular filtration and tubular secretion (*325*).

Side Effects and Adverse Reactions

When considering use of influenza antiviral medications (i.e., choice of antiviral drug, dosage, and duration of therapy), clinicians must consider the patient's age, weight, and renal function (Table 6); presence of other medical conditions; indications for use (i.e., chemoprophylaxis or treatment); and the potential for interaction with other medications.

Zanamivir

In a study of zanamivir treatment of ILI among persons with asthma or chronic obstructive pulmonary disease where study medication was administered after use of a B2-agonist, 13% of patients receiving zanamivir and 14% of patients who received placebo (inhaled powdered lactose vehicle) experienced a >20% decline in forced expiratory volume in 1 second (FEV1) after treatment (*317,330*). However, in a phase I study of persons with mild or moderate asthma who did not have ILI, one of 13 patients experienced bronchospasm after administration of zanamivir (*317*). In addition, during postmarketing surveillance, cases of respiratory function deterioration after inhalation of zanamivir have been reported. Certain patients had underlying airway disease (e.g., asthma or chronic obstructive pulmonary disease). Because of the risk for serious adverse events and because the efficacy has not been demonstrated among this population, zanamivir is not recommended for treatment for patients with underlying airway disease (*317*). If physicians decide to prescribe zanamivir to patients with underlying chronic respiratory disease after carefully considering potential risks and benefits, the drug should be used with caution under conditions of appropriate monitoring and supportive care, including the availability of short-acting bronchodilators (*355*). Patients with asthma or chronic obstructive pulmonary disease who use zanamivir are advised to 1) have a fast-acting inhaled bronchodilator available when inhaling zanamivir and 2) stop using zanamivir and contact their physician if they experience difficulty breathing (*317*). No definitive evidence is available regarding the safety or efficacy of zanamivir for persons with underlying respiratory or cardiac disease or for persons with complications of acute influenza (*355*). Allergic reactions, including oropharyngeal or facial edema, also have been reported during postmarketing surveillance (*317,337*).

In clinical treatment studies of persons with uncomplicated influenza, the frequencies of adverse events were similar for persons receiving inhaled zanamivir and for those receiving placebo (i.e., inhaled lactose vehicle alone) (*320–325,337*). The most common adverse events reported by both groups were diarrhea; nausea; sinusitis; nasal signs and symptoms; bronchitis; cough; headache; dizziness; and ear, nose, and throat infections. Each of these symptoms was reported by <5% of persons in the clinical treatment studies combined (*317*).

Oseltamivir

Nausea and vomiting were reported more frequently among adults receiving oseltamivir for treatment (nausea without vomiting, approximately 10%; vomiting, approximately 9%) than among persons receiving placebo (nausea without vomiting, approximately 6%; vomiting, approximately 3%) (*310,326,327,374*). Among children treated with oseltamivir, 14% had vomiting, compared with 8.5% of placebo recipients. Overall, 1% discontinued the drug secondary to this side effect (*329*), whereas a limited number of adults who were enrolled in clinical treatment trials of oseltamivir discontinued treatment because of these symptoms (*310*). Similar types and rates of adverse events were reported in studies of oseltamivir chemoprophylaxis (*310*). Nausea and vomiting might be less severe if oseltamivir is taken with food (*317,310*).

Use During Pregnancy

No clinical studies have been conducted regarding the safety or efficacy of zanamivir or oseltamivir for pregnant women. Because of the unknown effects of influenza antiviral drugs on pregnant women and their fetuses, these two drugs should be used during pregnancy only if the potential benefit justifies the potential risk to the embryo or fetus. Oseltamivir and zanamivir are both "Pregnancy Category C" medications (see manufacturers' package inserts) (*317,375*).

Drug Interactions

Clinical data are limited regarding drug interactions with zanamivir. However, no known drug interactions have been reported, and no clinically critical drug interactions have been predicted on the basis of in vitro data and data from studies using rats (*310,373*).

Limited clinical data are available regarding drug interactions with oseltamivir. Because oseltamivir and oseltamivir carboxylate are excreted in the urine by glomerular filtration and tubular secretion via the anionic pathway, a potential exists for interaction with other agents excreted by this pathway. For example, coadministration of oseltamivir and probenecid resulted in reduced clearance of oseltamivir carboxylate by approximately 50% and a corresponding approximate twofold increase in the plasma levels of oseltamivir carboxylate (*304,367*).

No published data are available concerning the safety or efficacy of using combinations of any of these influenza antiviral drugs. For more detailed information concerning potential drug interactions for any of these influenza antiviral drugs, package inserts should be consulted.

Information Regarding the Vaccines for Children Program

The Vaccines for Children (VFC) program supplies vaccine to all states, territories, and the District of Columbia for use by participating providers. These vaccines are to be administered to eligible children *without* vaccine cost to the patient, as well as the provider. All routine childhood vaccines recommended by ACIP are available through this program. The program saves parents and providers out-of-pocket expenses for vaccine purchases and provides cost-savings to states through the CDC vaccine contracts. The program results in lower vaccine prices and assures that all states pay the same contract prices. Detailed information regarding the VFC program is available at http://www.cdc.gov/nip/vfc/default.htm.

Sources of Information Regarding Influenza and Its Surveillance

Information regarding influenza surveillance, prevention, detection, and control is available at http://www.cdc.gov/flu/weekly/fluactivity.htm. Surveillance information is available through the CDC Voice Information System (influenza update) at 888-232-3228 or CDC Fax Information Service at 888-232-3299. During October–May, surveillance information is updated weekly. In addition, periodic updates regarding influenza are published in the *MMWR Weekly Report* (http://www.cdc.gov/mmwr). Additional information regarding influenza vaccine can be obtained by calling 800-CDC-INFO (800-232-4636). State and local health departments should be consulted concerning availability of influenza vaccine, access to vaccination programs, information related to state or local influenza activity, reporting of influenza outbreaks and influenza-related pediatric deaths, and advice concerning outbreak control.

Reporting of Adverse Events Following Vaccination

Clinically significant adverse events that follow vaccination should be reported through VAERS at http://vaers.hhs.gov or by calling the 24-hour national toll-free hotline at 800-822-7967.

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, health-care workers, hospital patients, pregnant women, children, and travelers) also are available in the following publications:

- American Academy of Pediatrics. 2006 red book: report of the Committee on Infectious Diseases. 27th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2006.
- American College of Obstetricians and Gynecologists. Influenza vaccination and treatment during pregnancy. ACOG committee opinion no. 305. Obstet Gynecol 2004;104:1125–6.
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Appendix C
Pneumococcal Vaccine Information
2006-2007

Pneumococcal vaccine (Pneumococcal Polysaccharide Vaccine, PPV 23) is used to decrease the risk of serious pneumococcal disease and its complications.

It may be administered to adults *at any time during the year* who meet any of the criteria or have conditions listed below:

- Age 65 or older
- HIV infection or AIDS
- Absent or malfunctioning spleen
- Sickle cell disease
- Organ or bone marrow transplant candidate or recipient
- Immunosuppressive treatment with X-ray, cancer drugs, or long-term steroids
- Persons living in special environments or social situations (such as Native Americans or residents of long-term care facilities)
- Nephrotic syndrome or renal failure
- Candidate for or recipient of a cochlear implant
- Lung disease
- Cancer, including leukemia, lymphoma, and multiple myeloma
- Diabetes mellitus
- Spinal cord injury or disease
- Cerebrospinal fluid leaks
- Alcoholism or cirrhosis of the liver

How often should pneumococcal vaccine be given?

- *Once* to adults age 65 or older if they have not received an earlier dose.
- Adults who received a dose before age 65 should receive a 2nd dose if 5 or more years have passed since the first dose.
- Adults at the highest risk of pneumococcal infections should receive a 2nd dose 5 or more years after the first dose, regardless of what age the 1st dose was given. Adults at the highest risk are those with: HIV infection or AIDS, absent or malfunctioning spleen, sickle cell disease, organ or bone marrow recipients, nephrotic syndrome or renal failure, immunosuppressive treatment with X-rays, cancer drugs, or long-term steroids.
- Only 2 doses at most are given.

What about repeating a dose if a patient is uncertain of having received it before?
If the patient's vaccination status is unknown, those in the recommended group should be administered pneumococcal vaccine. Studies have shown that adults who were revaccinated 4 years or more after an initial vaccination did not have an increased incidence of side effects. Consider supplying patients who have trouble remembering their vaccination history with a personal immunization card. Examples of cards are available at https://www.immunize.org/adultizcards/index.htm

Appendix D
Computerized Patient Record System (CPRS) Influenza Documentation

The health summary should contain the reminders that a site uses related to the performance measures and monitors clinical guidelines and VA directives. It should have at least the following 3 components: Clinical Reminder Summary (CRS), Clinical Maintenance (CM), and Immunizations (IM).

We want to emphasize there are specific reminders that should be part of this health summary since the setup at each site is potentially (and actually) very different.

The same list of reminders should be placed in both of the reminder components - the CRS and CM components - and those 2 components should include the national reminders (or the local equivalent) and any other local reminders that would provide useful information to other sites.

The national reminders to include (or include a local equivalent):

VA-DEPRESSION SCREENING
VA-POS DEPRESSION SCREEN FOLLOWUP
VA-WH MAMMOGRAM SCREENING
VA-WH PAP SMEAR SCREENING
VA-IRAQ & AFGHAN POST-DEPLOY SCREEN
VA-HTN ASSESSMENT BP >=140/90
VA-HTN ASSESSMENT BP >=160/100
VA-IHD ELEVATED LDL
VA-IHD LIPID PROFILE
VA-HEP C RISK ASSESSMENT

Other reminders that have been shared nationally to include:

ALCOHOL ABUSE SCREEN (AUDIT-C)
ALCOHOL USE SCREEN POS F/U
PTSD SCREEN
PTSD SCREEN POSITIVE
RPT PTSD SCORE 0
RPT PTSD SCORE 1
RPT PTSD SCORE 2
RPT PTSD SCORE 3
RPT PTSD SCORE 4
RPT PTSD SCREEN NEG OLD
RPT PTSD SCREEN POS OLD

Other local reminders to consider adding if any useful information might be displayed (even if you are not using some of these reminders consistently at your site, some information that would be displayed might still help others at another site):

INFLUENZA VACCINE
PNEUMOCOCCAL IMMUNIZATION
TOBACCO USE SCREENING
SMOKING CESSATION EDUCATION
DIABETES - HBA1C
DIABETES - MONOFILAMENT EXAM
DIABETES - RETINAL EXAM
DIABETES - PROTEINURIA & ACE-I
IHD - ASPIRIN
IHD - BETA BLOCKER

Appendix E
Prevention and Treatment of Influenza with Antiviral Drugs*

(See Section 6 for more information about influenza antiviral drugs)

TABLE 6. Recommended daily dosage of influenza antiviral medications for treatment and chemoprophylaxis — United States

	Age group (yrs)				
Antiviral agent	**1–6**	**7–9**	**10–12**	**13–64**	**≥65**
Zanamivir*					
Treatment, influenza A and B	N/A†	10 mg (two inhalations) twice daily	10 mg (two inhalations) twice daily	10 mg (two inhalations) twice daily	10 mg (two inhalations) twice daily
Chemoprophylaxis, influenza A and B	**Ages 1–4** N/A†	**Ages 5–9** 10 mg (two inhalations) once daily	10 mg (two inhalations) once daily	10 mg (two inhalations) once daily	10 mg (two inhalations) once daily
Oseltamivir					
Treatment,§ influenza A and B	Dose varies by child's weight¶	Dose varies by child's weight¶	Dose varies by child's weight¶	75 mg twice daily	75 mg twice daily
Chemoprophylaxis, influenza A and B	Dose varies by child's weight**	Dose varies by child's weight**	Dose varies by child's weight**	75 mg once daily	75 mg once daily

NOTE: Zanamivir is manufactured by GlaxoSmithKline (Relenza® — inhaled powder). Oseltamivir is manufactured by Roche Pharmaceuticals (Tamiflu® — tablet). This information is based on data published by the Food and Drug Administration (FDA), which is available at http://www.fda.gov.

* Zanamivir is administered through oral inhalation by using a plastic device included in the medication package. Patients will benefit from instruction and demonstration of the correct use of the device. Zanamivir is not recommended for those persons with underlying airway disease.

† Not applicable.

§ A reduction in the dose of oseltamivir is recommended for persons with creatinine clearance <30 mL/min.

¶ The treatment dosing recommendations of oseltamivir for children weighing ≤15 kg is 30 mg twice a day; for children weighing >15–23 kg, the dose is 45 mg twice a day; for children weighing >23–40 kg, the dose is 60 mg twice a day; and for children weighing >40 kg, the dose is 75 mg twice a day.

**The chemoprophylaxis dosing recommendations of oseltamivir for children weighing ≤15 kg is 30 mg once a day; for children weighing >15–23 kg, the dose is 45 mg once a day; for children weighing >23–40 kg, the dose is 60 mg once a day; and for children >40 kg, the dose is 75 mg once a day.

Source: CDC MMWR; 6/28/06; 55 (Early Release); 1-41 "Prevention and Control of Influenza Recommendations of the Advisory Committee on Immunization Practices (ACIP)". NOTE: ONLY oseltamivir and zanamivir are recommended influenza antiviral medications for the 2006-2007 season, at the time of printing this manual. Check for updated information at the CDC Web site: www.cdc.gov.

Appendix F
Resources, References, and Web sites

Resources

This VA Influenza Toolkit 2006-2007 is available on the VA Internet sites www.publichealth.va.gov/flu and www.publichealth.va.gov/InfectionDontPassItOn. and the VA Intranet sites http://vaww.vhaco.va.gov/phshcg/Flu and http://vaww.vhaco.va.gov/phshcg/InfectionDontPassItOn.

National Influenza Vaccine Summit's "Influenza Vaccination Pocket Information Guide" is available at http://www.immunize.org/fluguide/pocketguide.pdf

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Web sites

http://www.publichealth.va.gov/flu/ (VA Intranet vaww.publichealth.va.gov/flu) - This is the influenza Web site for the Department of Veterans Affairs. It includes links on the influenza virus and influenza vaccine, VA advisories on influenza vaccine as information evolves during influenza vaccine season, and the VA influenza toolkit, a set of materials to enable VA facilities to put on influenza immunization campaign.

http://www.publichealth.va.gov/infectiondontpassiton (VA Intranet http://vaww.vhaco.va.gov/phshcg/InfectionDontPassItOn) - This is the Web site for the VA public health campaign "Infection: Don't Pass It On," which focuses on prevention of infection in the VA medical system through hand and respiratory hygiene, material for infection emergencies, and vaccination against influenza and pneumonia.

http://www.nchpdp.med.va.gov/ - This Web site of the VA National Center for Health Promotion and Disease Prevention (NCP) has links to prevention resources.

http://www.cdc.gov/nip - This is the Web site for the National Immunization Program of the Centers for Disease Control and Prevention (CDC) and has a great deal of information for both the public and health care providers on all immunization topics.

http://www.cdc.gov/nip/publications/ACIP-list.htm - This page on the NIP site lists all recommendations of the ACIP (Advisory Committee for Immunization Practices).

http://www.cdc.gov/nip/recs/adult-schedule.htm - This page includes a printable schedule of adult immunization recommendations, a list of vaccines for adults, and an adult vaccination screening form.

http://www.cdc.gov/flu/weekly/fluactivity.htm - This page provides weekly updated reports about national and international influenza activity and has fundamental information concerning influenza surveillance methods.

http://www.cdc.gov/nip/publications/adultstrat.htm - This page includes strategies for Increasing Adult Vaccination Rates (NIP), March 8, 2002. Updated Jan 5, 2006

http://www.cdc.gov/flu/ - This is the main influenza Web page of the CDC. It includes extensive information about the disease of influenza and its prevention and control, for both patients and health care professionals.

http://www.immunize.org - This is the Web site for the Immunization Action Coalition (IAC) with a wide variety of information about immunizations, including Vaccine Information Statements in many languages. The Directory of Immunization Resources is full of useful information on organizations, Web sites, hotlines, and agencies that are immunization resources.

http://www.vaccineinformation.org - This page from the IAC is comprehensive, organized, and easy to access. For each vaccine-preventable disease, there are answers to many questions about the disease and the vaccine, as well as sections containing photos, case histories, recommendations, references, and links to useful resources. Also included is material about vaccine safety, travel, bioterrorism, state laws—and much more.

http://www.acponline.org/aii - This site from the American College of Physicians provides resources and tools to support physicians in their immunization efforts, with the goal of improving adult immunization rates. It includes physician education, patient education, and practice management tools for immunization and reimbursement.

http://www.nfid.org - This is the Web site for the National Foundation for Infectious Diseases and contains a call to action and strategies for increasing influenza immunization among employees and volunteers.

http://www.vaccines.org - This Web site provides access to up-to-the-minute news about vaccines and an annotated database of vaccine resources on the Internet.

http://www.ImmunizationEd.org - This is a Web page from the Society of Teachers of Family Medicine that provides news and reports to keep family physicians up-to-date on vaccines for children and adults, links to the most current immunization schedules and vaccine information, downloadable slide presentations and photographs of diseases.

http://www.atpm.org - This Web site of the Association of Teachers of Preventive Medicine has several educational resources available for download or purchase for training health care professionals and students about immunization issues.

http://www.naccho.org - This is the Web site of the National Association of County and City Health Officials and has several pages of vaccine information, with links to training and resources pages.

http://www.partnersforimmunization.org - This Web site of the National Partnership for Immunization, a non-profit organization dedicated to reducing the nationwide incidence of vaccine-preventable diseases through increased use of licensed vaccines, funded, in part, by the Centers for Disease Control and Prevention, is a good source for immunization resources.

http://www.nlm.nih.gov/medlineplus/influenza.html - This is the influenza Web page of Medline Plus, a service of the National Library of Medicine, National Institutes of Health (NIH). It includes sections on news, diagnosis, treatment, prevention, disease management, clinical trials and other research, and information focused on audiences ranging from children to the elderly.

http://www.mayoclinic.com/invoke.cfm?objectid=5CB89570-8B46-4961-8BFE66D06D5BDD1B - This is the Mayo Clinic patient information page on influenza.

http://www.health.state.mn.us/divs/idepc/diseases/flu/index.html - This is the influenza section of the Minnesota Department of Health.

http://www.prevention.va.gov - This is the new Web site for the VA National Center for Health Promotion and Disease Prevention (NCP).

Pandemic Influenza Web Sites

VA Pandemic Influenza Information
http://vaww.vhaco.va.gov/phshcg/Flu/pandemicflu.htm
Contains VA Pandemic Influenza Plan *and links to other documents, including information on use of the antiviral drug oseltamivir, respiratory infectious disease emergency plan for facilities, hand and respiratory hygiene, personal protective equipment*

Centers for Disease Control and Prevention
http://www.cdc.gov/flu/avian/index.htm
Contains links to key facts on avian influenza, the virus and its spread, prevention outbreaks, and information for specific groups

International Pandemic Influenza Information
http://www.who.int/csr/disease/avian_influenza/en/index.html
Contains links to advice for travelers, world regional avian influenza information, country activities, outbreak news and timeline

Federal/State Government Pandemic Influenza Information
http://www.pandemicflu.gov
Contains links to federal, state, and individual planning; business, school, health care, and community planning; avian influenza watch and meeting update

Federal Government Information
http://www.pandemicflu.gov/plan/tab1.html
Contains links to national strategy, federal agency activities, information for federal employees

Appendix G
Acknowledgements

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