disease prevention news

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Prevention and Control of Influenza Indications for Influenza Vaccine

*This report is a summary of the Advisory Committee on Immunization Practices (**ACIP**) recommendations for vaccine use during the 1996-97 influenza season (superseding those in MMWR 1995; 44 [No. RR-3]:1-22). The principle changes from last year's recommendations include information about the influenza strains in the trivalent vaccine for 1996-97 and extension of the optimal time for influenza vaccination campaigns for persons in high-risk groups.*

Introduction

Every year, infections due to influenza A virus or influenza B virus account for substantial upper respiratory morbidity during the late fall, winter, and early spring around the world. Central to this seasonal onslaught is the ability of the influenza viruses to alter the antigenic properties of their surface proteins in response to increasing levels of immunity in the population. Influenza A viruses can be classified into subtypes based on the antigenic characteristics of 2 major surface antigens: hemagglutinin (H) and neuraminidase (N). Currently 3 subtypes of hemagglutinin (H1, H2, H3) and 2 subtypes of neuraminidase (N1, N2) are associated with widespread seasonal disease in humans. Immunity to these antigens, especially to the hemagglutinin, reduces the likelihood of infection and lessens the severity of disease if infection occurs. Infection with a virus of one subtype, however, confers little or no protection against infection due to viruses of other subtypes. Over time, antigenic variation (antigenic drift) within a subtype may be so marked that infection or vaccination with one strain may not induce effective immunity to distantly related strains of the same subtype. Although influenza B viruses have demonstrated comparatively more antigenic stability than do influenza A viruses, antigenic variation does occur. Consequently, new variants of influenza virus emerge every year around the world, necessitating an annual change in the composition of the influenza vaccine. The antigenic characteristics of current strains provide the basis for selecting which virus strains to include in each year's vaccine.

The influenza vaccine for the 1996-97 season will include the following components: 15μg of A/Texas/36/91-like (H1N1), A/Wuhan/359/95-like (H3N2), and B/Beijing/184/93-like antigens in each 0.5 mL. For the A/Wuhan/359/95-like and B/Beijing/184/93-like antigens, US manufacturers will use the antigenically equivalent strains A/Nanchang/933/95 (H3N2) and B/Harbin/07/94 viruses, respectively, because of their growth properties.

Why Vaccinate Against Influenza?

Although influenza by itself is considered an acute, self-limiting upper respiratory infection, it can lead to more serious illness such as primary influenza pneumonia or secondary bacterial pneumonia. The risk for developing these secondary complications is especially high for the elderly and for persons with underlying health problems. To prevent morbidity and mortality due to severe influenza and its complications, influenza vaccine campaigns are targeted toward members of these medically at-risk groups. During major influenza epidemics hospitalization rates for high-risk

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Influenza Vaccine* Dosage, by Age Group
United States, 1996-97 Season

Age Group	Product	Dosage	No. Doses	Route
6-35 mos.	Split virus only	0.25 mL	1 or 2^	IM
3- 8 yrs.	Split virus only	0.50 mL	1 or 2^	IM
9-12 yrs.	Split virus only	0.50 mL	1	IM
>12 yrs	Whole or split virus	0.50 mL	1	IM

* Manufacturers include **Connaught Laboratories, Inc.** (Fluzone® whole or split); **Evans Medical Ltd.** (distributed by **Adams Laboratories, Inc.** [Fluvirin™ purified-surface-antigen vaccine]); **Parke-Davis** (Fluogen® split); and **Wyeth–Ayerst Laboratories** (Flushield™ split). For further product information, Connaught, 1-(800) 822-2463; Adams, 1-(800) 932-1950; Parke-Davis, 1-(800) 223-0432; Wyeth-Ayerst, 1-(800) FLU-SHIELD [1-(800) 358-7443].

^ Two doses administered at least 1 month apart are recommended for previously unvaccinated children <9 years of age. The preferred site is the anterolateral aspect of the thigh for infants and young children.

populations increase 2- to 5-fold, depending on the age group.

The impact of such epidemics is also demonstrated by an increase in mortality. While influenza-associated mortality is a major concern for persons with chronic diseases, this increase is most marked in persons 65 years of age or older, with more than 90% of the deaths attributed to pneumonia and influenza occurring in persons of this age group. Because the proportion of elderly persons in the US population is increasing and because age and its associated chronic diseases are risk factors for severe influenza illness, the number of deaths from influenza and its complications is expected to increase unless control measures are more vigorously implemented. Preseason vaccination of persons in high-risk groups currently remains the most effective measure for reducing the impact of influenza.

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Influenza Vaccine

Influenza vaccine is made from highly purified, egg-grown viruses that have been rendered non-infectious (inactivated). Each year's influenza vaccine contains 3 virus strains (usually 2 type A and one type B) representing those influenza viruses expected to circulate in the US during the upcoming season. The efficacy of the vaccine in preventing or attenuating illness depends on the age and immunocompetence of the vaccine recipient. The degree of similarity between the vaccine virus components and the circulating virus strains also influences vaccine efficacy. When there is a close match, the vaccine can prevent illness in approximately 70% of healthy children and young adults.

The efficacy of influenza vaccine in preventing hospitalization due to pneumonia and other complications among the elderly ranges from 30% to 90%. Among elderly persons residing in nursing homes, influenza vaccine can be 50% to 60% effective in preventing pneumonia and hospitalization, and 80% effective in preventing death due to influenza and its complications. Vaccine efficacy in the frail elderly, however, is only 30% to 40%. Therefore, it is important that persons who have contact with the frail elderly, particularly their care givers, be vaccinated. Although the current influenza vaccine can contain one or more of the antigens administered in previous years, annual vaccination with the current vaccine is necessary because immunity declines in the year following vaccination. Because the 1996-97 vaccine differs from that used during the 1995-96 influenza season, supplies of the 1995-96 vaccine should not be administered to provide protection for the 1996-97 season.

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Whole-virus, subvirion, and purified-surface-antigen preparations of vaccine are available. Any of the preparations may be used for adults. To minimize febrile reactions, only subvirion or purified-surface-antigen preparations should be used for children. Most vaccine recipients will develop high levels of immunity to the vaccine strains or related variants within 2 to 4 weeks of vaccination. Although the elderly and persons with chronic disease may develop only low antibody titers after vaccination, and therefore may remain somewhat susceptible to influenza infection, the influenza vaccine has been shown to be effective in preventing severe complications, thereby reducing the risk of hospitalization and death.

Recommendations for Use of Influenza Vaccine

Influenza vaccine is strongly recommended for any person 6 months of age or older who is at increased risk for complications of influenza because of age or an underlying medical condition. Health care workers, household members, and others in close contact with persons in high-risk groups should also be vaccinated. Influenza vaccine also may be given to any person who wishes to reduce the chance of becoming infected with influenza.

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Target Groups for Special Vaccination Programs

Members of the following high-risk groups and their close contacts should be targeted for organized vaccination programs:

- Persons 65 years of age or older
- Residents of nursing homes and other chronic-care facilities housing persons of any age who have chronic medical conditions
- Adults and children with chronic disorders of the pulmonary or cardiovascular systems, including children with asthma
- 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 immunosuppression regardless of cause
- Children and teenagers (aged 6 months to 18 years) who are receiving long-term aspirin therapy and therefore may be at risk of developing Reye syndrome after influenza

Persons who are clinically or subclinically infected and who are in close contact with members of high-risk groups can transmit influenza virus to them. To reduce the risk of exposure of high-risk persons to influenza via care providers, the following individuals should be vaccinated:

- Physicians, nurses, and other personnel in both hospital and out-patient-care settings
- Employees of nursing homes and chronic-care facilities
- Providers of home care to persons at high risk (eg, visiting nurses)
- Household members (including children) of persons in high-risk groups

Influenza vaccine is considered safe for pregnant women. Pregnant women who have other medical conditions that increase their risks for influenza-related complications should be vaccinated, regardless of the stage of pregnancy. Thus it is undesirable to delay vaccination of pregnant women who have high-risk conditions and who will be in the first trimester of pregnancy when the influenza season begins. In addition, recent studies suggest that women in the third trimester of pregnancy and early puerperium, including women without any underlying risk factors, might be at increase risk of serious complications from influenza. Influenza vaccination may be considered for all pregnant women who will be in the third trimester or in the early puerperium during the influenza season.

A single dose of influenza vaccine is generally recommended for adults and previously vaccinated children. Two doses administered at least 1 month apart may be required for a satisfactory antibody response in previously unvaccinated children under 9 years of age. Influenza vaccine is administered via the intramuscular route for all age groups. Adults and older children should be vaccinated in the deltoid muscle, and infants and young children in the anterolateral aspect of the thigh.

Please note that current recommendations **DO NOT** include additional doses of influenza vaccine for adults during the second half of the season. Studies conducted with vaccines similar to those in current use have shown little or no improvement in antibody responses when a second dose is administered to adults during the same season.

Limited information exists regarding the frequency and severity of influenza illness among HIV-infected persons, but reports suggest that symptoms might be prolonged and the risk of complications increased for some HIV-infected persons. Influenza vaccine has produced protective immunity in vaccinated HIV-infected persons who have minimal AIDS-related symptoms and high CD4+ T-lymphocyte cell counts. In persons with advanced HIV disease and low CD4+ T-lymphocyte cell counts, the vaccine may not induce protective antibody titers. Nevertheless, influenza vaccination will benefit many HIV-infected persons.

Contraindications, Side Effects, and Adverse Reactions

Influenza vaccine contains only noninfectious viruses. Therefore, the vaccine does not cause influenza in vaccine recipients. Respiratory disease after vaccination represents coincidental illness unrelated to influenza vaccination. The most frequent side effect of vaccination is soreness at the injection site that lasts approximately 2 days. Two forms of systemic reactions also have been noted:

- Fever, malaise, myalgia, and other systemic symptoms (most often affecting persons who have had no exposure to influenza virus antigens in the vaccine [eg, young children]). These symptoms begin 6 to 12 hours after vaccination and may persist for 1 or 2 days.
- Immediate reactions (presumably allergic) resulting from hypersensitivity to a vaccine component (most often to residual egg protein). The protocol for influenza vaccination developed by Murphy and Strunk may be considered for high-risk patients with known sensitivities to egg proteins (see reference at the end of the article).

The potential exists for hypersensitivity reactions to any vaccine component. Reactions to thimerosal also may occur but are generally local delayed-hypersensitivity reactions.

Adults with acute febrile illness usually should not be vaccinated until their symptoms have abated. Minor illness with or without fever does not, however, contraindicate the use of influenza vaccine. This vaccine should not be given to persons with known anaphylactic hypersensitivity to eggs or to other components of the influenza vaccine without prior physician consultation. Vaccine inserts provided by each manufacturer contain specific contraindications.

Unlike the 1976 swine influenza vaccine, subsequent vaccines prepared from other influenza virus strains have not been clearly associated with an increased frequency of Guillain-Barré syndrome (GBS).

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Timing of Influenza Vaccination Activities

Beginning in September, persons at high risk who are seen by health care providers for routine care or as a result of hospitalization should be offered influenza vaccine. Children aged 9 years or younger who have not been previously vaccinated should receive 2 doses of vaccine at least one month apart to maximize the chance of a satisfactory antibody response to all 3 vaccine components. The second dose for these children should be given before December, if possible. Vaccine should be offered to both children and adults up to and even after influenza virus activity is documented in a community. Influenza vaccine can be administered at the same time as are other routine immunizations, including pertussis vaccine (DTP or DTaP). Influenza vaccine and DTP both can cause fever in young children. Therefore, when influenza and pertussis vaccines are administered simultaneously, it is preferable to use DTaP for those children aged 15 months or older who are receiving the fourth or fifth dose of pertussis vaccine. (DTaP causes fewer febrile reactions, but it is not licensed for the initial 3-dose series of pertussis vaccine.) Vaccines should be administered at different sites on the body.

The optimal time for organized vaccination campaigns for persons in high-risk groups has been recently extended to a 6-week period covering all of October and the first half of November. Vaccination programs can be conducted as soon as influenza vaccine supplies become available, especially if regional influenza virus activity is expected to begin earlier than usual.

Influenza vaccination levels among persons ≥65 years of age have improved substantially from 33% in 1989 to 52% in 1993. However, vaccination levels among high-risk persons <65 years of age are estimated to be <30%.

Information for the 1996-97 Season

Influenza virus activity has been greater during the 1996 interseasonal period (May through September), compared with levels observed during the same period in previous years. Influenza B viruses continued to circulate at the end of the 1995-96 season. Influenza B virus appeared sporadically during June and July in Alaska, Ohio, Hawaii, and Texas. Influenza A (H3N2) viruses have been linked to at least 2 outbreaks occurring in nursing homes in Hawaii during mid- to late July and in Washington during June. Influenza A (H3N2) was also isolated from military personnel and their families at Tripler Army Medical Center in Hawaii during July and August.

In other parts of the world, influenza A (H3N2) viruses have already caused significant morbidity. New Zealand and Australia have experienced epidemic levels of influenza-like illness (ILI) attributed to influenza A/Wuhan (H3N2) during their 1996 influenza season. Other countries reporting significant levels of ILI this year include Brazil, Chile, Korea, China, South Africa, Russia, and various European countries. Given the worldwide circulation patterns and the interseasonal virus activity in the US, the Centers for Disease Control and Prevention (CDC) expects that all 3 influenza virus strains — type A(H3N2), type A(H1N1), and type B — will circulate at various levels during the 1996-97 influenza season in the US.

CDC monitors antigenic trends in circulating viruses and has noted some drift in type A(H3N2) viruses during the course of the 1995-96 season. During the first third of the season, the dominant virus in the US was influenza A/Johannesburg/33/94-like (H3N2). As the season progressed, however, the proportion of influenza A/Wuhan/359/95-like (H3N2) viruses began to increase. This trend underscored the decision to change the A(H3N2) component in the

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vaccine for the 1996-97 season. Observations of past A(H3N2) seasons indicate that persons aged 65 years or older might comprise the group at highest risk of developing severe complications associated with H3N2-attributed infections. Therefore, vaccination of the elderly is an especially important means of reducing the impact of this group's influenza-related morbidity and mortality. Vaccination levels in this population group are improving, largely as a result of including influenza vaccination among covered benefits for all Medicare B beneficiaries as of May 1, 1993. **Health care providers such as physicians, hospitals, skilled-nursing facilities, home health agencies, and public health departments can bill Medicare for reimbursement for the cost of influenza vaccination and the cost of its administration. The codes for billing are 90724 and Q0124 respectively.** Additional information for health care providers in each state is available from the state's Medicare intermediary or carrier.

. . . influenza vaccination will benefit many HIV-infected persons.

Minor illness with or without fever does not, however, contraindicate the use of influenza vaccine.

For further information regarding the availability and use of influenza vaccine, including updated informed consent statements, contact the TDH Immunization Division, at (512) 458-7284. For general information about the epidemiology of influenza and laboratory identification of influenza viruses in Texas, contact the TDH Infectious Disease Epidemiology & Surveillance, Division, at (512) 458-7676. Information about national surveillance is available through the CDC Voice Information System by telephone, (404) 332-4555, or fax, (404) 332-4565 [document number 361100].

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Adapted from: CDC. Recommendations and Reports. Prevention and Control of Influenza: Recommendations of the Advisory Committee on Immunization Practices (ACIP), MMWR 1996; 45(RR-5).

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Murphy, KR, and Strunk, RC. Safe administration of influenza vaccine in asthmatic children hypersensitive to egg proteins. J. Pediatric. 1985; 106:931-933.

CDC. Final results: Medicare influenza vaccine demonstration - selected states, 1988-1992. MMWR 1993; (42)31:601-604.

CDC. Update: Influenza Activity - Worldwide, 1996. MMWR. 1996; (45) in press.

Erratum

Selected data for reported rabies cases were incorrect in the Bimonthly Statistical Summary for Jul/Aug 1996, in DPN Vol. 56, No. 20. Please make note of these corrections.

Animal rabies - dogs and cats/This Period: 1995, 9 (not 71) and 1996, 6 (not 22)
Animal rabies - total/Cumulative: 1995, 478 (not 52) and 1996, 261 (not 44)

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Federal Web Sites

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http://www.os.dhhs.gov/
Agency for Health Care Policy and Research
http://www.ahcpr.gov/
United States Public Health Service
http://phs.os.dhhs.gov/phs/phs.html
National Institutes of Health (NIH)
http://www.nih.gov/
Centers for Disease Control and Prevention
http://www.cdc.gov/
Morbidity & Mortality Weekly Report
http://www.cdc.gov/epo/mmwr/mmwr.html
National Electronic Telecommunications System for Surveillance (NETSS)
http://www. cdc. gov/epo/mmwr/other/netss/netss. html
CDC—EID Emerging Infectious Diseases
http://www.cdc.gov/ncidod/EID/eid.htm
National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP)
http://www.cdc.gov/nccdphp/nccdhome.htm
CDC - National Center of Health Statistics
http://www.cdc.gov/nchswww/nchshome. htm
CDC Information Network for Public Health Officials (INPHO)
http://www.cdc.gov/inpho/inpho.htm
Food and Drug Administration
http://www.fda.gov/fdahomepage.html
CDC Wonder on the Web
http://wonder.cdc.gov/
US National Library of Medicine (NLM)
http://www.nlm.nih.gov/
FedWorld Information Network
http://www.fedworld.gov/
National Network of Libraries of Medicine
http://www.nnlm.nlm.nih.gov/guides.html

State Web Sites

Texas Department of Health
http://www.tdh.state.tx.us/
Texas Department of Human Services
http:www.dhs.state.tx.us/

Universities and Colleges Web Sites

University of Texas - Houston School of Public Health
http://utsph.sph.uth.tmc.edu/

Nonprofit Organizations Web Sites

American Public lIealth Association (APHA)
http://www.apha.org/
Texas Medical Association
http://www.texmed.org/
American Medical Informatics Association
http://amia2.amia.org/
Program for Monitoring Emerging Diseases; Electronic Conference (ProMED)
http://www.healthnet.org/promed.html
Outbreak
http://www.outbreak.org/cgi-unreg/dynaserve.exe/index.html
PLL ONLINE—the WHO Library and Health Literature Services
http://www-pll.who.ch/programmes/pll/hlt/hlt_index.html

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Private Organizations Web Sites

Medscape: (CME credit available)
http://www5.medscape.com/default.mhtml
Annual Review of Public Health
http://www.annurev.org/series/pubhelth/pubhelth.htm
Physicians' Choice
http://www.mdchoice.com/
Physicians' Online Network
http://www.po.com/

Further reading:

Being Digital, Nicholas Negroponte (Alfred A. Knopf, 1995)
Civilizing Cyberspace: Policy, Power, and the Information Superhighway, Steven E. Miller (Addison Wesley, 1996)
New Community Networks: Wiredfor Change, Douglas Schuler (Addison Wesley, 1996)
The Road Ahead, Bill Gates, with Nathan Myhrvold and Peter Rinearson (Viking Press, 1995)

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