

Outpatient Practice Management Tips

Practical Considerations to Influenza Vaccination

Kenneth A. Musana, MD, *Department of Internal Medicine, Marshfield Clinic, Marshfield, Wisconsin*
Steven H. Yale, MD, *Department of Internal Medicine, Marshfield Clinic, and Clinical Research Center, Marshfield Clinic Research Foundation, Marshfield, Wisconsin*
Joseph J. Mazza, MD, *Department of Hematology/Oncology, Marshfield Clinic, Marshfield, Wisconsin*
Kurt D. Reed, MD, *Department of Pathology, Marshfield Clinic, and Clinical Research Center, Marshfield Clinic Research Foundation, Marshfield, Wisconsin*

REPRINT REQUESTS:

Steven H. Yale, MD
Department of Internal Medicine
Marshfield Clinic
1000 North Oak Avenue
Marshfield, WI 54449
Telephone: 715-387-5436
Fax: 715-389-3808
Email: yale.steven@mcrf.mfldclin.edu

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A significant proportion of the United States population would benefit from receiving the annual influenza vaccination. Each fall many health care providers are unclear regarding indications, adverse effects, contraindications to and evidence supporting the efficacy (production of protective antibodies) and effectiveness (prevention of infection) of the influenza vaccine. When there is limited availability of the vaccine, these questions become even more important. Thus, the vaccination must first target those individuals who are at risk of acquiring, transmitting, or developing complications from the disease. Four primary groups should be the first to receive the vaccine (table 1). These groups can best be remembered by the mnemonic FLU-A and include:

- F Facilities:** nursing homes or other long-term care facilities.
- L Likelihood of transmitting influenza to others at high risk:** young or elderly individuals with an underlying medical condition that puts them at risk, health care providers, employees in assisted living and other residential facilities, individuals living with a person who is part of a high risk group, etc.
- U Underlying medical conditions:** diabetes mellitus, chronic heart or lung disease, pregnancy, cancer, etc.
- A Age:** elderly (≥ 65 years) or children (6 to 23 months).

Adverse effects of and contraindications to the influenza vaccine

The inactivated vaccine should not be administered to persons known to have anaphylactic hypersensitivity to eggs or other components of the vaccine. A person with an acute febrile illness should not be vaccinated until their symptoms have resolved. Minor illness with or without fever is not a contraindication to administering the influenza vaccine, especially among children with mild upper respiratory tract infections or allergic rhinitis.

Among adults, the most frequent side effect of the vaccine is soreness at the vaccination site, affecting 10% to 64% of patients, and usually lasting less than 2 days.¹⁻³ Systemic side effects including fever, malaise, and myalgias can occur, especially in those who have had no prior exposure to the influenza virus antigens in the vaccine. These reactions may begin between 6 to 12 hours following vaccination and can last between 1 to 2 days. The inactivated influenza vaccine contains noninfectious, killed viruses and does not cause influenza. Coincidental respiratory illnesses are oftentimes incorrectly attributed to the vaccine.

Table 1. Target therapy for annual influenza virus vaccination.

Persons at high risk for complications from influenza	Persons at risk of transmitting influenza to susceptible individuals at risk
65 years and older	Anyone (including children >6 months old) who lives with someone in a high-risk group
Nursing home and other long-term care facility residents	Health care providers
Adults and children >6 months old with chronic heart or lung conditions, including asthma	Nursing home and long-term care facility employees who have contact with patients or residents
Adults and children >6 months old who require regular medical care or were in a hospital during the previous year because of a chronic metabolic disease (e.g., diabetes), chronic kidney disease, or immunosuppression (e.g., HIV infection)	Employees in assisted living and other residences for people in high-risk groups
Children (6 months to 18 years) on long-term aspirin therapy (risk of Reye's syndrome if given aspirin when they have influenza)	Anyone who provides care to those in high-risk groups (including children <2 years)
Women who will be pregnant during the influenza season	
All children 6 to 23 months of age	

HIV, Human immunodeficiency virus

Less information from published studies is available for children compared with adults. However, there have been no reported increases in asthma exacerbations⁴ and no increased risks of complications during the 2 weeks after administration in children receiving the inactivated influenza vaccination compared with controls.⁵

The live attenuated vaccine (FluMist[®]) is generally safe in adults. Runny nose or nasal congestion (28% to 78%), headache (16% to 44%), and sore throat (15% to 27%) are the most common reported side effects.⁶ In children, signs and symptoms that are reported more often among vaccinated recipients than controls included runny nose or nasal congestion (20% to 75%), headache (2% to 46%), vomiting (3% to 13%), abdominal pain (2%) and myalgias (0% to 21%). These symptoms are associated with the administration of the first dose and are self-limited. The live attenuated vaccine is not approved for use in children between the ages of 12 to 59 months because of possible concerns related to an increase in the risk of asthma or reactive airway disease.⁷

Co-administration of the influenza vaccine

The influenza vaccine is administered in the deltoid muscle of adults and the anterolateral thigh of infants and toddlers. The inactivated vaccine can be given with the pneumococcal vaccine in persons aged 50 years or older who have medical conditions that indicate the need for pneumococcal prophylaxis, such as immunocompromised individuals or those with asplenia. This combination is given as long as the

vaccine is administered at separate anatomical sites and different syringes are used. Persons aged 65 years or older should receive a second pneumococcal vaccine if they have not been vaccinated in the past 5 years.

The live attenuated vaccine should not be given in conjunction with other vaccinations or in patients who are immune suppressed, e.g., individuals receiving corticosteroids, chemotherapy, or having a diagnosis of an immune deficiency syndrome. Furthermore, at least 2 weeks should elapse before administering an inactivated vaccine after administration of the live attenuated influenza vaccine, and 4 weeks should elapse before administering another live vaccine.

Evidence of the efficacy and effectiveness of the influenza vaccination

It is important to understand and evaluate both the efficacy and effectiveness of the influenza vaccination in preventing influenza infection in high-risk groups. Efficacy studies provide information on whether patients develop an appropriate immunologic response to the antigen (vaccine). However, this endpoint alone is insufficient since subjects may have a suboptimal clinical response to the vaccine despite having an immunologic response to the vaccine virus strain. Effectiveness studies are needed to determine the preventative effects of the vaccination against the influenza infection. The effectiveness of the inactivated influenza vaccine depends primarily on the immunocompetence of the vaccine recipient and the degree of similarity between the

antigens in the vaccine and virus circulating within the community.⁸ Using endpoints such as clinical symptoms and findings at presentation, or need for hospitalization in patients who received the vaccine frequently result in an over-diagnosis of influenza, since a variety of infectious agents can cause clinical signs and symptoms indistinguishable from influenza infection.

In healthy children, the efficacy (immunogenicity) of the inactivated and live attenuated influenza vaccine exceeds 80%.^{9,10} In healthy adults, the efficacy of the inactivated vaccine exceeds 87%,¹¹ although results vary between studies. The majority of vaccinated children, including those with chronic lung and congenital heart disease, develop high post-vaccination hemagglutination inhibition antibody titers.^{12,13} Dorrell and colleagues⁸ administered the inactivated influenza vaccine to 34 healthy volunteers, 29 with either insulin or non-insulin dependent diabetes, and 14 with obstructive airway diseases, 30 elderly persons, and 49 HIV-infected persons and reported the efficacy of the vaccine to be 58.8%, 44.8%, 35.7%, 33.3%, and 26.5%, respectively.

It has been reported that the effectiveness of the inactivated influenza vaccine against laboratory-confirmed cases among healthy adults aged <65 years is in the 70% to 90% range during years when the vaccine and circulating strains of virus are well matched.^{1,14} A randomized, double-blinded, placebo-controlled trial which included 4,561 healthy, working adults aged 18 to 64 years revealed that this vaccine significantly reduced the numbers of severe febrile illnesses, febrile upper respiratory tract illnesses, days of illness, days of work lost, and health care provider visits.⁶

The Centers for Disease Control and Prevention and Kaiser Permanente retrospectively evaluated the effectiveness of the inactivated influenza vaccine in 5,139 children aged 6 to 23 months in the Denver area during the 2003-2004 influenza season. Despite the suboptimal match between the predominant influenza A virus strain circulating that season and the vaccine strains, when fully-vaccinated children (e.g., those who received both doses of vaccine) were compared with non-vaccinated children, the vaccine effectiveness or protection against influenza-like illness and pneumonia, and influenza was approximately 25% ($p=0.052$) and 49% ($p=0.022$), respectively. When partially vaccinated children were compared with unvaccinated children, no statistically significant reduction in influenza-like illness or pneumonia, and influenza was observed. Among adults aged 50 to 64 years (304 cases and 1,055 controls) vaccine effectiveness was estimated at 52% for those without a high-risk condition and 38% for those with high-risk conditions.¹⁵

It should be noted that in most studies that have reportedly evaluated the effectiveness of the influenza vaccine, accurate molecular and microbiologic testing for positive identification of the influenza virus were not performed. Furthermore, studies that have used febrile illnesses, febrile

upper respiratory tract illnesses, pneumonia, hospitalization or death without attempting to confirm whether the influenza virus was present do not specifically address the question of whether the vaccine prevents the development of the disease. Therefore, these studies do not provide accurate incidence data on influenza virus infection and the effectiveness of the vaccine.

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